TWENTY-EIGHTH ANNUAL REPORT

OF THE

New York State Museum of Natural History,

BY

THE REGENTS OF THE UNIVERSITY

OF THE

STATE OF NEW YORK.

[EX-OFFICIO TRUSTEES OF THE MUSEUM.]

STATE MUSEUM EDITION.

TRANSMITTED TO THE LEGISLATURE MARCH 30, 1875.

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IN SENATE,

March 30, 1875.

TWENTY-EIGHTH ANNUAL REPORT

ON THE STATE MUSEUM OF NATURAL HISTORY, BY THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK.

University of the State of New York:
Office of the Regents,
Albany, *March* 30, 1875.

To the Hon. William Dorsheimer,

President of the Senate.

Sir — I have the honor to transmit the Twenty-eighth Annual Report on the State Museum of Natural History, by the Regents of the University.

I remain, very respectfully,

Your obedient servant,

JOHN V. L. PRUYN,

Chancellor of the University

REPORT.

To the Honorable the Legislature of the State of New York:

The Regents of the University, as trustees of the State Museum of Natural History, respectfully submit this their Twenty-eighth Annual Report:

The report of the Director of the Museum herewith communicated, shows the work of the last year and the present condition of the Museum. From this it will appear that valuable additions have been made, and that the plan of arrangement has been very decidedly advanced.

The Museum has increased beyond the capacity of the building. Many parts are greatly crowded and it is difficult properly to exhibit some of the most valuable collections. This embarrassment will continue and increase until more ample room is provided, for a museum of natural history, in the nature of things, can never be stationary. New objects of interest will be discovered, and these must be preserved and exhibited.

The report of the Botanist shows that he has prosecuted his work with the zeal of a true naturalist, and that he has been rewarded by the discovery of many species hitherto undescribed. He has literally added to the stores of botanical knowledge.

The object of the museum is to gather and exhibit objects which illustrate the natural history of the state, and to publish the results of investigations made in the different departments of science indicated by its designation, and is worthy of liberal provision by a great State. It is commended to the continued confidence of the legislature.

Respectfully submitted in behalf of the Regents.

JOHN V. L. PRUYN,
Chancellor.

S. B. WOOLWORTH,
Secretary.

REPORT ON THE STATE MUSEUM.

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PREFATORY NOTE

TO THE

STATE MUSEUM EDITION OF THE 28TH REPORT.

[This report was originally communicated to the Legislature in 1875, and printed as a Legislative Document in 1876.]

The reports of the State Museum of Natural History, with the accompanying scientific papers, are communicated to the board of Regents of the University in the month of January of each year, and by the Chancellor of the board are transmitted to the Legislature of that year. All the reports thus transmitted are printed to the number of 800 copies, as State documents ; any greater number are printed only on special order or resolution of the Legislature, and it had so happened that no such order was given regarding the 27th, 28th, 29th and 30th reports, which were printed only as documents in the regular course of State printing.

In 1878, a special appropriation was made (chapter 252 of Laws of 1878,) for printing the usual Museum edition of the reports above-named, together with additional matter to be included in the 28th and 30th reports.

The present report, in addition to the matter contained in the Documentary edition, includes descriptions of all the species of fossils illustrated on plates 3-34 inclusive, with some revision of the nomenclature of the species: also, pages 205–210, with plates 35–37 in illustration. The 30th report contains additional matter from page 117 to page 256 inclusive.

ALBANY, *December*, 1879.

REPORT OF THE DIRECTOR.

Albany, *January* 9, 1875.

To the Honorable the Board of Regents of the University of the State of New York:

Gentlemen :

I have the honor to present herewith the Annual Report upon the condition of the collections in the State Museum of Natural History ; the additions thereto by collection through its officers ; by purchase and donation ; and a statement of the work done in the Museum.

The collections in the several departments are all in good order, and the re-arrangement of some portions, referred to in my Report of last year, is now going on, and we hope within a few months to have all the material in such order that new catalogues of the Museum Collections may be commenced.

I must again call your attention to the want of space for the proper arrangement of the New York Palæozoic fossils ; and likewise to the necessity of immediate provision of more room for the arrangement of the Zoölogical collections. We are at the present time entirely unable to find place in the cases for the recent additions ; and place for other specimens will soon be required.

In regard to the need of more accommodation in the different departments, and the want of working rooms, I might repeat essentially what I stated in my Report of last year,—though in one or two points there is an improvement, as will appear further on.

The present condition of the Museum, with its constantly accumulating collections, and the want of space in nearly every direction, demands from the Trustees their especial attention. While we desire to perform our duty both to the scientific world and to the general public, we cannot satisfy the demands of the latter without provision for the exhibition of material which is constantly increasing on our hands, and which ought to be placed on exhibition in proper cases.

By the authorization of the Commissioners of the Land Office — the custodians of the building — some changes have been made in the interior arrangement of the Director's Room, which were really indispensable for the preservation of the valuable Botanical collection. The new cases for this collection, constructed two years ago, were then located in what appeared as the only available space: but it was found to be too near the heated wall and the register of the furnace; and these, with two other cases formerly containing the entire Herbarium, have been removed to the west side of the room, and a small addition made to fill the space. The cases of the Herbarium now occupy the entire west side of the room; and besides presenting a far better appearance, afford greater facilities for the arrangement and examination of the collections.

The Library cases now occupy the south side of the room; and a case used for the reception of miscellaneous objects of natural history has replaced the botanical cases in the north-east corner of the apartment. I believe that the present arrangement will commend itself to the Trustees as in every way the most appropriate which, under the circumstances, can be devised.

The Economic Collection — building-stones and marbles — remains essentially as previously reported, with few additions during the past year, and scarcely any room for the display of further contributions.

On the First Foor, additional representation of the fauna of the Potsdam Sandstone period has been made, in some large slabs containing *Lingulepis pinnaformis* (Owen), etc., from collections by the Director at the Falls of St. Croix, Minn., in 1850 and in 1865.

Some other additions have been made to the Palæontological series, mainly from the materials of the Gebhard collection, which have passed under review, either in the preparation of the Palæontology of N. Y., or in the distribution of duplicate specimens to the Institutions of the State, as provided by law.

In the table-cases devoted to the Lithological series, fifty-one species of fossils of the lower carboniferous limestone from Missouri, Indiana and Illinois have been arranged, and thirty species of fossils of the coal measures, mainly from Illinois and Kentucky. These are temporarily placed here, until a more suitable place may be provided.

The relabeling of the Lithological series, with the identification and designation of the specimens collected during the early geological survey of the state, has been continued and extended over the new red sandstones, drift specimens, sands, clays, marls, peat and tufas. There now remain of these rocks, to be relabeled only the specimens belonging to the Trenton group. The labeling of the Laurentian group is not perfectly satisfactory and will need to be revised.

The material of the quaternary period, contained in the wall-cases, has been re-arranged in proper grouping and order of succession.

In the wall-cases of the Helderberg group, have been added among a number of others the following: an unusually large specimen of *Favosites conica* Hall, and several large fossiliferous slabs from the Gebhard collection, viz., three of the Upper Pentamerus Limestone, five of Oriskany Sandstone, and three of the Hamilton group.

On the second floor the re-arranging and relabeling of the Eocene fossils from the Paris basin, and of the American Eocene and Cretaceous fossils, which was in progress at the date of the last report, has been completed during the past year. In one of the cases containing these, a small collection of Post Pleiocene fossils from the Champlain Valley, has been arranged and labeled.

Several large and very fine blocks of Calcite from the Gebhard collection, satin-spar and other cave-forms have been placed in the mineralogical collection.

The collection of New York Minerals located on this floor, has long been in a condition discreditable to the Museum. While other departments have presented a steady if not rapid progress, this has been allowed to remain very nearly in the condition in which it was left more than twenty-five years ago. A few valuable additions had been made to it from purchased collections, and specimens donated by friends of the Museum had been incorporated with it, without always adding to its value. In the report of the Director given last year, some improvements in the arrangement of this collection were noted. Provision has now been made for the entire revision and relabeling of the collection. The services of Prof. Chester, of Hamilton college, have been secured for the work, and considerable progress has already been made.

As the more economical method the minerals are taken from the shelves, packed and forwarded to Prof. Chester, at Clinton. Nine boxes containing about eight hundred specimens, have been sent to him, which are already labeled, arranged and returned to the Museum.

From the want of time consequent on the necessity of preparing the Duplicate collections for distribution, in compliance with the repeated calls from various quarters for these collections, the returned Minerals have not yet been placed on the shelves.

So numerous are the demands continually made upon all connected with the Museum, both for legitimate Museum duties, and to meet the various requirements made by individuals, by the educational Institutions of the State, and by scientists throughout the United States, that it often becomes a perplexing task for the Director to determine to which apparently imperative duty claiming immediate attention, shall be given precedence. Under this condition of things — with means wholly inadequate to the requirements — much important work must be left, at least for the time, undone.

In one of the temporary Table-cases of the second floor, a collection of over four hundred clay-stones from the Gebhard collection, has been arranged. These, with several hundred more, were collected, during a period of many years, from a single locality on Foxes creek, at Schoharie, N. Y. They are interesting for study, displaying lines of stratification and other features, by the aid of which large series of them can be definitely grouped and referred to the corresponding strata in the clay beds, where their strange and often beautiful forms were developed.

Through the expenditure authorized by the Commissioners of the Land Office, a greatly needed requirement of the Museum, viz., a working-room on each floor, has been in part supplied. Hitherto whenever extensive examination, comparison or relabeling of any of the material of the collections were required, it was necessary to carry it down one, two, three or four stair ways to the director's room or to the hall below, incurring, in transit, in addition to the labor involved, the risk of displacement of labels, and by a single misstep, an irreparable injury to the more fragile zoölogical specimens.

With some iron-railing, which had formerly been in use in the Museum, an inclosure of nine feet by twenty-three has been constructed on the central portion of this floor. Upon the rails, a wire netting is carried up to a sufficient height to give protection to whatever material may be under examination or preparation on the tables within. Three sides of the inclosure are occupied with the tables, giving seventy-eight square feet of area, and beneath one of them sixty drawers are arranged, having an area of one hundred and sixty-five square feet.

Until this room was provided, it was impracticable to undertake the long contemplated revision of the North American land and fresh-water shells, which will now be proceeded with as soon as the services of Dr. Lewis can be obtained.

On the Third Floor, valuable additions have been made to the alcoholic collection of Echino dermata, Mollusca, Crustacea and Pisces, through collections made at Cape Cod Bay and Penikese Island, by the Director and Mr. C. E. Hall, which will be found recorded in their proper place. Several of the species were obtained in sufficient quantity to afford numerous duplicate specimens for exchanges.

Several dissections of *Lepas fascicularis*, exhibiting both the outer and inner surfaces of the carina, the terga, and the scuta, have been arranged among the New York Crustaceans in the case of Invertebrata; also groups of individuals attached to sea-weeds, with their filamentary appendages finely shown.

The annual appropriation for the special increase of the Zoölogical collection, which we received for several years, having been withheld the past year, I am unable to report any extensive additions to the skeletons of the New York Vertebrata. Some preparations of the foot-bones of Mammals and Birds have been made and mounted by Dr. J. W. Hall, Assistant in the Museum, and placed in the collection; and the series of skulls has been re-labeled.

An addition, of some interest, to the stuffed skins of the New York Mammalia, is that of an Albino Mink, which was killed in a barn near Greenbush, N. Y.

A very interesting addition to the collections of this floor is a specimen of the Horse-Mackerel, American Tunny (*Orcynus secundi-dorsalis* Storer), of which I was so fortunate, during a short sojourn on the sea-coast last summer, as to procure three specimens which had become stranded in a fish-wier in Cape Cod Bay. The largest of these, an unusually large individual, measuring nine feet and four inches in length, has been stuffed and mounted by Prof. Ward of Rochester, and is now in position over the case containing the alcoholic collection of New York fishes.* The skeleton of another is in course of preparation, and will soon be received at the Museum, while the skin of the third specimen is in preparation by Mr. J. Wallace, of New York.

These specimens are a valuable acquisition to the collections. The estimated weight of the Museum specimen was eight hundred pounds. This fish is known on the American coast from Newfoundland to Florida. In Massachusetts Bay it is called Horse-Mackerel, and in Rhode Island and elsewhere it is known as Albicore or Albricore. It was for a long time supposed to be identical with the Tunny of Europe (*Thynnus vulgaris*), which occurs often in immense numbers

* It has since been removed to the large wall-case containing the skeletons of Mammalia and the larger stuffed Fishes.

in the Mediterranean sea. It was referred to this species by De Kay, but has since been found to be distinct.

A list in detail of the additions and their source, in each one of the Departments of the Museum, will be found appended to this Report.

ADDITIONS TO THE MUSEUM BY DONATION.

To the Zoölogical department, donations are recorded from twenty-six individuals and Institutions of about one hundred and ten distinct lots of specimens.

To the Botanical department, donations have been received from twenty-six sources.

To the Geological, Mineralogical, and Palæontological departments, seventeen donors.

To the Archæological and Ethnological department, six donors.

To the Library fifteen individuals and societies have made donations (to some of these Museum Reports had been sent and contributions were received in return), adding to the Library twenty-one pamphlets and three bound volumes.

The whole number of contributors to the several departments during the year is ninety.

GENERAL WORK OF THE MUSEUM.

During the past year, the Assistants in the Museum have been faithfully engaged in the work allotted to them.

Mr. Callaway, who had been specially employed in the work of selecting and labeling the duplicate fossils for distribution, left the Museum on the first of June on account of the failure of the appropriation to continue his salary beyond that time.

The regular work of distribution of duplicate specimens was continued till May, when the large room in the Agricultural department, which we had been permitted to use, was required for other purposes. The distribution has since been carried on at intervals and so far as facilities permitted.

The collections ordered, by the several laws of the State, for distribution to Institutions of learning, have been, so far as finished, packed in boxes, and are ready to be sent to their destination. Those for the Syracuse University have already been sent forward, in accordance with an expressed wish of the Chancellor of that Institution.

In making the distribution into the series required, there were certain species of fossils and minerals in greater number than needed for the authorized sets. These have been distributed in series; some of them running to twenty sets; so that we have a number of smaller sets of specimens, which would be of great use for instruction in the Normal Schools of the State. One of these collections has already been sent to the Oswego Normal and Training School, and has proved very acceptable to the Principal and the Professor of Natural Sciences of that Institution.

I would recommend that the Board of Regents take some action regarding this matter, and if necessary secure authority for the distribution of these collections to proper Institutions. I venture to make this suggestion in view of the frequent applications from persons to have collections of fossils and minerals sent by the Museum to schools and scientific societies.

The Economic collection of Iron ores on the first floor has been re-arranged and relabeled.

Some additions have been made by Mr. Lintner to the Invertebrate collection, illustrating the different stages of insect life and architecture; a list of which will be found among the additions to the collections.

The alcoholic collection has been much improved in condition and appearance by the substitution of new glass jars which have been specially made of a size and form adapted to the wants of the collection.

A list of fossils described in the Annual Reports of the State Museum, up to the twenty-sixth report, comprising over 1,200 species, has been prepared for publication, and will appear as soon as a general and synonymic revision can be given to the work.

Mr. Andrew Sherwood, with the assistance of his brother Mr. Clark Sherwood, has continued the investigations in the Chemung group and Catskill mountain formation. At the same time, they have made extensive collections of the rocks and fossils, which have been received at the Museum.

The field-work has been essentially completed, and Mr. Sherwood has been for some time engaged in the preparation of the map and sections. This work was originally undertaken with a view of tracing more accurately the limits of the several formations in the southern counties of the State, a work which could not be satisfactorily accomplished during the original geological survey. On several occasions questions had arisen regarding the existence of certain formations within the limits of the State; and in the report on the State Cabinet of 1862, the curator (E. Jewett) stated that from the observations of himself and others, the Old Red sandstone or the Catskill formation, did not occur within the State of New York.

A review of the ground during the following year (1863) convinced me that the observations on which this conclusion was based, had been conducted along the line of an eroded anticlinal valley; and that the red rock of the Catskill formation occupied the higher portions of the country on either side. Having made geological sections across this part of the country in 1844, I saw nothing on this review to conflict with the observations made at that time; but as the lines of section had been carried southward from the Mohawk, they had extended only to the higher portions of country in the range of the Catskills; and these elevated outcrops, of which several are visible on looking from the north, proved to be, as I had before asserted, synclinals, preserving the red shales and sandstones in their upper members. This structure, however, left the broader valleys exhibiting the outcropping edges of the strata of the Chemung and Portage groups, which are here not separable from each other by any well marked limitation of either lithological or palæontological evidence.

It became apparent, therefore, that no true representation of these strata could be made upon a map, without first having a careful survey of the country, and tracing and locating the outcrops upon township-plats, the best means at our disposal, and then combining the whole on a larger map.

A visit to the Catskill mountains in 1857, also satisfied me that the higher part of the range on the south of the Clove (and to some extent on the north of this gorge) was composed of higher rocks than those referred to the Catskill or Old Red sandstone, which latter had been first recognized near Blossburg in the northern part of Pennsylvania, by its numerous remains of Holoptychius.

Therefore, while we had sufficient evidence of the occurrence of old red sandstone in the Catskill mountain range, we had not that knowledge which was requisite for its proper and satisfactory illustration upon a geological map. In order to set at rest this question and to be able to present the real expression of this formation upon a map of the State, Mr. Sherwood was employed to carry out the proposed investigation.

I may mention a few of the general results. The red sandstone or Catskill formation, has been traced from its wider extension in Pennsylvania northward into New York, at several points along the border to the west of the Catskill range. The same rocks have been traced in several synclinals far into the State, in Greene and Chenango counties. On the eastern face of the Catskills, in the gorge known as the Clove, the same beds have been recognized charged with the remains of Holoptychius, similar to those of the beds near Blossburgh, Pa., and elsewhere.

These red shaly and marly beds, in alternations with sandstone of more than 200 feet in thickness, carry these Ichthyic remains in the form of fragments of bony plates, scales, etc., and remind one strongly of the same beds on the northern outcrop of the formation in Tioga county, Pennsylvania.

We have had for some time a nearly entire form of Holop tychius in the collections of the State Museum, from Delaware county, and specimens of scales from the same region.

Not only do we find these fish-beds so well marked in the eastern outcrop, but we see the red beds passing upward into mottled gray, and generally succeeded by sandstone and conglomerate in alternating beds, the coarser materials increasing as we ascend, until the higher part of the mountain becomes chiefly composed of gray sandstone and conglomerate—the highest exposure giving us 440 feet of coarse gray sandstone and conglomerate to the summit of Round Top.

On comparison of observation elsewhere made, it seems pretty well determined that at least the upper 900 feet of the Catskill mountains consist of strata belonging to a higher member of the series, No. X, or the Vespertine formation of the Pennsylvania Survey.

It has also been ascertained, that in addition to the occurrence of this formation in the Catskill mountain region and in the synclinals extending thence to the southwest, it occurs in two other synclinals in the western part of Delaware county; and we shall probably be able to show that it extends into the State of New York, at one or more points in the south-western counties, where it is underlaid by the Catskill formation.

In the eastern part of the State there are no strong lines of demarcation between the formations, such as may be recognized in its central portion and elsewhere. Bands of red rock occur at the horizon of the Portage group; and in my report of last year I communicated the fact that a band of gray sandstones with characteristic Chemung fossils, had been found at a point 150 feet above the base of the red rocks which were essentially non-fossiliferous, and which had heretofore been referred to the Catskill formation.

The section measured from Palenville, in Greene county, to the top of Round Top Mountain, gives an entire thickness of nearly 3,800 feet; the fish remains beginning at a point sixty-two feet above the base of section, and continuing for over two hundred feet; there being still 3,500 feet of rock without recognized fossils.

Prof. H. D. Rogers has given the maximum thickness of Formation IX (the Catskill formation) at 6,000 feet; while its average thickness along the Alleghany mountains is given at 2,000 feet. The maximum thickness of No. X (the Vespertine) as given by the same author, is 2,000 feet.

It will require further examination of the series in the region of the southern part of the Catskill mountains, to determine a satisfactory line of demarcation between the two formations. The question, however, of the outer limits and extension of the Catskill formation in the State of New York, has been essentially determined by this investigation.

In conclusion, I would beg leave to repeat what I said in my Report of last year, viz.: that it is quite time that similar careful investigations should be commenced in other parts of the State, and especially along the junction of the Lower fossiliferous rocks with the crystalline formations; and also among the crystalline formations themselves, of which we know very little beyond their general geographical distribution and exterior limitation.

I am, very respectfully,
Your obd't servant,
JAMES HALL.

ADDITIONS TO THE STATE MUSEUM

DURING THE YEAR 1874.

I. ZOÖLOGICAL.

I. By Donation.

Ophioglypha bullata Wyville Thomson, dredged May 27, 1873, from 2,650 fathoms, bottom gray ooze. Lat. 34° 51′ N.: Long. 63° 59′ W.

Caryophillia borealis var. and *Deltocyathus Agassizi* Pourtales, dredged, together with about sixty other specimens mostly in the living condition, from 1,090 fathoms, July 10, 1873. Lat. 37° 26′ N.: Long. 25° 14′ W.

Sand, composed of larger Foraminifera, Orbulina, etc., from 60 fathoms. St. Jago, Cape Verdes.

Material from dredge, Sept. 9, 1873, Lat. 8° 37′ S.: Long. 34° 28′ W. 615 fathoms.

Sounding, Feb. 26, 1873, Lat. 23° 23′ N.: Long. 35° 10′ W. 3,150 fathoms.

Sounding, Sept. 30, 1873, Lat. 20° 13′ S.: Long. 35° 19′ W. 2,150 fathoms.

Sounding, Oct. 11, 1873, Lat. 35° 41′ S.: Long. 20° 55′ W. 2,025 fathoms.

Sounding, Oct. 23, 1873, Lat. 35° 59′ S.: Long. 1° 34′ E. 2,550 fathoms.

Sounding, Oct. 25, 1873, Lat. 36° 22′ S.: Long. 8° 12′ E. 2,650 fathoms.

Sounding, Oct. 28, 1873, Lat. 35° 0′ S.: Long, 17° 57′ E. 1,250 fathoms.

From H. N. Mosely, of H. M. ship Challenger, through Hon John A. Dix.

An albino mink — *Putorius vison* (Linn.). From G. C HALL, Greenbush, N. Y.

A red mouse — *Hesperomys Nuttalli* Baird (Mammals of America, p. 467). From IRA SAYLES, Canisteo, N. Y. Specimen captured in Christiansville, Mecklenburgh Co., Va.

A young specimen of the tawny meadow-mouse — *Arvicola rufescens* DeKay. From B. S. MESICK, Claverack, N. Y.

A violet-colored salamander — *Salamandra violacea* Barton. Specimens of queen-cells of the honey-bee *Apis mellifica*. From Rev. J. L. ZABRISKIE, New Baltimore, N. Y.

A hellgramite fly — *Corydalis cornuta* (Linn.). From HOWARD TREADWELL, Albany, N. Y.

A spectre bug — *Diapheromera femorata* (Say). September 4th. From BERNARD GLOECKNER, Albany, N. Y.

Two living dipterous "rat-tail" larvæ, probably *Eristalis* sp. July 23d. From C. L. G. BLESSING, Slingerlands, Albany Co., N. Y.

A scorpion brought from the South in paper-rags to C. Van Benthuysen & Sons. From J. WARREN CUTLER, Albany, N. Y.

A Luna moth — *Actias Luna* (Linn.), captured June 17th. From FRANK MUNSELL, Albany, N. Y.

A myriapod — *Cermatia forceps* Rafin. November 6th. From W. RYAN, Albany, N. Y.

A brook trout — *Salmo fontinalis* Mitch., weight 4½ lbs., length 20⅞ in., circumference at anterior portion of first dorsal fin, 12 inches. Captured in a pond in St. Lawrence Co., N. Y., emptying into Bog River near Graves Mountain. From W. W. HILL, Albany, N. Y.

Two specimens of the banded gar-fish — *Belone truncata* Lesueur, taken in the Hudson river, near the lock at Albany. From WILLIAM LEONARD and S. G. FISHER.

Specimens of *Teredo navalis* Linn., taken alive from the timbers of the U. S. frigate Congress, sunk by the Merrimac in Hampton Roads; also a polished section of the perforated timber. From WM. J. MCALPINE, Albany, N. Y.

A cat having the fore-legs only — a year old at its death. The skeleton added to the Museum collection. From WILLIAM W. DURFEE, Gloversville, N. Y.

A hoary bat — *Vespertilio pruinosus* Say. From VERPLANCK COLVIN, Albany, N. Y.

A pine grosbeak — *Pinicola enucleator* (Linn.), from flocks feeding on the berries of the mountain ash (*Pyrus Americana*), during November and December, in New Scotland, Albany county, N. Y. From JOHN S. MOAK, New Scotland.

An entozoön from a cat. From CHARLES DEVOL, M. D., Albany, N. Y.

A photograph of a muskalonge — *Esox estor* (Linn.), taken July 2, 1869, in the St. Lawrence river, near Clayton, N.Y., of the length of 4 feet 7½ inches, and circumference of 25¼ inches. From ELISHA W. HOPKINS, Little Falls, N. Y.*

Tusks, 6¾ inches in length, of a domestic hog — *Sus scrofa* Linn., ♀, killed at Cohoes, N. Y. From F. A. CLUTE, Schenectady, N. Y.

A piece of a bone, two inches in diameter, imbedded in the trunk of a hemlock tree, near its center, two feet below a branch, and forty-five feet from the ground, the trunk at the point having a diameter of twenty inches. Chittendon, Vt. From HENRY SPAWN, Albany, N. Y.

Skull, feet and leg bones, vertebræ and ribs, and skin of a Peccary. Lower jaw bones of a large Wolf. Skull of a Bear. Two skulls of Racoons. Opossum skull (not complete). Skeleton of a large Crane. Carapace and plastron of a Turtle. Teeth and bones of various animals. Fishes,

* Another muskalonge captured by Mr. Hopkins at the same locality, measured 4 feet 11½ inches in length, 27 inches in circumference, and weighed 42½ pounds.

Snakes, Horned toads, Turtles, Scorpions and Insects in alcohol, collected in Texas. From C. E. HALL, Albany, N. Y.

A dried toad (imperfect) — *Bufo Americanus* Le C. From RUTH M. TITUS, Preston Hollow, N. Y.

Ten skulls and three mounted feet of mammals and birds, as follows:

Vulpes fulvus Rich. Red Fox. Skull.
Felis domestica Linn. Domestic Cat. Skull.
Sciurus Hudsonicus Harl. Red Squirrel. Skull.
Sciurus Carolinensis Gm. Gray Squirrel. Skull.
Arctomys monax (Linn.). Woodchuck. Skull.
Fiber zibethicus Cuv. Muskrat. Skull.
Mus decumanus Pallas. Common Rat. Skull.
Lepus nanus Schr. Gray Rabbit. Skull.
Sus scrofa Linn. Domestic Hog. Foot.
Cervus Virginianus Penn. Red Deer. Foot.
Syrnium nebulosum Gray. Barred Owl. Skull.
Corvus Americanus Aud. Crow. Skull.
Meleagris gallopavo (Linn.). Domestic Turkey. Foot
From J. W. HALL and C. E. HALL, Albany, N. Y.

II. By Collection.

A horse mackerel — *Orcynus secundi-dorsalis* Storer — measuring 9 feet 9 inches in length. (The skin stuffed and mounted, and parts of the skeleton preserved.) Cape Cod Bay.

Skeleton of a horse mackerel. (Prepared and mounted by Prof. H. A. Ward, of Rochester, N. Y.) Cape Cod Bay.

Mactra solidissima Chemn., *Solen ensis* Linn., *Busycon canaliculata* (Linn.), and other shells from Cape Cod Bay and Penikese Island: in alcohol.

Collection of Prof. JAMES HALL.

Pandora trilineata Say, and *Loligo brevipinna* Lesu., from Penikese Island: in alcohol.

Libinia canaliculata Say (spider crab), *Cancer irroratus* Say (sand crab), and *Lepas fascicularis* Ell. and Soland, dried and in alcohol. Penikese Island.

Platyonichus ocellatus Herbst. sp., dried: *Asterias arenicola* Stimp., in alcohol. Buzzard's Bay.
Tautoga Americana, in alcohol. Penikese Island.
Collection of C. E. HALL, Albany, N. Y.

Specimens of insects and their operations:
Eggs of *Platysamia Cecropia* (Linn.), and of *Ixodes bovis*.
Larvæ of *Eacles imperialis* (Drury), young, and *Alypia octomaculata* (Fabr.).
Pupæ of *Orgyia leucostigma* (Sm.-Abb.), and *Datana ministra* (Drury).
Poplar-stem gall of *Pemphigus populicaulis* Fitch.
Cone-like spruce gall of *Adelges* ——— ?
Solidago gall of *Gelechia gallæsolidaginis* Riley.
Oak gall of *Hamadryas Bassetella* Clem.
Maple leaf cut by *Ornix acerifoliella* Fitch.
Burrows under cedar bark of *Hylurgus dentatus* Say.
Collection of J. A. LINTNER.

A whip snake, puff adder, corn snake, two water moccasins, pilot snake, a large tree lizard and several smaller ones of two species, sea and land birds, craw-fish and other crustaceans, and numerous insects. (Not yet arranged in the collections). Collection of J. W. HALL.

III. By Purchase.

Two walruses — *Trichicus rosmarus*, an adult female and young. Baffin's Bay.

II. BOTANICAL.

I. By Donation.

Section of a branch, with leaves and berries of *Celtis occidentalis* Linn. (hackberry), taken from the "unknown tree" on the N. Y. Central Railroad, near Spraker's Basin, 53 miles from Albany. From O. J. STAFFORD and E. H. VEDDER, Canajoharie, N. Y.

Section of a locust tree (*Gleditschia triacanthos* L.) with an imbedded thorn. Two species of Fungi. From Prof. JAMES HALL.

Specimen of *Cladastris tinctoria* — yellow-wood, from Kentucky.

A polished section of *Maclura aurantiaca* — Osage orange.

Specimens of *Platycerium alcicorne* Gaud. and *Cucurbitaria seriata* Pk. From C. DEVOL, M. D., Albany, N. Y.

Two species of Lichens. From Miss M. L. WILSON, Buffalo, N. Y.

A Fern and three species of Fungi. From Mrs. L. A. MILLINGTON, Glens Falls, N. Y.

Twenty species of southern Plants. From Mrs. E. E. ATWATER, Chicago, Ill.

Specimens of *Sedum reflexum* L. From Rev. H. WIBBE, Oswego, N. Y.

Six species of Fungi. From Rev. J. L. ZABRISKIE, New Baltimore, N. Y.

Two species of Fungi. From Prof. C. E. BESSEY, Ames, Iowa.

Five species of flowering Plants. From Prof. A. N. PRENTISS, Ithaca, N. Y.

Ten species of Plants, mostly Fungi. From E. C. HOWE, M. D., Yonkers, N. Y.

Two species of Lichens. From H. WILLEY, New Bedford, Mass.

Specimens of *Centaurea nigra* L. From R. KERSTING, Yonkers, N. Y.

Four species of Plants, three of them Fungi. From H. A. WARNE, Oneida, N. Y.

Specimens of *Habenaria leucophæa* Nutt. From E. L. HANKENSON, Newark, N. Y.

Eight species of Fungi. From W. R. GERARD, Poughkeepsie, N. Y.

Specimens of *Lygodium palmatum* Sw. From J. T. LOCKWOOD, Hunter, N. Y.

Three rare Carices and *Botrychium matricariæfolium* A. Br. From B. D. GILBERT, Utica, N. Y.

Specimens of *Amarantus spinosus* L. From M. RUGER, New York City.

Specimens of *Ustilago Montagnei* v. *major* Desm. From E. S. MILLER, Wading River, N. Y.

Forty-seven species of Fungi. From J. B. ELLIS, Newfield, N. J.

Twelve species of Plants. From C. F. AUSTIN, Closter, N. J.

Two species of Fungi. From C. C. PARRY, Davenport, Iowa.

Fourteen species of Plants. From T. M. PETERS, Moulton, Ala.

Forty-five species of Fungi. From Hon. G. W. CLINTON, Buffalo, N. Y.

II. By Exchange.

Thirty species of rare Flowering Plants. From J. M. CONGDON, East Greenwich, R. I.

III. By Collection.

One hundred and sixty species of Plants, mostly Fungi. By the Botanist, CHARLES H. PECK.

III. GEOLOGICAL AND MINERALOGICAL.

I. By Donation.

A block ($10\frac{1}{2}$x6x3) of sileceous Sandstone, sand rubbed with edges beveled. No. 160 in Economic collection. Fulton, Schoharie county, N. Y. From J. M. SCRIBNER, Middleburgh, N. Y.

Two slabs of Potsdam Sandstone, containing *Lingulepis pinnaformis* (Owen). From Falls of St. Croix, Minn. Collection of Prof. JAMES HALL in 1865.

A weathered block of Corniferous Limestone, containing numerous specimens of Spirifera, Orthis, Atrypa, Corals, etc. Collected for the Museum.

Spirifera———? from the Cauda-Galli Grit, near Cobleskill, N. Y. From CHARLES CALLAWAY, Albany, N. Y.

A rolled mass of calciferous Sandstone, with Fucoids weathered from its surface. From O. H. CROMWELL, Saratoga Springs, N. Y.

Conglomerate. Locality? From MICHAEL MILLER, Lansingburgh, N. Y.

A block of limestone bearing glacial scratches, taken from a well at No. 259 Central avenue, Albany, from a depth of 43 feet in the blue clay.

Three concretionary forms from a sand hill 40 feet below the surface. From L. R. BOYCE, M. D., Albany, N. Y.

Specimen of Espenhain's Hydraulic Cement rock. From E. ARMSTRONG, Fayetteville, N. Y.

A globular mass of Iron Pyrites from soil 47 feet beneath the surface, south of Park avenue, Albany. From JAMES BRIERTON, Albany, N. Y.

Two claystones of remarkable forms (imitative), from near the Albany Penitentiary. From J. M. NORTHRUP, Albany, N. Y.

Coal — Lignite, from Disco, Greenland, Lat. 69° 45′ N.: Long. 52° 20′ W. Juniata Expedition, 1873. From Prof. D. S. MARTIN, Rutgers Female College, New York.

A piece of Plymouth Rock. From HENRY HURDIC, Pittsburg, Penn.

Crystals of Calcite, and large cubic crystals of Iron Pyrites in mica slate, from Chittenden, Vt. From L. D. SMITH, West Winfield, Herkimer Co., N. Y.

Three specimens of Plumbago, from the Plumbago mine at Ticonderoga, N. Y. From Hon. ROBERT S. HALE, Elizabethtown, N. Y.

Specimens of Brazilian topaz. From Hon. ALEX. T. JOHNSON, Utica, N. Y.

A photograph of *Eurypterus Dekayi* Hall, from quarries of B. Miller & Son, Williamsville, N. Y., — the original in the Buffalo Society of Natural Sciences. From ED. B. MILLER.

Rose Quartz from Essex Co., N. Y.
Calciferous Sandstone, containing Ophileta. From H. H. INGOLSBE, S. Hartford, Washington Co., N. Y.

Cannel Coal from Ohio, containing plant remains. From AMASA J. PARKER, Jr., Albany, N. Y.

IV. ARCHÆOLOGICAL AND ETHNOLOGICAL.

By Donation.

An Indian skin-dresser. From H. H. INGOLSBE, South Hartford, Washington Co., N. Y.

An old hammer, bearing date of 1771. From DIEDERICH TREMPER, Valatie, N. Y.

A brick from the bake oven of Fort Ticonderoga. From J. W. CLEMANS, Albany, N. Y.

A perforated stone implement (aboriginal) found on Mr. Seely's farm at Cedar Hill. From R. J. HUBBS.

Three flint Indian arrow heads and a scraper, from Lake Co., Ill. From D. R. WILLIAMS.

Indian stone implements, flint arrow heads, Indian jaw, arm and leg bones. Collected in Texas. From C. E. HALL, Albany, N. Y.

V. TO THE LIBRARY.

I. By Donation.

Descriptions of Bryozoa and Corals of the Lower Helderberg Group. By James Hall. Published May, 1874, in advance of the 26th Report on the N. Y. State Museum of Natural History. 8vo., pp. 24.

Descriptions of New Species of Goniatitidæ. With a List of previously described species. By James Hall. Printed May, 1874, in advance of the 27th Annual Report on the N. Y. State Museum of Natural History. 8vo., 4 pp.

Report on the United States and Mexican Boundary Survey, by Wm. H. Emory. Vol. I, Part II, [comprising] Geological Reports of Dr. C. C. Parry and Assistant Arthur Schott.— Notes by Wm. H. Emory.— Palæontology and Geology of the Boundary, by James Hall.— Description of Cretaceous and Tertiary Fossils, by T. A. Conrad.— Washington, 1857. Quarto, pp. 174, plates 21. From Prof. JAMES HALL.

Annual Report of the Commissioner of Agriculture and Public Works for the Province of Ontario, on Agriculture and Arts, for the year 1872. Toronto, 1873. 8vo., pp. 511.

Catalogue of Minerals, with their Formulæ and Crystalline systems, prepared for the use of the Students of the School of Mines of Columbia College. By Thomas Egleston. New York, 1871. Pamph., 8vo., pp. 41. From the AUTHOR.

The Geological and Natural History Survey of Minnesota. The second annual report for the year 1873. Saint Paul, 1874. Pamph., 8vo, 219 pp. From Prof. N. H. WINCHELL, State Geologist.

Auditor of Accounts' Annual Report of the Receipts and Expenditures of the city of Boston and the county of Suffolk, State of Massachusetts, for the financial year 1873–74. Boston, 1874. From ALFRED T. TURNER, Auditor.

Fifth Annual Report of the Geological Survey of Indiana, made during the year 1873, by E. T. Cox, State Geologist, assisted by Prof. John Collett, Prof. W. W. Borden, and Dr. G. M. Levette. Indianapolis, 1874, 8vo, pp. 494 and 4 maps. From Dr. G. M. LEVETTE.

Sixth Annual Report of the Trustees of the Peabody Academy of Science, for the year 1873. Salem, 1874. Pamph., 8vo, pp. 114. From the ACADEMY.

Bulletin de la Société des Sciences Historiques et Naturelles de L'Yonne. Année 1873, 27e volume; Année 1874, 28e volume. Auxerre, 1873, 1874. From the SOCIETY.

Myriapoda Nova Americana, auctoribus A. Humbert et H. de Saussure.—Extrait de la Revue et Magasin de Zoölogie. (Mat 1870.) Pamph., 8vo., pp. 10. From the AUTHORS.

Carcinologiske Bidrag til Norges-Fauna af G. O. Sars. I. Monographi over de ved Norges Kyster forekommende Mysider. Andet Hefte. med 3 Pl. Christiania, 1872. Quarto, pp. 32.

Bidrag til Kundskaben om Christianiafjordens Fauna. III. Væsentlig udarbeidet efter Prof. Dr. M. Sars's efterladte Manuscripter ved G. O. Sars. Christiania, 1873. 8vo., pp. 88, plates 5.

On some Remarkable Forms of Animal Life, from the Great Deeps of the Norwegian Coast. I. Partly from Posthumous Manuscripts of the late Professor Dr. Michael Sars. By George Ossian Sars. With 6 copperplates. Christiana, 1872. Pamph., quarto, pp. 82.

From DET KONGELIGE NORSKE UNIVERSITET I CHRISTIANIA.

Bulletin de la Société Impériale des Naturalistes de Moscou. Année 1873. No. 2. Moscou, 1873. Pamph., 8vo. From the SOCIETY.

Bulletin du Jardin Impérial de Botanique de St. Pétersbourg. Tome I, Part II; Tome II, Parts I, II. St. Pétersbourg, 1872, 1873. Pamphlet, 8vo. From E. R. DE TRAUTVETTER, Director.

K. F. Köhler's Antiquarium in Leipzig. Catalog No. 256, 1874. Catalog No. 257, 1874. Two pamphs., 8vo., pp. 30, 90. From K. F. KÖHLER.

Les Cristalloïdes Complexes a sommet étiolé, par Le Cte. Leopold Hugo. Paris, 1872. Pamph., 8vo., pp. 24.

Essai sur la Géométrie des Cristalloïdes, par Le Cte. Léopold Hugo. Paris, 1873. Pamph., 8vo., pp. 20.

Une Réforme Géométrique. Introduction a la Géométrie descriptive des Cristalloïdes, par Le Cte. Leopold Hugo. Paris, 1874. Pamph., pp. xii+19.

From the AUTHOR.

Sitzungs-Berichte der naturwissenschaftlichen Gesellschaft Isis in Dresden. Jahrgang 1873, April – Decem. Jahrgang 1874, Jan. – Mch. From the SOCIETY.

II. By Purchase.

Traité de Paléontologie Végétale ou la Flore du Monde Primitif dans ses Rapports avec les Formations Géologiques et la Flore du Monde Actuel, par W. Ph. Schimper. Tome troisième. Paris, 1874. Atlas cinquième et sixième livraisons, avec les planches xci a cx. Quarto, Paris, 1874.

Spécies Général et Iconographie des Coquilles vivantes, comprenant la Collection du Muséum d'Histoire naturelle de Paris, Par L.-C. Kiener continué par le docteur P. Fischer. Famille des Turbinacées. Paris, 1873. 8vo., p. 128, plates 42.

The American Journal of Science and Arts. New Haven, Conn., 1874. Third series. Vols. VII and VIII.

The American Naturalist. Salem, Mass., 1874. Vol. VIII.

Bulletin of the Buffalo Society of Natural Sciences. Vol. I, No. 4; Vol. II, Nos. 1, 2 and 3. Buffalo, N. Y., 1874.

United States Railroad and Mining Register. Philadelphia, 1874. Vol. XVII. Folio.

Annual Record of Science and Industry for 1871. Edited by Spencer F. Baird. New York, 1872. 12mo.
Do. for 1872. New York, 1873.
Do. for 1873. New York, 1874.

Asher and Adams' New Statistical and Topographical Atlas of the United States. New York [1874]. Two vols., folio.

The Albany Directory for the year 1874. Albany, 1874.

ADDITIONS TO THE MUSEUM IN PREVIOUS YEARS OMITTED, AND CORRECTIONS TO FORMER REPORTS.

A porphyry axe, 7x3 inches (original number 17470) probably from northern Europe, presented to the State Cabinet during the Curatorship of E. Jewett, 1857-1865, by the Hon. W. DE REAASLOFF, Chargés d' Affaires of Denmark.

A piece of fossil wood, 18x8 inches, from California. From Hon. CHARLES P. DALY, N. Y.

In the 12th Report on the State Cabinet, p. 109, Benjamin Marsh, Esq., of Albany, is credited with a "section of a Petrified Tree from Arizona." A portion preserved (about three-fourths) of apparently, the original label of the specimens, bears the following:

This piece of petrified
from a Mining Claim, 350
surface of the earth at Bal
colony of Victoria, Australi
San Francisco, by Professor
Wizard, and presented to the
and by the proprietors of the
presented to W. C. Smith, Es

The specimen has accordingly been relabeled in accordance with the above record, as from Victoria, Australia.

In the 20th Annual Report on the State Cabinet, p. 388, line 4 of foot-note, the genus Syringothyris is inadvertently given as Lysingothyris.

In the 23d Annual Report the following corrections are to be made in the list of Echinodermata, pp. 22 and 23:

Page 22, line 34, for *Cropaster* read *Crossaster.*

Page 22, line 39, for *Stichaster albulus* read *Stephanasterias albula.*

Page 23, line 5, for *parnia* read *parma.*

Page 23, line 6, for *Desbachiensis* read *Dröbachiensis;* (recently referred by A. Agassiz to the genus Strongylocentrotus.)

In the 24th Annual Report on the State Museum, p. 24, in the donation credited to Hon. Ezra Cornell, the fossils recorded as *Spirifera Verneuili* Murch, should be *Spirifera mesastrialis* Hall.

In the 25th Annual Report, p. 19, in lines 11 and 12, for N.Y. read Vermont.

REPORT OF THE BOTANIST.

S. B. Woolworth, LL.D.,
Secretary of the Board of Regents of the University.

Sir — Since the date of my last report, specimens of one hundred and fifty species of plants have been mounted and placed in the Herbarium of the State Museum of Natural History, of which one hundred and thirty were not before represented therein. A list of the specimens mounted is marked (1).

Specimens have been collected in the counties of Albany, Dutchess, Fulton, Greene, Hamilton, Oswego, Rensselaer and Saratoga. These represent one hundred and sixty species new to the Herbarium, seventy of which are regarded as new or hitherto undescribed species. A list of the specimens collected is marked (2).

Specimens of fifty-six New York species, new to the Herbarium and not among my collections of the past season, have been contributed by or been obtained in naming specimens for correspondents. These added to the collected species make the whole number of additions two hundred and sixteen, a number considerably in excess of that for the previous year. A list of the contributors and their contributions is marked (3).

New species with their descriptions, previously unreported species, new stations of rare plants, etc., are given in a section marked (4).

CLASSIFIED TABULAR STATEMENT.

		New to the Herbarium.	New to science.
Plants collected,	Flowering plants.....	3	....
	Algæ................	3	....
	Fungi	154	70
Total...........................		160	70
Plants contributed,	Flowering plants...	5	....
	Mosses	2	....
	Lichens............	3	....
	Fungi	46	13
Total...........................		56	13
Collected and contributed		216	83

In my last report allusion was made to the fact that the spruce trees in some parts of the great northern wilderness, were said to be dying at an unusual rate as if affected by some fatal disease. In the absence of any personal knowledge of the circumstances or conditions attending the destruction of these trees, the attacks of fungi, the attacks of insects and the effects of drought were suggested as possible causes, chiefly for the purpose of directing the attention of those who might have the opportunity of an investigation, in such directions as seemed most likely to afford a satisfactory explanation of the mystery. It was then my impression that the trouble was of comparatively recent date and that it was possibly due to the modification of our climate by reason of the extensive and rapid denudation of our forest lands.

But I find that it is no new thing, that years ago lumbermen were fully aware of the pecuniary loss they were sustaining from this timber malady. Mr. Henry Hough, in answer to my inquiries, writes from Lewis county thus: "The dying of the spruce in this section has mostly, if not entirely, ceased. The greatest destruction on our territory was from ten to fifteen years ago." In Rensselaer county the same trouble was experienced about thirty years ago. A lumber firm found that their spruce timber was rapidly dying, and to make their loss as light as possible they made haste to open roads in the forest that they might draw out and work up as many dead spruces as practicable before decay should render them entirely worthless. But with all their promptness they suffered no inconsiderable loss, for these dead trees soon became too much decayed to make marketable lumber.

I have asked lumbermen and others who have been aware of the destruction of the spruces, what theory they held in respect to the cause of it. Their theories are various, but the most prevalent attribute it to excessive dry weather or to the agitation of the trees by high winds. The few observations that I have been able to make lead me to adopt a theory quite different from these, and though the discussion of it belongs rather to the province of the entomologists than of the botanists, such is the importance of the subject that I cannot withhold a brief account of my investigations and conclusions.

In August a collecting trip was undertaken in the vicinity of Lake Pleasant, Hamilton county. While there it became apparent to me that I was in a region where the spruces were dying. Standing near the outlet of the lake and looking upon the distant mountain slopes toward the north-east, east and south, patches of brown appeared here and there mingled with the usual dark green hue of the forest. The inhabitants told me that these brown patches were groups of dead spruces; that the spruce trees were then rapidly dying, and had been for two or three years previous, and that in consequence the value of the woodland was greatly diminishing. One of the most conspicuous of these brown patches was on the slope of Speculator Mountain, a little more than half way from the base to the summit. Preparations were therefore made to visit this locality. Once on the ground it needed but little observation to satisfy me that the destructive process was then in operation. The ground under some of the spruces was thickly strewn with their fallen leaves, yet green, and every agitating wind was bringing down more of them. The bark of these trees, and of others already dead, was perforated in many places with small round holes scarcely one-eighth of an inch in diameter. Upon stripping a piece of bark from the trunk of one of the affected trees, the apparent cause of the mischief was at once revealed. The surface of the wood and the inner layers of the bark were abundantly furrowed by the winding and branching galleries of a small bark-mining beetle, an insect known to entomologists as the *Hylurgus rufipennis* Kirby, though the wings are by no means always red, as the name would indicate. Both the mature insect and its larvæ occurred in countless numbers under the bark of the dying and recently dead trees. In a single instance they were accompanied by a much smaller beetle of similar shape and habits, the *Apate rufipennis* Kirby,* but the former is evidently the chief agent in this unprofitable business. These insects excavate their passages between the bark and the wood, eating away a part of both. Their extended work is, therefore, equivalent to a girdling of the tree. Their numerous galleries form an intricate network of furrows on all sides of the trunk, and traverse one of the most vital parts of the tree, the newly formed and forming layers of wood and bark. The furrows are shallow on the surface of the wood, rather more than half their diameter being in the bark, but their effect is to interrupt the circulation of the nutrient juices, and finally to destroy all vital action. The perforations in the bark, by admitting moisture, doubtless work more or less injury. The surface of the sapwood and the corresponding inner surface of the bark of living trees are discolored for a short space on both sides of the furrows, as if the injury exerted a poisonous or deadening influence on the tissues in its immediate vicinity. This was clearly seen in a tree which had been but slightly injured, there being but few furrows, and these merely longitudinal ones without lateral branches. Each occupied the center of a discolored stripe about half an inch broad, but which usually extended from two to four inches up and down beyond the extremities of the furrows. In another tree there were groups of furrows separated by considerable intervals, the central portions of which intervals had a whitish fresh appearance when the bark was first peeled, but after a few moments' exposure to the air the whole surface of the wood had changed to a dull, dead brown color, indicating a diseased or unnatural condition of the surface tissues. The foliage on this tree had not yet lost the green hue of life, but had commenced falling to the ground.

Small trees are rarely attacked. In the localities visited,

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* I am indebted to Messrs. *J. A. Lintner* and *J. L. Leconte* for the entomological names of these insects.

from one-half to two-thirds of the spruces with a basal diameter ranging from one to two feet were either dead or dying. Trees of this size are the most suitable for lumber and consequently the most valuable. The smallest affected tree noticed, had an estimated basal diameter of about ten inches. In this case the attack appeared to be a failure, for so much resin had oozed from the wounds that the work was obstructed. The galleries were scattered and single and their authors were found dead, each in its furrow. No larvæ were present, and the apparent attempt to establish a colony in this tree had thus far failed. But it may be that this tree had only been attacked for the purpose of obtaining food, and had not yet been brought into that sickly, languishing condition thought by some entomologists to be necessary to induce the establishment of a colony, the deposition of eggs and the development of larvæ. For it is said of *Scolytus destructor*, a bark-mining beetle that sometimes proves very destructive to elm trees in Europe, that the adult insects first attack healthy trees for the purpose of obtaining food, and when, by this means the vigor of the tree has become somewhat impaired, the female deposits her eggs in her galleries. Then the rapidly increasing numbers soon destroy the life of the tree.

When two trees of unequal size stand in close proximity the larger one seems to be most liable to be attacked. In one instance two trees stood scarcely more than three feet apart. The larger one had been attacked; the smaller remained unharmed. In another similar instance the larger of the two trees was dead, having been attacked first; the other was dying. Why this preference on the part of these insects for the largest trees? It may be that young trees are apt to be too resinous to be attacked successfully. In the case of the small tree already mentioned the gummy exudations from the perforations in the bark first attracted my attention. Or the insects may instinctively know that a tree with a large trunk presents a broader field for their operations than one with a small trunk; or possibly the vigor of the tree may be so impaired by age that it is more readily brought into suitable condition for the habitation of these parasites. Whatever the cause of this selection, no diseased condition of the trees was detected except that which was accompanied by and to all appearance was directly due to the insects themselves. Certainly if the tree is at all diseased before its attack, the insects must be exceedingly quick to detect it, else they could not be found in abundance in trees whose leaves are yet green and whose sapwood is yet fresh and moist, except where stained by their excavations.

In the vicinity of Lake Pleasant the affected trees are upon the mountain slopes or on dry ridges where the spruces are especially abundant. And we might naturally expect that the insects would be attracted to and carry on their depredation most extensively in those localities where the material on which they work is most abundant. In the valleys I saw no trees affected by them and yet they doubtless do carry on their destructive work in the low lands where spruces abound. I see no reason why they should not.

In some localities their ravages have already ceased. On the slopes of an elevation a few miles southwest from Speculator Mountain there are two groves of dead spruces. Many trees in both were examined and, though all the dead ones bore unmistakable marks of the former presence of the beetle, not one could now be found either in the adult or in the larval state. What had caused them to disappear? Surely not the lack of material on which to work, for several large living spruces yet remained. This leads to the consideration of remedies. Doubtless there are natural agencies whose free operation has a tendency to check the ravages of these insects and to prevent their excessive multiplication, but there are times and localities in which these opposing agencies are inefficient or inoperative, and then these destructive insects multiply rapidly and their ravages become painfully apparent. It is then necessary that man himself should do something to protect his property from these active little foes. It was noticeable that many of the dead trees, in the two groves just mentioned, had their bark so chipped by wood-peckers that the general hue of the trunk was a reddish-brown instead of the usual grayish-brown. Here then is a possible explanation of the cessation of the ravages and the absence of the insects. Here is doubtless the indication of one of natures antidotes to the mischief. The wood-pecker is the natural foe of such insects. With its long beak and barbed tongue it extracts them as a dainty morsel from beneath the bark. It is quite probable that these birds had congregated in these two localities in sufficient numbers to completely stop the ravages of the insects.

A few were seen at work on the affected spruces of Speculator Mountain, and if not interrupted they will probably in due time succeed in checking the ravages here also. The protection of these birds is to be enumerated among the means to be employed in checking the malady of the spruces. They are the friends of the forest and the allies of man. How insignificant the insect yet how capable of injury. How lightly we esteem the wood-pecker yet how indispensable are his services.

A remedy employed in similar cases in Europe is to cut down the affected trees, strip off their bark and burn it with its destructive tenants. Though it is somewhat doubtful if the owners of large tracts of timber land can be induced to adopt this method of checking the destruction of their spruces, it is certainly to be recommended. The loss from its omission would soon far exceed the cost of its employment, but care should be taken not to engage in this work in a dry time lest the destruction from forest fires should be greater than that from insects.

A brief extract from the Entomology of Kirby and Spence will show that the ravages of insects upon forest trees in Europe have sometimes been serious, and that it is none too soon for us to note well what is transpiring in our own forests.

"The bark-borer of the oak is a small beetle of an allied genus, *Scolytus pygmæus* which with us does no great harm, but so abounded of late years in the Bois-de-Vincennes, near Paris, that 40,000 trees were killed by it; and many of the finest elms in St. James' Park and Kensington Gardens as well as in the promenades of various cities in the north of France, have fallen victims to another of this tribe, *Scolytus destructor*, whose trivial name well characterizes the frequency and severity of its ravages. The ravages of *Tomicus typographus* in the pine forests of Germany, have long been known under the name *Wurmtrökniss* (decay caused by worms), and they sometimes attack the inner bark in such numbers, 80,000 being sometimes found in a single tree, that they are infinitely more noxious than those insects that bore into the wood. About the year 1668 this pest was particularly prevalent and caused incalculable mischief, and in 1783 it is estimated that a million and a half of trees were destroyed by it in the Hartz forests alone. At this period when arrived at their perfect state they migrated in swarms like bees into Suabia and Franconia. At length between 1784 and 1789 in consequence of a succession of cold moist seasons the numbers of this scourge were sensibly diminished, but they appeared again in 1790 and so late as 1796 there was great reason to fear for the few fir trees that were left."

Westwood states that occasionally the evil was so great that prayers were offered in the churches against its extension. While we hope that our spruce tree bark-borer may never prove to be such a pest as this Tomicus, we certainly think that he deserves some special attention.

(1.)

PLANTS MOUNTED.

Ranunculus acris *L.*
Caltha palustris *L.*
Vaccaria vulgaris *Host.*
Ptelea trifoliata *L.*
Prunus pumila *L.*
Aralia hispida *Mx.*
Cornus stolonifera *Mx.*
Sambucus pubens *Mx.*
Solidago cæsia *L.*
Erigeron strigosum *Muhl.*
Cannabis sativa *L.*
Quercus alba *L.*
Q. bicolor *Willd*
Q. montana *Willd.*
Q. prinoides *Willd.*
Q. coccinea *Wang.*
Q. tinctoria *Bart.*
Q. rubra *L.*
Carex bromoides *Schk.*
Agrostis alba *L.*

New to the Herbarium.

Aconitum Napellus *L.*
Solidago elliptica *Ait.*
Polygonum Careyi *Olney.*
P. Hartwrightii *Gr.*
Euphorbia Cyparissias *L.*
Scirpus Olneyi *Gr.*
Carex striata *Mx.*
Botrychium Lunaria *Sw.*
B. matricariæfolium *A. Br.*
Lycopodium sabinæfolium
Thelia Lescurii *Sulliv.*
Hypnum Oakesii *Sulliv.*
Hypnum exannulatum *Gumb.*
H. cupressiforme *L.*
H. acutum *Mitt.*
Sphagnœcetis Hubeneriana
Jungermannia albescens *Hook.*
J. ventricosa *Dicks.*
Scapania undulata *N. & M.*
Frullania Oakesiana *Aust.*
Cetraria Fahlunensis *Schær.*
Lecanora badia *Fr.*
Cladonia deformis *Hoffm.*
C. papillaria *Hoffm.*

Bæomyces byssoides *Fr.*.
Biatora milliaria *Fr.*
Lecidea arctica *Smf.*
L. Diapensiæ *Th. Fr.*
L. melancheima *Tuck.*
Porphrydium cruentum *Ag.*
Agaricus cepæstipes *Sow.*
A. fumosoluteus *Pk.*
A. rosellus *Fr.*
A. constans *Pk.*
A. atroalboides *Pk.*
A. delectabilis *Pk.*
A. Acicula *Schæff.*
A. montanus *Pk.*
A. Rhododendri *Pk.*
A. infidus *Pk.*
A. fuscodiscus *Pk.*
A. luteofolius *Pk.*
A. chimonophilus *B. & Br.*
Coprinus aquatilis *Pk.*
Cortinarius fuscoviolaceus *Pk.*
Hygrophorus aurantiacoluteus
Gomphidius stillatus *Fr.*
Lactarius alpinus *Pk.*
Marasmius minutus *Pk.*
M. minutissimus *Pk.*
Panus operculatus *B. & C.*
Polyporus cupulæformis *B.&C*
P. squamosus *Fr.*
P. volvatus *Pk.*
P. vulgaris *Fr.*
P. incarnatus *Fr.*
Trametes odoratus *Fr.*
Merulius porinoides *Fr.*
Stereum balsameum *Pk.*
S. versiforme *B. & C.*
Corticium calceum *Fr.*
C. colliculosum *B. & C.*
C. cremoricolor *B. & C.*
C. lilacinofuscum *B. & C.*
Cyphella candida *Pk.*
Clavaria spathulata *Pk.*
Typhula gyrans *Fr.*
T. filicina *Pk.*
Tremella enata *B. & C.*
T. stipitata *Pk.*
Dacrymyces fragiformis *Nees.*
Ditiola radicata *Fr.*
Reticularia umbrina *Fr.*
Diderma umbilicatum *Pers.*
Phoma ellipticum *Pk.*
Septoria Verbenæ *D. & R.*
Discosia Maculæcola *Ger.*
Pestalozzia Mariæ *Clinton.*
Coryneum triseptatum *Pk.*
Spilocæa concentrica *Schw.*
Helicosporium olivaceum *Pk.*
H. ellipticum *Pk.*
Sporidesmium concinnum *B&C*
Puccinia Veratri *Clinton.*
Uromyces Lilii *Clinton.*
Ustilago Syntherismæ *Schw.*
U. Erythronii *Clinton.*
Uredo Smilacis *Schw.*
U. Empetri *DC.*
Æcidium dubium *Clinton.*
Peridermium elatinum *Lk.*
P. balsameum *Pk.*
P. decolorans *Pk.*
Pterula setosa *Pk.*
Cladosporum Lignicola *Cd.*
Oidium corticale *Pk.*
Fusidium flavovirens *Fr.*
Monilia candida *Pk.*
Pilobolus crystallinus *Tode.*
Chætomium melioloides *C.&P*
Helvella sphærospora *Pk.*
Mitrula cucullata *Fr.*
M. inflata *Schw.*
Peziza adusta *C. & P.*
P. subcarnea *C. & P.*
Ascobolus pilosus *Fr.*

Helotium aciculare *Fr.*
H. fastidiosum *Pk.*
Tympanis Fraxini *Schw.*
Hysterium tumidum *Duby.*
H. xylomoides *Chev.*
H. Rhododendri *Schw.*
Rhytisma monogramma *B. & C*
Torrubia entomorrhiza *Fr.*
Epichloe Hypoxylon *Pk.*
Hypomyces aurantius *Tul.*
Nectria episphæria *Fr.*
Dothidea tetraspora *Fr.*
Dothidea Dalibardæ *Pk.*
Diatrype platasca *Pk.*
D. corniculata *Ehrh.*
Valsa impulsa *C. & P.*
V. Peckii *Howe.*
Lophiostoma sexnucleata
Sphæria thujina *Pk.*
S. pilifera *Fr.*
S. lagenaria *Pers.*
S. orthogramma *B. & C.*
S. Parnassiæ *Pk.*
S. Arceuthobii *Pk.*

(2.)

PLANTS COLLECTED.

Pyrus sambucifolia *C. & S.*
Aster amethystinus *Nutt.*
Bromus tectorum *L.*
Glæocapsa rupestris *Kutz.*
Hydrogastrum granulatum *L.*
Spirogyra longata *Vauch.*
Agaricus pusillomyces *Pk.*
A. tenerrimus *Berk.*
A. Austini *Pk.*
A. Watsoni *Pk.*
A. detersibilis *Pk.*
A. Colvini *Pk.*
Coprinus Seymouri *Pk.*
Hygrophorus marginatus *Pk.*
H. parvulus *Pk.*
H. Peckianus *Howe.*
Cantharellus pruinosus *Pk.*
Lentinus umbilicatus *Pk.*
Boletus robustus *Frost.*
B. chromapes *Frost.*
Polyporus Stephensii *Berk.*
Hydnum aurantiacum *Batsch.*
Michenera Artocreas *B. & C.*
Corticium giganteum *Fr.*
Corticium colliculosum *B. & C.*
Cyphella muscigena *Fr.*
Solenia filicina *Pk.*
Clavaria rugosa *Bull.*
C. pulchra *Pk.*
C. gracillima *Pk.*
Typhula Grevillei *Fr.*
Tremella vesicaria *Bull.*
T. mycetophila *Pk.*
Æthalium geophilum *Pk.*
Licea ochracea *Pk.*
Diderma flavidum *Pk.*
Didymium oxalinum *Pk.*
D. subroseum *Pk.*
D. flavidum *Pk.*
Dictydium umbilicatum *Schrd.*
Phoma pallens *B. & C.*
Sphæropsis Sambuci *Pk.*
S. biformis *Pk.*
Hendersonia Sarmentorum
Vermicularia coptina *Pk.*
Septoria Scrophulariæ *Pk.*
S. Rhoidis *B. & C.*
Dinemasporium Pezizula *B.&C*

Cytispora Micheneri *B. & C.*
Discella discoidea *C. & P.*
Sphæronema oxysporum *Berk*
S. conforme *Pk.*
Coryneum Kunzei *Cd.*
Pestalozzia insidens *Zab.*
Septonema bicolor *Pk.*
Sporidesmium Lepraria *B.&Br*
Melanconium disseminatum *Fr*
M. oblongum *B. & C.*
Puccinia Sorghi *Schw.*
Ustilago destruens *Duby.*
Peridermium columnare *A.&S.*
Æcidium Dracontiatum *Schw.*
Cystopus Amaranthi *Schw.*
Stilbum candidum *Pk.*
Stachybotrys lobulata *Berk.*
Haplographium apiculatum
Helminthosporium Urticæ *Pk.*
Macrosporium Saponariæ *Pk.*
Nematogonum aurantiacum
Perenospora Geranii *Pk.*
P. obliqua *Ck.*
Erysiphella aggregata *Pk.*
Microsphæra Van Bruntiana
Chætomium lanosum *Pk.*
Geoglossum velutipes *Pk.*
Peziza onotica *Pers.*
P. repanda *Wahl.*
P. pallidula *C. & P.*
P. omphalodes *Bull.*
P. sepulta *Fr.*
P. ovilla *Pk.*
P. clandestina *Bull.*
P. fusicarpa *Ger.*
P. hyalina *Pers.*
P. cinera *Batsch.*
P. scirpina *Pk.*
P. Pteridis *A. & S.*
P. corneola *C. & P.*
P. subatra *C. & P.*
Peziza atrocinerea *Ck.*
Helotium pileatum *Pk.*
H. salicellum *Fr.*
Patellaria fusispora *C. & P.*
P. fenestrata *C. & P.*
Dermatea cinnamomea *C. & P.*
Sphinctrina tigillaris *B. & Br.*
Cenangium Rubi *Fr.*
C. Aucupariæ *Fr.*
C. deformatum *Pk.*
Stictis pupula *Fr.*
S. hysterina *Fr.*
S. quercina *Pk.*
Rhytisma Urticæ *Fr.*
Hysterium Rousselii *De Not.*
H. clavisporum *C. & P.*
Colpoma lacteum *Pk.*
Ailographum subconfluens *Pk*
Torrubia clavulata *Schw.*
T. superficialis *Pk.*
Nectria sanguinea *Fr.*
Hypoxylon fuscopurpureum
Dothidea Linderæ *Ger.*
Diatrype aspera *Fr.*
D. discoidea *C. & P.*
D. anomala *Pk.*
Melanconis bicornis *Cooke.*
Valsa Prunastri *Fr.*
V. Rubi *Pk.*
V. Woolworthi *Pk.*
V. leiphemia *Fr.*
V. acerina *Pk.*
V. oxyspora *Pk.*
V. obscura *Pk.*
V. mucronata *Pk.*
V. femoralis *Pk.*
V. sambucina *Pk.*
Cucurbitaria alnea *Pk.*
C. seriata *Pk.*
Lophiostoma Jerdoni *B. & Br.*
L. macrostoma *Fr.*

Lophiostoma triseptata *Pk.*
L. Spirææ *Pk.*
L. Scrophulariæ *Pk.*
Sphæria callista *B. & C.*
S. subcorticalis *Pk.*
S. hirtissima *Pk.*
S. phæostromoides *Pk.*
S. eximia *Pk.*
S. canina *Pk.*
S. valsoides *Pk.*
S. minima *Awd.*
S. scoriadea *Fr.*
S. monosperma *Pk.*
Sphæria pulicaris *Pers.*
S. rubefaciens *Pk.*
S. Urticæ *Rabh.*
S. mirabilis *Pk.*
S. tubæformis *Tode.*
Sphærella sparsa *Awd.*
S. carpinea *Fr.*
S. indistincta *Pk.*
S. orbicularis *Pk.*
Venturia Myrtilli *Cooke.*
V. maculans *Pk.*
V. Clintonii *Pk.*
V. Kalmiæ *Pk.*

(3.)

CONTRIBUTORS AND THEIR CONTRIBUTIONS.

Miss M. L. WILSON, Buffalo, N. Y.

Collema limosum *Nyl.*
Biatora uliginosa *Fr.*

Mrs. L. A. MILLINGTON, Glens Falls, N. Y.

Aspidium Noveb. *v.* fragrans.
Dothidea Pteridis *Fr.*
Peridermium decolorans *Pk.*
P. elatinum *A. & S.*

Mrs. E. E. ATWATER, Chicago, Ill.

Sarracenia variolaris *Mx.*
Viola ped. *v.* bicolor.
Drosera capillaris *Poir.*
D. brevifolia *Ph.*
Ascyrum amplexicaule *Mx.*
Silene Pennsylvanica *Mx.*
Melia Azederach *L.*
Sassafras officinale *Nees.*
Lycopodium alopecuroides *L.*
Dicranum scoparium *L.*
Leucobryum minus *Hampe.*
Hedwigia ciliata *Ehrh.*
Bryum Atwateriæ *C. Mull.*
Hypnum molluscum *Hedw*
Lentinus Lecomtei *Fr.*
Polyporus hirsutus *Fr.*
P. cinnabarinus *Fr.*
Stereum fasciatum *Fr.*
Mitremyces lutescens *Schw.*
Peridermium Cerebrum *Pk.*

Rev. H. WIBBE, Oswego, N. Y.

Sedum reflexum *L.*

Rev. J. L. ZABRISKIE, New Baltimore, N. Y.

Dinemasporium Pezizula *B.&C*	Blastesis tridens *Zab.*
Pestalozzia insidens *Zab.*	Lophiostoma Jerdoni *B. & Br.*
P. rostrata *Zab.*	Diatrype discoidea *C. & P.*

Prof. C. E. BESSEY, Ames, Iowa.

Ustilago fœtens *B. & C.*	Ustilago destruens *Duby.*

Prof. A. N. PRENTISS, Ithaca, N. Y.

Negundo aceroides *Mœnch.*	Primula Mistassinica *Mx.*
Nardosmia palmata *Hook.*	Trillium erec. *v.* album *Ph.*
Pinguicula vulgaris *L.*	

Prof. J. HALL, Albany, N. Y.

Hellvella esc. *v.* conica *Fr.*	Spilocæa Pomi *Fr.*

C. DEVOL, M. D., Albany, N. Y.

Platycerium alcicorne *Gaud.*	Cucurbitaria seriata *Pk.*

E. C. HOWE, M. D., Yonkers, N. Y.

Centaurea nigra *L.*	Microsphæra Platani *Howe.*
Coryneum dis. *v.* ellipticum.	M. Symphoricarpi *Howe.*
Puccinia bullaria *Lk.*	M. Menispermi *Howe.*
Patellaria dispersa *Ger.*	M. Viburni *Schw.*
Diatrype prominens *Howe.*	Sphæria Platanicola *Howe.*

H. WILLEY, New Bedford, Mass.

Synalissa Schæreri *Mass.*	Ramalina rigida *Pers.*

R. KERSTING, Yonkers, N. Y.

Centaurea nigra *L.*

H. A. WARNE, Oneida, N. Y.

Azolla Caroliniana *Willd.*	Epichloe typhina *Berk.*
Hydnum auriscalpium *L.*	Geoglossum velutipes *Pk.*

E. L. HANKENSON, Newark, N. Y.

Habenaria leucophæa *Nutt.*

W. R. GERARD, Poughkeepsie, N. Y.

Septoria maculosa *Ger.*	Patellaria dispersa *Ger.*
Stilbum aurifilum *Ger.*	Hysterium vixvisibile *Ger.*
Peziza Cucurbitæ *Ger.*	H. magnosporium *Ger.*

J. T. LOCKWOOD, Hunter, N. Y.

Lygodium palmatum *Sw.*

B. D GILBERT, Utica, N. Y.

Carex Grayi *Carey.*
C. Crawei *Dewey.*
C. livida *Willd.*
Brotychium matricariæfolium *A. Br.*

M. RUGER, New York, N. Y.

Amarantus spinosus *L.*
Scleria verticillata *Mx.*

E. S. MILLER, Wading River, N. Y.

Ustilago Montagnei *v.* major *Desm.*

J. B. ELLIS, Newfield, N. J.

Agaricus trullisatus *Ellis.*
Polyporis contiguus *Fr.*
Thelephora pedicellata *Schw.*
Hymenochæte tabacina *Fr.*
H. agglutinans *Ellis.*
Corticium colliculosum *B. &C.*
Exobasidium discoideum *Ellis*
E. Andromedæ *Pk.*
Scleroderma Geaster *Fr.*
Hendersonia sarmentorum.
Pestalozzia pezizoides *DeNot.*
Melanconium magnum *Berk.*
M. bicolor *Nees.*
Bactridium Ellisii *Berk.*
Septonema bicolor *Pk.*
Phragmidium mucronatum *Fr*
P. speciosum *Fr.*
Puccinia Smilacis *Schw.*
P. Helianthi *Schw.*
Uromyces Spermacocis *Schw.*
Ustilago Syntherismæ *Schw.*
Rœstelia Ellisii *Pk.*
Æcidium pyratum *Schw.*
Æ. myricatum *Schw.*
Peridermium pyriforme *Pk.*
Gymnosporangium Juniperi.
G. clavipes *C. & P.*
G. biseptatum *Ellis.*
Podisoma Ellisii *Berk.*
Dendriphium quadriseptatum.
Helminthosporium 7-septatum.
Chætomium melioloides *C.&P.*
Peziza albopileata *Ck.*
P. Erigeronata *Ck.*
P. pollinaria *Ck.*
P. protrusa *B. & C.*
P. Andropogonis *B. & C.*
Nectria inaurata *B. & Br.*
Triblidium unisculptum *Ck.*
Hypoxylon Sassafras *Schw.*
H. marginatum *Schw.*
Valsa Peckii *Howe.*
Sphæria hirtissima *Pk.*
S. pulveracea *Ehrh.*
Venturia pulchella *C. & P.*

Hon. T. M. PETERS, Moulton, Ala.

Neviusia Alabamensis *Gr.*
Leavenworthia Michauxii *Tor.*
Diamorpha pusilla *Nutt.*
Asplenium pinnatifidum *Nutt*
Trichomanes radicans *Sw.*
T. Petersii *Gr.*
Lemanea fluviatilis *Ag.*
Myriangium Curtisii *M. & B.*
Corticium prasinum *B. & C.*
Hygrophorus Petersii *B. & C.*
Pilacre Petersii *B. & C.*
Hypocrea Petersii *B. & C.*
Hypoxylon Petersii *B. & C.*
Dendrina Diospyri *B. & C.*

Hon. G. W. CLINTON, Buffalo, N. Y.

Stereum candidum *Schw.*
Phoma Mariæ *Clinton.*
Sphæropsis Wilsoni *Clinton.*
S. Squieriæ *Clinton.*
S. Clintonii *Pk.*
Diplodia Herbarum *Lev.*
Hendersonia Peckii *Clinton.*
H. Mariæ *Clinton.*
Septoria Scrophulariæ *Pk.*
S. Rhoidis *B. & C.*
S. Verbascicola *B. & C.*
S. Sambucina *Pk.*
S. Wilsoni *Clinton.*
Vermicularia coptina *Pk.*
Asteroma Rosæ *DC.*
Cytispora Micheneri *B. & C.*
Melanconium minutissimum.
Pestalozzia Peckii *Clinton.*
Puccinia Smilacis *Schw.*
P. Dayi *Clinton.*
P. Clintonii *Pk.*
P. Sorghi *Schw.*
Uromyces Graminum *Ck.*
Protomyces Menyanthis.
Monotospora biseptata *Pk.*
Microsphæra abbreviata *Pk.*
Helotium salicellum *Fr.*
Sphinctrina tigillaris *B. & Br.*
Hysterium clavisporum *C.&P.*
Melogramma Bulliardi *Tul.*
Melanconis bicornis *Ck.*
Valsa suffusa *Fr.*
V. femoralis *Pk.*
Lophiostoma triseptata *Pk.*
Sphæria callista *B. & C.*
S. acer. *v.* Juniperi *West.*
S. rubefaciens *Pk.*
S. Daturæ *Schw.*
S. perisporioides *B. & C.*
Sphærella oblivia *Ck.*
S. carpinea *Fr.*
S. sparsa *Awd.*
Venturia Clintonii *Pk.*

C. F. AUSTIN, Closter, N. J.

Barbula recurvifolia *Schp.*
Hypnum compactum *C. Mull.*
Tremella foliacea *Pers.*
Pistillaria Muscicola *Fr.*
Perichæna flavida *Pk.*
Licea perreptans *Berk.*
Morchella esculenta *Pers.*
Leotia lubrica *Pers.*
Torrubia militaris *Fr.*
Xylaria polymorpha *Grev.*
Sphæria fimbriata *Pers.*
S. coprophila *Fr.*

C. C. PARRY, Davenport, Iowa.

Æcidium biforme *Pk.*
Calyptospora Gœppertiana *Kühn.*

J. M. CONGDON, East Greenwich, R. I.

[*By exchange.*]

Acer macrophyllum *Ph.*
Desmodium sessilifolium *T.&G*
Hedysarum boreale *Nutt.*
Garrya Fremontii *Don.*
Plectritis congesta *DC.*
Galium verum *L.*
Aster graminifolius *Ph.*
Solidago elliptica *Ait.*
Primula suffruticosa *Gr.*
Sarcodes sanguinea *Don.*
Mimulus rubellus *Gr.*
Gilia pungens *Gr.*
Castanea chrysophylla *Doug.*
Lacnanthes tinctoria *Ell.*
Listera convallarioides *Hook.*
Eleocharis rostellata *Torr.*
Rhynchospora scirpoides *Gr.*
Scirpus sylvaticus *L.*
Scleria reticularis *Mx.*
Carex salina *Wahl.*
C. maritima *Vahl.*
C. polymorpha *Muhl.*
C. muricata *L.*
C. paludosa *Good.*
C. præcox *Jacq.*
C. Novæ-Angliæ *Schw.*
Calamagrostis stricta *Trin.*
C. Lapponica *Trin.*
Oryzopsis Canadensis *Don.*
Poa cæsia *Sm.*

(4.)

PLANTS, INDIGENOUS AND INTRODUCED, NOT BEFORE REPORTED.

NEGUNDO ACEROIDES *Mœnch.*

Inlet Valley, near Ithaca. *Prof. A. N. Prentiss.* The credit of the discovery of these trees in the locality given is attributed to *Mr. J. C. Branner*, a student of Cornell University.

PYRUS SAMBUCIFOLIA *Cham. & Schl.*

Adirondack Mountains. Not common.

SEDUM REFLEXUM *L.*

Near Burden's lake, Rensselaer county. *Rev. H. Wibbe.* I am informed by Mr. Wibbe that the plants grow on a bank by the road-side, in a reddish soil of clay and shale and that they appear to be thoroughly naturalized. He was unable to learn upon inquiry that the plant is now or ever had been in cultivation any where in the vicinity.

ASTER AMETHYSTINUS *Nutt.*

Green Island, Albany county. The locality of this fine aster was made known to me by *Mr. Wibbe.* The plants are not numerous and are associated with *Aster Novæ-Angliæ* and *A. multiflorus.*

CENTAUREA NIGRA *L.*

Rocky places. Yonkers. *R. Kersting* and *E. C. Howe.*

HABENARIA LEUCOPHÆA *Nutt.*

Sphagnous marshes on the shores of Mud pond, Wayne county. *E. L. Hankenson.*

BROMUS TECTORUM *L.*

Riverhead, Long Island. *E. S. Miller.*

BARBULA RECURVIFOLIA *Schp.*

Watkins Glen. *C. F. Austin.* Sterile.

HYPNUM COMPACTUM *C. Mull.*

Eldridge Glen, near Seneca lake, *Austin.* Sterile.

BIATORA ULIGINOSA *Schrad.*

North Collins. *Miss. M. L. Wilson.*

SYNALISSA SCHÆRERI *Mass.*

Rocks. Trenton Falls. *H. Willey.*

COLLEMA LIMOSUM *Ach.*

Buffalo. Very rare. *Miss Wilson.*

GLÆOCAPSA RUPESTRIS *Kutz.*

What I take to be this species is not rare about Albany, forming a green stratum on stone steps, walls of buildings, old fences and trunks of trees. It is most conspicuous in wet weather in winter and spring. I have not seen a full description of the species.

HYDROGASTRUM GRANULATUM *L.*

Damp ground in dried water holes. North Greenbush. This plant has been supposed by some to be the cause of ague and has therefore been called the "ague plant," but it is hardly probable that it has any such deleterious quality.

SPIROGYRA LONGATA *Vauch.*

In ditches along the railroad. North Greenbush. June.

AGARICUS (LEPIOTA) PUSILLOMYCES *n. sp.*

Pileus thin, subcampanulate or convex, subumbonate, minutely granular-mealy, whitish or dingy; lamellæ broad, close, free, white; stem slender, equal, exannulate, rough with a granular-mealiness, colored like the pileus; spores elliptical, .00016′–.0002′* long.

Plant scarcely 1′ high, pileus 2″–4″ broad, stem .5″ thick.

Ground under *Pteris aquilina*. Lake Pleasant. August. (Plate 1, figs. 1–3.)

The species is related to *A. granulosus* but the plants are very much smaller and ringless.

AGARICUS TENERRIMUS *Berk.*

Under pine and hemlock trees. Northville, Fulton county. August.

AGARICUS (OMPHALIA) AUSTINI *n. sp.*

White, rather tenacious; pileus convex or hemispherical, glabrous, striate, deeply umbilicate, sometimes perforate, viscid when moist; lamellæ subdistant, decurrent; stem slender, equal, hollow, smooth, villose at the base; spores elliptical, .00025′ long.

Plant gregarious, about 1′ high, pileus 3″–6″ broad.

Prostrate dead trunk of a small spruce tree. Providence, Saratoga county. August.

Dedicated to *Mr. C. F. Austin.*

AGARICUS (ECCILIA) WATSONI *n. sp.*

Pileus hemispherical or convex, umbilicate, striatulate, brown, the umbilicus darker and rough with minute blackish-brown scales; lamellæ distant, arcuate, decurrent, whitish then flesh-colored; stem equal, smooth, shining, brownish or pallid; spores angular, generally with a single nucleus, .00035′–.0004′ in diameter.

Plant 1′ high, pileus 5″–10″ broad, stem .5″–1″ thick.

Ground in woods. Northampton, Fulton county. August.

Dedicated to *Mr. Sereno Watson.*

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* One accent (,) denotes inch or inches, two accents („) denote line or lines.

AGARICUS (PHOLIOTA) DETERSIBILIS *n. sp.*

Pileus hemispherical or convex, thin, densely coated with small erect pyramidal or spinulose scales, ochraceous-brown; lamellæ broad, plane, close, reaching the stem, slightly attached, pallid then cinnamon-brown; stem equal, stuffed or hollow, squamulose below the obsolete ring, colored like the pileus, often curved; spores unequally elliptical, .0003′–.00035′ long.

Plant about 1′ high, pileus 6″ broad, stem 1″ thick.

Decaying trunks of deciduous trees in woods. Lake Pleasant. August.

The small soft scales are rubbed off easily, whence the specific name. I suspect that under more favorable conditions the plant may grow considerably larger than the dimensions given.

AGARICUS (HEBELOMA) COLVINI *n. sp.*

Pileus fleshy, convex or expanded, sometimes gibbous or broadly umbonate, rarely centrally depressed, glabrous grayish or alutaceous inclining to pale ochre; lamellæ close, broad, emarginate or rounded behind, whitish or pallid becoming brownish; stem flexuous, silky-fibrillose, stuffed or hollow, solid toward the base, whitish; spores subelliptical, .0004′-.0005′ long.

Plant 2′–4′ high, pileus 1′–3′ broad, stem 1″–3″ thick.

Sand hills near West Albany. October.

This interesting species is dedicated to *Mr. V. Colvin*, to whom is due the credit of its discovery. Its habitat is peculiar, being the clear drifting sand of the plains west of Albany. The mycelium binds the sand together in a mass which adheres to the base of the stem. A cricket was observed feeding upon the pileus of a small specimen.

COPRINUS SEYMOURI *n. sp.*

Cæspitose, fragile; pileus thin, soon expanded, smooth or sprinkled with minute granular scales, dark-brown, the disk sometimes with a reddish tinge, strongly striate or subplicate, the thin margin soon splitting and revolute; lamellæ close, narrow, reaching the stem, brown then black; stem equal, hollow, smooth or slightly pulverulent, white; spores broadly ovate, compressed, .00025′-.0003′ long, .0002′–00025′ broad.

Plant 3′–4′ high, pileus 8″–12″ broad, stem 1″ thick.

Clay soil. Albany. October.

It is allied to *C. micaceus*, but is thinner, more fragile, darker in color, with more narrow lamellæ which are darker in the young plant. The species is respectfully dedicated to *Hon. H. Seymour.*

HYGROPHORUS MARGINATUS *n. sp.*

Fragile; pileus subcampanulate or expanded, often irregular or lobed, sometimes broadly umbonate, glabrous, shining, often minutely rimose, striatulate on the thin margin, bright golden-yellow; lamellæ rather broad, subdistant, ventricose, emarginate, often venose-connected, yellow, becoming more highly colored with age, the edge generally changing to orange or vermilion; stem smooth, hollow, often flexuous or irregular, pale yellow; spores subelliptical, about .0003′ long.

Plant 2′ high, pileus about 1′ broad, stem 1″–2″ thick.

Ground in woods. Northville. August.

This seems to be the American analogue of the European *H. obrusseus*. After considerable hesitation I have ventured to separate it as a species because of its smaller size and the red color of the edge of the lamellæ, a singular character which has suggested the specific name.

HYGROPHORUS PARVULUS *n. sp.*

Pileus thin, hemispherical or convex, smooth, hygrophanous, striatulate on the margin when moist, sulphur-yellow; lamellæ, subdistant, arcuate, adnate or decurrent, pale-yellow or whitish; stem equal, smooth, hollow, pale-yellow or luteous.

Plant 1′ high, pileus 3″–4″ broad.

Ground in woods and under *Pteris aquilina.* Northville and Lake Pleasant. August. (Plate 1, figs. 20–24.)

The stem and pileus are slightly viscid when young and moist. The stem is sometimes more highly colored than the pileus, an unusual feature in the Agaricini.

HYGROPHORUS PECKIANUS *Howe.*

Ground under *Pteris aquilina.* Lake Pleasant. August.

LACTARIUS AQUIFLUUS *n. sp.*

Pileus fragile, fleshy, convex or expanded, at length centrally depressed, dry, smooth, or sometimes appearing as if clothed with a minute appressed tomentum, reddish tan-colored, the decurved margin often flexuous; lamellæ rather narrow, close, whitish, becoming dull reddish yellow; stem more or less elongated, equal or slightly tapering upward, colored like the pileus, smooth, hollow, the cavity irregular as if eroded; spores subglobose, rough, .0003′ in diameter; flesh colored like the pileus; milk sparse, watery.

Plant 3′–8′ high, pileus 3′–6′ broad, stem 5″–10″ thick.

Swamps and wet mossy places in woods. Sandlake and North Elba. August and September.

The relationship of this plant is with *L. serifluus*, to which it was formerly referred, but from which I am now satisfied it is distinct. The hollow stem is a constant character in our plant, and affords a ready mark of distinction. The plant, though large, is very fragile, and breaks easily. The taste is mild or but slightly acrid. Sometimes there is an obscure zonation on the pileus, which, in large specimens, is apt to be irregular and much worm-eaten. The milk looks like little drops of water when first issuing from a wound, but it becomes a little less clear on exposure to the atmosphere. The decided but agreeable odor of the dried specimens persists a long time.

CANTHARELLUS PRUINOSUS *n. sp.*

Pileus convex, even or slightly umbilicate, pruinose, white; lamellæ distant, simple, long-decurrent; stem slender, slightly enlarged above, pruinose, whitish.

Plant scarcely 1′ high, pileus 2″–3″ broad.

Ground in pastures. Sageville, Hamilton county. August.

The small size and white mealy pruinosity are distinguishing features in this species. But for the obtuse edge of the lamellæ it might readily be taken for some small Omphalia, especially as the lamellæ are not branched.

LENTINUS UMBILICATUS *n. sp.*

Pileus fleshy, thin, tough, smooth, deeply umbilicate hygrophanous, brownish tan-colored when moist, paler when dry; lamellæ crowded, adnate or decurrent, serrate on the edge, whitish; stem slender, short, smooth, nearly even, tough, stuffed or hollow, central or eccentric, colored like the pileus.

Plant about 1′ high, pileus 6″–12″ broad, stem 1″ thick.

Ground and old logs. Lake Pleasant. August. (Plate 1, figs. 15–19.)

It is related to *L. cochleatus*, which it resembles in color and texture, but it is a much smaller plant, with a more slender and not sulcate stem. It is gregarious in habit. The form with eccentric stem grew on decaying logs, and has the stem more or less curved.

BOLETUS ROBUSTUS *Frost.*

Borders of woods. Sandy Creek, Oswego county. July.

BOLETUS CHROMAPES *Frost.*

Woods. Northville. August.

POLYPORUS STEPHENSII *Berk.*

Under side of spruce logs in woods. Indian Lake. July. It forms patches several feet in extent.

HYDNUM AURANTIACUM *Batsch.*

Ground. Albany. August.

HYDNUM AURISCALPIUM *L.*

Old cones of Scotch fir. Oneida. *H. A. Warne.* Autumn.

MICHENERA ARTOCREAS *B. & C.*

Dead branches of black ash, *Fraxinus sambucifolia.* Lake Pleasant. August.

The hymenium in our specimens is of a dull reddish or pale chestnut color, and the spores are generally bluntly pointed or beaked, but the species is so singular that I have no doubt of the correctness of the determination.

CORTICIUM GIGANTEUM *Fr.*

Pine wood and bark. Albany.

CORTICIUM COLLICULOSUM *B. & C.*

Dead branches. North Greenbush.

STEREUM CANDIDUM *Schw.*

Bark of trees. Gowanda, Erie county. *G. W. Clinton.*

CYPHELLA MUSCIGENA *Fr.*

Mosses on precipices in woods. Lake Pleasant. August.

SOLENIA FILICINA *n. sp.*

Cups springing from an ochraceous, white-margined, tomentose subiculum, elongated, clavate or cylindrical, deflexed, clothed with appressed hairs or tomentum, ochraceous; spores hyaline, broadly fusiform, pointed at the ends, containing one or two nuclei, .0004′ long.

Base of living fern stems. Lake Pleasant. August.

The basal part of the cups sometimes turns brown and shrinks in size, so that they appear as if stipitate. Both the habitat and the effused stratum of tomentum are noteworthy features.

CLAVARIA RUGOSA *Bull.*

Ground in woods. Northampton and Sageville. August,

CLAVARIA PULCHRA *n. sp.*

Simple, small, about 1′ high, club elongate-clavate, obtuse, yellow, sometimes a little darker at the apex, gradually tapering into the whitish or pale yellow stem-like base.

Ground and decaying wood in damp shaded places. Northville and Chittenango Falls. August. (Plate 1. fig. 10.)

A pretty species, associated with *C. fusiformis* in both localities, but differing from it in shape and habit.

CLAVARIA GRACILLIMA *n. sp.*

Simple, very slender, smooth, about 1′ high, rather tough; club acute or acuminate, pale yellow, a little thicker than the long slender distinct bright yellow shining stem.

Among moss in a pasture. Northville. August. (Plate 1, fig. 9.)

In this species, as in *C. argillacea*, the hymenium is quite distinct from the stem.

TYPHULA GREVILLEI *Fr.*

Fallen leaves. Lake Pleasant. August.

The stem in our specimens is not distinctly pilose.

TREMELLA VESICARIA *Bull.*

Ground in damp shaded places. Oneida. *Warne.* Albany and Greenbush.

TREMELLA MYCETOPHILA *n. sp.*

Suborbicular, depressed, gyrose-plicate, tremelloid-fleshy, slightly pruinose, yellowish or pallid, 4″–8″ broad.

Stem and pileus of *Agaricus dryophilus.* Oneida. *Warne.* North Elba. August. (Plate 1, fig. 4.)

ÆTHALIUM GEOPHILUM *n. sp.*

Effused in small irregular masses, whitish or yellowish, sometimes with a slight pinkish tinge; spores globose, colorless, .00016′–.0002′ in diameter.

Damp ground in woods. Sageville. August.
The small size and colorless spores furnish the distinguishing characters of this species.

DIDERMA FLAVIDUM *n. sp.*

Cæspitose, small, external peridium thick, pale yellow or lemon color outwardly, white within, rupturing irregularly, inner peridium delicate; flocci white; spores black, globose, minutely rough, .0005′ in diameter.

Among moss on decaying wood. Lake Pleasant. August.

DIDYMIUM OXALINUM *n. sp.*

Small, sessile, scattered or crowded, subglobose or elongated and somewhat confluent, plumbeus; peridium thin, clothed with a minute whitish mealiness, whitish when evacuated, tawny or reddish-brown within at the base; columella white, subglobose; flocci slender, colored; spores globose, blackish-brown, with a purplish tinge, .00033′–.00035′ in diameter.

Living leaves and petioles of wood sorrel, *Oxalis Acetosella.* Williamstown, Oswego county. July.

DIDYMIUM SUBROSEUM *n. sp.*

Peridium subglobose, externally farinaceous, pinkish-white; stem short, white, equal or slightly tapering upward; flocci white; spores globose, smooth, purplish-black, 00033′ in diameter.

Bark of butternut trees, *Juglans cinerea.* Williamstown. July

DIDYMIUM FLAVIDUM *n. sp.*

Peridium subglobose, sessile, thin, yellow, clothed with a minute yellow mealiness; spores subglobose, black, .0004′ in diameter.

Bark of dead balsam trees, *Abies balsamea.* North Elba August.

DICTYDIUM UMBILICATUM *Schrad.*

Decaying wood. North Greenbush. June.

LICEA OCHRACEA *n. sp.*

Peridia short, connate, springing from a white gelatinous hypothallus, coated externally with a minute golden-yellow or bright-ochraceous mealiness; spores globose, purplish black, .0004′ in diameter.

Living grass and club moss, *Lycopodium annotinum*. Lake Pleasant. August.

The tufts or patches are small and when moist are of a brown color, but upon drying the yellow color of the minute branny scales or mealiness becomes apparent.

PHOMA PALLENS *B. & C.*

Dead stems of woodbine, *Ampelopsis quinquefolia*. North Greenbush. June.

PHOMA MARIÆ *Clinton n. sp.*

Perithecia minute, punctiform or subhysteriform, covered by the epidermis, black; spores oblong-elliptical somewhat pointed, hyaline, with a nucleus near each end, .00033′ long.

Living stems of *Lonicera flava* and *L. Tartarica*. Buffalo. *Clinton*. November and January.

Dedicated to *Miss Mary L. Wilson*.

SPHÆROPSIS WILSONI *Clinton n. sp.*

Perithecia minute, punctiform, slightly prominent, covered by the epidermis which at length ruptures longitudinally, black; spores oblong-elliptical, colored, .0008′–.0009′ long.

Living stems of *Lonicera flava*. Buffalo. *Clinton*. January.

SPHÆROPSIS CLINTONII *n. sp.*

Perithecia minute, scattered, innate, black; spores elliptical or oblong-elliptical, colored .0005′–.0007′ long.

Decorticated maple wood. Buffalo. *Clinton*. January.

SPHÆROPSIS SQUIERIÆ. *Clinton n. sp.*

Perithecia small, numerous, covered by the epidermis which ruptures longitudinally, black; spores subglobose, colored, .0007′–.0008′ long.

Dead stems of *Aristolochia tomentosa*. Buffalo. *Clinton*. January.

SPHÆROPSIS SAMBUCI *n. sp.*

Perithecia subglobose, scattered or subcæspitose, rather prominent, erumpent, surrounded by the ruptured epidermis, black; spores oblong, colored, .0006′–.0008′ long.

Dead branches of elder, *Sambucus Canadensis*. North Greenbush, November.

Sphaeropsis mutica and *S. macropsora* are said to inhabit the elder, but the former is described as having very small hyaline spores, and the latter as having much larger subfusiform spores.

SPHÆROPSIS BIFORMIS *n. sp.*

Perithecia scattered, erumpent, some minute, rupturing the epidermis slightly, others larger, rupturing the epidermis distinctly, and generally longitudinally; spores variable, obovate elliptical or oblong, sometimes curved, colored, .0006′–.001′ long.

Dead branches of ash, *Fraxinus Americana*. Albany. May.

SPHÆRONEMA OXYSPORUM *Berk.*

Old *Merulius tremellosus*. Forestburgh. September.

SPHÆRONEMA CONFORME *n. sp.*

Perithecia scattered, erumpent, with a long, rigid, spine-like black ostiolum; globule whitish; spores subfusiform, generally curved, often with one or two nuclei, .0006′–.0008′ long.

Dead branches of apple trees. Center. June.

Almost exactly like *S. Spina* and *S. Magnoliæ* externally, but the spores afford distinguishing characters.

DIPLODIA HERBARUM *Lev.*

Dead stems of *Thalictrum cornuti*. Buffalo. *Clinton.*

HENDERSONIA SARMENTORUM *West.*

Dead bark of grape vines. North Greenbush. June.

HENDERSONIA PECKII *Clinton n. sp.*

Perithecia minute, punctiform, covered by the epidermis which is at length ruptured, black; sporophores long, slender; spores oblong, slightly colored, triseptate, shorter than the sporophores, from which they soon separate, .0005′–.0007′ long.

Living stems of *Lonicera flava*. Buffalo. *Clinton*. January.

HENDERSONIA MARIÆ *Clinton n. sp.*

Perithecia as in the preceding species; sporophores shorter than the spores, persistent; spores oblong, often a little curved, five-septate, colored, with the basal cell and sometimes also the apical cell hyaline, about .001′ long.

Living stems of *Lonicera flava*. Buffalo. *Clinton*. January.

SEPTORIA SCROPHULARIÆ *n. sp.*

Spots small, arid, whitish, surrounded by a purplish-rown border; perithecia few, on the upper surface; spores filiform, curved, hyaline, .001′–.0016′ long.

Living leaves of *Scrophularia nodosa*. Buffalo. *Clinton*. Albany. June.

SEPTORIA RHOIDIS *B. & C.*

Leaves of sumach. Forestburgh. September. Buffalo. *Clinton*. October.

SEPTORIA VERBASCICOLA *B. & C.*

Leaves of *Verbascum Blattaria*. Buffalo. *Clinton*. August. The specimens agree with those distributed under this name by the late Dr. Curtis, but so far as I am aware no description has ever been published.

SEPTORIA MACULOSA *Ger.*

Leaves of *Cuphœa viscosissima*. Poughkeepsie. *W. R. Gerard*.

SEPTORIA WILSONI *Clinton n. sp.*

Spots scattered, suborbicular, arid, whitish or pallid, surrounded by a darker border; perithecia minute, blackish; spores filiform, more or less curved, sometimes nucleate, .0015′–.002′ long.

Leaves of *Chelone glabra*. Buffalo. *Clinton*.

SEPTORIA SAMBUCINA *n. sp.*

Spots arid, whitish, surrounded by a broad, dark margin, brown or purplish-brown on the lower surface; perithecia on the upper surface, few, minute; spores long, filiform, more or less curved, obscurely three to six-septate, .002′–.003′ long.

Leaves of elder, *Sambucus Canadensis*. Buffalo. *Clinton*. October.

VERMICULARIA COPTINA *n. sp.*

Perithecia minute, slightly prominent, black, with a tuft of divergent one or two-septate hairs at the apex; spores curved, pointed at each end, hyaline, .0008′–.001′ long.

Dead or dying leaves of gold thread, *Coptis trifolia*. Buffalo. *Clinton*. Sandlake and Sandy Creek. June to October.

DINEMASPORIUM PEZIZULA *B. & C.*

Decaying elder wood. New Baltimore. *Rev. J. L. Zabriskie*. North Greenbush. May and June.

BLASTESIS TRIDENS *Zab.*

Living quince leaves. Flatbush, Long Island. *Zabriskie*.

ASTEROMA ROSÆ *DC.*

Leaves of *Rosa rubiginosa*. Buffalo. *Clinton*. October.

CYTISPORA MICHENERI *B. & C.*

Dead ash branches. Angola. *Clinton*. Greenbush. May. It sometimes renders the branch rough for several feet.

DISCELLA DISCOIDEA *C. & P.*

Erumpent, discoid, reddish when moist, black or blackish when dry, surrounded by the lacerated epidermis which splits in a somewhat stellate manner; perithecia obsolete above; sporophores long, branched or simple, the branches subclavate; spores abundant, oblong or elliptical, colorless, .0008′–.0012′ long, containing a granular endochrome.

Dead branches of the water beech, *Carpinus Americana*. Greenbush. May. (Plate 1, figs. 34–37.)

MELANCONIUM DISSEMINATUM *Fr.*

Decaying wood. Richmondville and Hunter. June and July.

The masses of spores often occupy the summit of little protuberances of the wood, as if the fungus prevented or retarded the decay and wasting away of the woody tissues immediately beneath it.

MELANCONIUM OBLONGUM *B. & C.*

Bark of butternut trees, *Juglans cinerea.* Greenbush. May.

MELANCONIUM MINUTISSIMUM *Schw.*

Bark of *Platanus occidentalis.* Buffalo. *Clinton.* April.

CORYNEUM DISCIFORME *var.* ELLIPTICUM *B. & Br.*

Dead birch branches. Yonkers. *Howe.*

CORYNEUM KUNZEI *Cd.*

Dead branches of white birch, *Betula populifolia.* West Albany. May.

PESTALOZZIA INSIDENS *Zab.*

Bark of Elm trees. New Baltimore. *Zabriskie.* Hunter, Greene county. April and June.

The spores in this species are .0011′–.0015′ in length, exclusive of the long bristles at the extremities. There are generally four central colored cells.

PESTALOZZIA ROSTRATA *Zab.*

Bark of Lonicera and of apple trees. New Baltimore. *Zabriskie.*

Externally this species closely resembles the preceding, but the spores are smaller, being .001′ long, and have no bristle at the base. There are usually four central colored cells. I cannot distinguish the spores of this from those of *P. concentrica B. & R.*, from which, therefore, it differs only in habit and habitat, and to which it ought perhaps to be united.

PESTALOZZIA PECKII *Clinton n. sp.*

Pustules thickly scattered over the surface of the leaf or over indefinite grayish spots, erumpent, black; spores straight or slightly curved, subfusiform, pale, with two or three colored central cells and a hyaline cell at each extremity, .0006′-.0007′ long exclusive of the single short sometimes deciduous apical bristle; pedicels slender, hyaline, about as long as the colored part of the spore.

Under surface of fallen oak leaves, *Quercus alba.* Buffalo. *Clinton.* May.

The apical hyaline cell is somewhat elongated and abruptly contracted into the short straight erect bristle. The species is allied to *P. hysteriiformis*, from which it differs in its much paler spores, more numerous orbicular pustules and absence of spots or in having its indefinite spots not at all concentrically divided.

SEPTONEMA BICOLOR *n. sp.*

Sori small, scattered, varying in color from yellowish to blackish, generally dark olivaceous with a paler or yellowish center; spores elliptical-oblong, somewhat irregular; multicellular, at length rough and opaque.

Decorticated surface of wood. Forestburgh. September.

The species is similar in habit to *S. spilomeum*, but the threads of spores are coarser, the sori are different in color and the spores are both transversely and vertically septate, making them multicellular, although this is seen with difficulty except in the younger spores.

SPORIDESMIUM LEPRARIA *Berk.*

Decaying wood. Sandlake, Rensselaer county.

PUCCINIA BULLARIA *Lk.*

Stems of Sanicula. New Baltimore. *Howe.*

PUCCINIA SMILACIS *Schw.*

Leaves of *Smilax rotundifolia.* Shelter Island. *Clinton.*

PUCCINIA DAYI *Clinton n. sp.*

Spots suborbicular, brown, sori prominent, scattered or confluent, brown; spores oblong-clavate, slightly constricted, .0015′-.0023′ long; peduncle slightly colored, one-half to wholly as long as the spore.

Leaves of *Lysimachia ciliata.* Buffalo. *Clinton.*

Very closely related to *P. Gerardii*, differing chiefly in the darker color of the spots and sori. Dedicated to Mr. D. F. Day.

PUCCINIA CLINTONII *n. sp.*

Spots obliterated; sori amphigenous, clustered or scattered, brown; spores oblong, slightly constricted, .0011′–.0014′ long.

Leaves of Pedicularis. Goat Island. *Clinton.* October.

PUCCINIA SORGHI *Schw.*

Leaves of Indian corn. Buffalo. *Clinton.* West Albany.

UROMYCES GRAMINUM *Cooke.*

Leaves of *Bryzopyrum spicatum.* Shelter Island. *Clinton.* September.

USTILAGO DESTRUENS *Duby.*

Spikes of *Setaria glauca.* Bethlehem. Albany county. September.

PROTOMYCES MENYANTHIS *De Bary.*

Leaves of *Menyanthes trifoliata.* Buffalo. *Clinton.* August.

PERIDERMIUM COLUMNARE *A. & S.*

Leaves of Hemlock trees. *Abies Canadensis.* Sandlake. July.

The more elongated peridia and the yellow or orange colored spores distinguish this species from *P. balsameum.*

ÆCIDIUM DRACONTIATUM *Schw.*

Leaves of *Arisæma Dracontium.* North Greenbush. June.

This species occurs also on leaves of *Arisæma triphyllum.*

CYSTOPUS AMARANTHI *Schw.*

Amaranth leaves. Albany. June and July.

STILBUM AURIFILUM *Ger.*

On *Dædalea unicolor.* Poughkeepsie. *Gerard.*

STILBUM CANDIDUM *n. sp.*

White, when dry slightly tinged with yellow, scarcely one line high, scattered, erumpent from minute chinks in the matrix; head obovate or subglobose; stem slightly tapering upward; spores oblong, colorless, .0004′–.0005′ long.

Dead stems of *Amphicarpœa monoica*. Portville. September. (Plate 1, figs. 25–27.)

STACHYBOTRYS LOBULATA *Berk.*

Damp wall paper. Albany. September.

HAPLOGRAPHIUM APICULATUM *n. sp.*

Flocci simple, septate, black, the tips slightly thickened and papillose; spores almond-shaped, very unequal in size, .0002′–.00066′ long, with a minute apiculus at each end, forming branched moniliform cinereous threads, which diminish in size upward.

Discolored elongated-conical galls of witch hazel leaves. Bethlehem. September. (Plate 1, figs 28–33.)

The galls which this fungus inhabits are those of a plant louse, *Brysocrypta Hamamelidis* Fitch. *Messrs. J. A. Lintner* and *H. F. Bassett.*

MONOTOSPORA BISEPTATA *n. sp.*

Effused, black; flocci erect, simple, septate, slightly thickened at the base, bearing at the apex a single obovate, at first pale and uniseptate, then colored and biseptate spore, .0011′–.0013′ long, .0007′ broad, with the basal cell generally paler than the others.

Decaying wood. Gowanda. *Clinton.* October. (Plate 1, figs. 5–8.)

The specimens are accompanied by *Sphæria hirsuta.*

HELMINTHOSPORIUM URTICÆ *n. sp.*

Flocci forming elongated effused blackish velvety patches, septate, knotty, sometimes slightly branched, the tips paler; spores cylindrical, obtuse, triseptate, colored, about equal in diameter to the flocci, but much shorter, .0006′–.001′ long.

Dead nettle stems. Greenbush. May.

MACROSPORIUM SAPONARIÆ *n. sp.*

Spots arid, suborbicular; flocci short, stout, septate, obtuse, colored; spores oblong-clavate, brown or olivaceous-brown, five to ten-septate, .002′–.0036′ long, including the very short concolorous peduncle.

Leaves of soapwort, *Saponaria officinalis*. Greenbush. September.

The spores are often longer than the flocci.

NEMATOGONUM AURANTIACUM *Desm.*

Cut surface of a birch stump. Lake Pleasant. August.

PERONOSPORA OBLIQUA *Cooke.*

Living leaves of yellow dock, *Rumex crispus*. North Greenbush, October.

PERONOSPORA GERANII *n. sp.*

Effused, sometimes occupying the whole under surface of the leaf, whitish, the flocci irregularly branched, branches short, divaricately spreading, the apices not swollen, furnished with short slender spicules; acrospores globose, .0006′ in diameter.

Living leaves of *Geranium maculatum*. North Greenbush. June.

Related by its spiculose branches to *P. gangliformis*.

ERYSIPHELLA *nov. gen.*

Perithecia destitute of appendages, spores definite.

This genus differs from *Perisporium* in having a definite number of spores in an ascus, and from *Uncinula*, *Microsphæra* and *Erysiphe* in being destitute of appendages.

ERYSIPHELLA AGGREGATA *n. sp.*

Mycelium obscure or concealed; perithecia numerous, densely crowded, subglobose, glabrous, reddish-brown or black; sporangia numerous, ten to twenty, varying from oblong-ovate to subclavate; spores eight, broad, elliptical, .0008′–.0009′ long, .0005′–.0006′ broad.

Fertile aments of alders. North Greenbush. May. (Plate 2, figs. 1–3.)

The perithecia are densely aggregated in the interstices of the aments, giving them a compact blackened appearance. Usually a white meal-like substance more or less involves and, with the crowded perithecia, conceals the mycelium. Sometimes nearly all the aments in a cluster are covered by this fungus.

MICROSPHÆRA PLATANI *Howe.*

Leaves of buttonwood, *Platanus occidentalis.* Yonkers *Howe.*

MICROSPHÆRA SYMPHORICARPI *Howe.*

Leaves of snowberry, *Symphoricarpus racemosus.* Yonkers. *Howe.*

MICROSPHÆRA MENISPERMI *Howe.*

Leaves of moonseed, *Menispermum Canadense.* Yonkers. *Howe.*

MICROSPHÆRA ABBREVIATA *n. sp.*

Mycelium thin; conceptacles small; appendages six to fifteen, hyaline, rough, shorter than the diameter of the conceptacles, many times dichotomous at the tips, the ultimate ramuli curved; sporangia three or four, containing three to five, mostly four, spores; spores large, .001′–.0013′ long, .00066′ broad.

Under surface of dead or languishing oak leaves. Buffalo. *Clinton.* (Plate 2, figs. 4–5.)

Allied to *M. Hedwigii*, from which it is separated because of the short scabrous appendages, etc.

MICROSPHÆRA VAN BRUNTIANA *Ger.*

Living leaves of elder, *Sambucus Canadensis.* Poughkeepsie. *Gerard.* Buffalo. *Clinton.* Oneida. *Warne.* West Albany and Sandlake. July to September.

This species is described as having eight spores in a sporangium, but I have not been able to detect more than four in the specimens which I have examined.

CHÆTOMIUM LANOSUM *n. sp.*

Perithecia small, subglobose, scattered or crowded, densely covered with long woolly hairs, which are either dingy-olivaceous or mouse-colored; asci short, broad, fugacious; spores subglobose, at first pale, then slightly colored, .0003′–.00035′ in diameter, containing a single large nucleus.

On herbarium specimens of grasses. Albany. May.

The soft woolly appearance of the hairs suggests the specific name.

GEOGLOSSUM VELUTIPES *n. sp.*

Subcæspitose, black; club short, compressed; stem densely clothed with a very black velvety pubescence; asci lanceolate; spores fasciculate, at first simple or triseptate, then elongated and nine to eleven-septate, brown, .002′–.005′ long; paraphyses septate, recurved at the tips.

Ground in hemlock woods. Oneida. *Warne.* Northville. August.

This species is easily distinguished both by its somewhat cæspitose habit and its very black hairy stem. The difference between the young and the mature spores is quite noticeable. I have not seen specimens of *G. Walteri*, a hairy species from Australia, but as it is said to have the spores seven-septate it must be distinct from our plant.

PEZIZA ONOTICA *Pers.*

Ground in woods. Williamstown and Northville. August.

P. unicisa is deemed only a form of this species.

PEZIZA REPANDA *Wahl.*

Ground and decaying wood. Croghan. September.

This is not rare in woods and in damp shaded places. It is quite variable in size and in the degree of expansion of the cups.

PEZIZA PALLIDULA *C. & P.*

Decaying beech wood. Croghan. September.

PEZIZA OMPHALODES *Bull.*

Burnt ground. Sandlake. August.

When confluent, as it often is, it has more the appearance of some Corticium than of a Peziza.

PEZIZA FUSICARPA *Ger.*

Ground. Poughkeepsie. *Gerard.* North Greenbush and Williamstown. August.

This, according to specimens received from Dr. Curtis, is the *P. velutina* B. & C. in his Catalogue of North Carolina Plants.

PEZIZA SEPULTA *Fr.*

Sand hills near West Albany. October.

Little openings in the sand reveal the places where these plants lie concealed.

PEZIZA OVILLA *n. sp.*

Small, 1″–2″ in diameter, at first closed and subglobose, then open, cup-shaped or concave, rather firm, minutely tomentose, whitish, the disk sometimes tinged with pink; asci cylindrical; spores fusiform, large, one or two nucleate, .0013′–.0016′ long.

Ground in woods. Sageville. August.

PEZIZA CLANDESTINA *Bull.*

Dead stems of raspberry, *Rubus strigosus.* Sandlake. June.

PEZIZA HYALINA *Pers.*

Decaying wood. Center. June.

PEZIZA CUCURBITÆ *Ger.*

Squashes. Poughkeepsie. *Gerard.*

PEZIZA CINEREA *Batsch.*

Decaying wood. Worcester and Portville. July and September.

PEZIZA CORNEOLA *C. & P.*

Subgregarious, erumpent, soon naked, elevated, pitchy-black, coriaceous or horny; cups at first sphæroid, opening by a narrow paler mouth, opaque, subrugose, at length cup-shaped, margin inflexed, disk pallid tawny-gray; asci clavate or cylindrical; spores narrowly elliptical, binucleate, hyaline, .0004′–.0005′ long.

Decaying stems of herbs. North Greenbush. June.

PEZIZA ATROCINEREA *Cooke.*

Dead stems of Solidago. Albany. June.

PEZIZA SUBATRA *C. & P.*

Gregarious, erumpent, black, soft or waxy; cups at first hemispherical, then open, smooth or slightly rugose, disk fuliginous, margin paler; asci subcylindrical; spores cylindrical, straight or curved, with two or three nuclei, .0006′ long.

Dead stems of herbs. North Greenbush. June.

The species is allied to *P. atrata*, *P. ebuli* and *P. sphærioides*, but it differs in fruit and in the more fibrous structure of the cup.

PEZIZA SCIRPINA *n. sp.*

Minute, scattered, erumpent, glabrous, black externally, paler or grayish within; asci oblong; spores crowded, fusiform, straight or slightly curved, binucleate, colorless, .0008′–.001′ long.

Dead stems of *Scirpus cæspitosus*. Adirondack Mountains. July.

PEZIZA PTERIDIS *A. & S.*

Dead fern stems. North Greenbush. June.

HELOTIUM PILEATUM *n. sp.*

Subhemispherical or pileiform, stipitate, smooth, whitish, under surface flattened and slightly pruinose; stem rather long, white, pruinose; spores oblong, hyaline, .0004′–.0005′ long.

Decaying herbaceous stems in wet places. Hunter, Greene county. June. (Plate 1, figs. 11–14.)

The fresh plant, which is scarcely half an inch high, looks like some very small white Agaricus.

HELOTIUM SALICELLUM *Fr.*

Dead willow twigs. Buffalo. *Clinton.* Dead grape vines. Albany. October.

DERMATEA CINNAMOMEA *C. & P.*

Subcæspitose, erumpent, subsessile, surrounded by the ruptured epidermis, somewhat coriaceous, externally pulverulent, cinnamon colored, margin involute, disk brown, nearly plane, somewhat angular when dry; asci elongated-clavate; spores narrowly elliptical, simple, .0005′ long.

Dead branches of poplars. Shandaken. June.

PATELLARIA FUSISPORA *C. & P.*

Gregarious immarginate, dull black, orbicular, regular, convex, lenticular, somewhat coriaceous; asci cylindrical, attenuated at the base; spores lanceolate, uniseptate at first with each cell binucleate, ultimately brown,

.0008′–0009′ long, .0002′ broad; paraphyses slender, simple, slightly thickened above.

Decaying wood. Portville. September.

PATELLARIA DISPERSA *Ger.*

Bark of *Juniperus Virginiana.* Poughkeepsie. *Gerard.* New Baltimore. *Howe.*

PATELLARIA FENESTRATA *C. & P.*

Scattered, dull black, somewhat soft and waxy when moist, discoid, rather irregular when dry, margin rounded, elevated, contracted when dry, disk plane or convex, sometimes depressed or umbilicate in the center; asci subclavate; spores four to eight, involved in mucus, large, pyriform, multiseptate, fenestrate, brown, .0018′–.002′ long; paraphyses slightly clavate.

Dead branches of poplar. Center. October and November.

This species closely resembles the preceding one, but it is less scattered in its mode of growth, the spores are longer in proportion to their breadth, and are involved in mucus.

SPHINCTRINA TIGILLARIS *B. & Br.*

On *Polyporus abietinus.* Albany. Buffalo. *Clinton.* The spores in our specimens are .0003′–.0006′ long.

CENANGIUM AUCUPARIÆ *Fr.*

Dead branches of mountain ash, *Pyrus Americana.* Keene, Essex county. July.

CENANGIUM RUBI *Fr.*

Dead stems of raspberry. North Greenbush. May.

CENANGIUM DEFORMATUM *n. sp.*

Small, crowded or scattered, at first irregular or subspherical then opening at the top and becoming discoid with an irregular or ruptured margin, black; spores crowded, elliptical, at first pale with the endochrome centrally parted, then colored and uniseptate, .0011′–.0013′ long.

Dead bark of *Juniperus Virginiana.* Greenbush. May.

When young the plants resemble some small irregular Sphæria. They sometimes manifest a tendency to grow in lines.

STICTIS PUPULA *Fr.*

Dead poplar branches. Center. October and November.

STICTIS HYSTERINA *Fr.*

Decorticated pine branches. Guilderland. May.

STICTIS QUERCINA *n. sp.*

Amphigenous, scattered, minute, erumpent, the epidermis split into three or four blunt laciniæ or teeth; disk white; asci subcylindrical; spores filiform, .0016′–.0026′ long.

Fallen oak leaves. Port Jervis. September.
It is related to *S. phacidioides*, from which its amphigenous habit and fewer blunt teeth will separate it.

RHYTISMA URTICÆ *Fr.*

Dead nettle stems. Greenbush. May. Sterile.

HYSTERIUM VIXVISIBILE *Ger.*

Dead branches. Poughkeepsie. *Gerard.*

I am not fully satisfied that this is any thing more than a small variety of *H. angustatum.*

HYSTERIUM CLAVISPORUM *C. & P.*

Dead stems of reeds, *Phragmites communis.* Buffalo. *Clinton.* Tyre. September.

The spores are colored and multiseptate, and by their clavate form suggest the specific name.

HYSTERIUM ROUSSELII *De Not.*

Decaying wood. Tyre and Lake Pleasant. August and September.

HYSTERIUM MAGNOSPORIUM *Ger.*

Decaying hickory wood. Poughkeepsie. *Gerard.*

COLPOMA LACTEUM *n. sp.*

Perithecia scattered, erumpent, thin, black, the longitudinally ruptured epidermis closely appressed; disk plane, milk white; asci subcylindrical or clavate; spores filiform, .002′–.003′ long.

Dead stems of Labrador tea, *Ledum latifolium.* Sandlake. June.

When moist the perithecium gaps widely, revealing the conspicuous white disk. This and the different habit distinguish the species from *Xyloma Ledi*.

AILOGRAPHUM SUBCONFLUENS *n. sp.*

Perithecia, small, numerous, thin, scattered, or subconfluent; orbicular, elliptical or elongated, black; asci oblong; spores oblong-clavate, hyaline, .003′–.004′ long.

Dead stems of herbs. North Greenbush. June.

This appears to the naked eye much like some Leptostroma.

TORRUBIA CLAVULATA *Schw.*

On dead scale insects of black-ash branches. Lake Pleasant. August.

Schweinitz describes his *Sphæria clavulata* as growing on a fibrillose-membranaceous shield-shaped subiculum which adheres closely to the bark of living branches of oak trees, *Quercus palustris* and *Q. coccinea.* Our plant grows on the flattened discolored or blackened bodies of a scale insect found on living branches of *Fraxinus sambucifolia.* Notwithstanding this difference in habitat and a slight discrepancy in the arrangement of the perithecia, the species is so remarkable and so well characterized that I cannot believe our plant to be specifically distinct. It is the smallest Torrubia known to me, and does not well agree with the generic character. It occurs on young and half grown as well as on full grown insects, but I have not been able to determine whether it attacks the insect while living or only after death.

TORRUBIA SUPERFICIALIS *n sp.*

Slender, about 1′ high, smooth, brown, the sterile apex gradually tapering to a point; perithecia crowded, superficial, subglobose, blackish-brown, sometimes collapsed, with a small papilliform ostiolum; asci cylindrical; spores long, slender, filiform.

Under hemlock trees on buried larvæ. Northville. August.

Related to and intermediate between *T. Ravenelii* and *T. Carolinensis.* The stem of the plant is about equal in length to the club or perithecia-bearing part. The perithecia are more loosely placed at the extremities of the club, thereby giving it a subfusiform shape. The spores are more slender than those of *T. Carolinensis* but the plant itself is less elongated and slender.

EPICHLŒ TYPHINA *Berk.*

Living stems of Carex. Oneida. *Warne.*

I do not know that this plant has before been detected in this country.

NECTRIA SANGUINEA *Fr.*

Cut surface of maple wood. Williamstown. July.

HYPOXYLON FUSCOPURPUREUM *Schw.*

Old rails and decaying wood. Sandlake.

HYPOXYLON SASSAFRAS *Schw.*

Bark of *Sassafras officinale.* Yonkers. *Howe.*

DOTHIDEA LINDERÆ *Ger.*

Dead stems of the spice bush, *Lindera Benzoin.* Albany. October.

MELOGRAMMA BULLIARDI *Tul.*

Bark of hornbeam. La Salle, Niagara county. *Clinton.* May.

DIATRYPE ASPERA *Fr.*

Dead stems of Cornus. Tyre. September.

DIATRYPE DISCOIDEA *C. & P.*

Stroma orbicular or elliptical, transversely erumpent, surrounded by the epidermis, disk naked, plane, grayish-black; ostiola small, scarcely exserted, nearly smooth or four to six sulcate, perithecia six to twelve, ovate; asci small, linear-clavate, stipitate, polysporous; spores cylindrical, curved or straight, slightly colored, .0002′ long; paraphyses filiform.

Dead branches of white birch, *Betula populifolia.* Center. October.

When the outer bark is torn away the fungus comes off with it. The species belongs to the subgenus Diatrypella and is closely related to *D. quercina.* There are two forms, one with the stroma small, narrow, and transversely erumpent, the other larger and suborbicular.

Diatrype prominens *Howe.*

Bark of *Platanus occidentalis.* Yonkers. *Howe.*

Diatrype anomala *n. sp.*

Pustules prominent, subrotund or elliptical, 1″–2″ in diameter, erumpent, penetrating the wood, generally with a thin black crust beneath and around them, the disk convex or slightly depressed, rough, brown or black, sometimes whitish-pulverulent; perithecia crowded, deeply imbedded in the stroma, often elongated; ostiola scattered or crowded, convex, often radiate-sulcate, black; asci short, broad, firgacious; spores crowded, elliptical, simple, often with a nucleus at each end, colorless, .0003′–00035′ long.

Stems of hazel bushes living or dead. Albany. May.

The pustules sometimes appear in long lines or series. The peculiar and anomalous character of this species is found in its unusual spores and in its attacking living stems.

Melanconis bicornis *Cooke.*

Perithecia circinating, five to seven, seated beneath the epidermis which is but slightly elevated; ostiola short, convergent, just piercing the epidermis, with a regular orifice; spores expelled when mature, blackening the matrix round the ostiola, fasciculate, obtusely fusiform, straight or curved, triseptate, brown, .0026′–.0033′ long, scarcely constricted, ultimate cells smallest, each extremity tapering into a hyaline at first straight then curved or flexuous cornute appendage, one-half to one-third the length of the spore.

Bark of *Platanus occidentalis.* La Salle. *Clinton.* Greenbush. March and May.

Allied to *Melanconis Berkelei* Tul., but distinct. When the epidermis is torn away, the perithecia come off with it. They are slightly whitish-floccose or tomentose above.

Valsa Prunastri *Fr.*

Dead branches of plum or cherry. Greenbush. June.

Valsa Rubi *n. sp.*

Perithecia crowded, irregular, black, white within, forming a small pustule which is covered by the whitened epidermis; ostiola crowded, piercing and generally obliterating the minute rusty-brown erumpent disk, not prominent, black; asci subclavate; spores eight, curved, simple, colorless, .0003′–.0004′ long.

Dead stems of blackberry, *Rubus villosus*. Forestburgh. September.

The epidermis is paler in the patches where the pustules occur. The disk appears to the naked eye like a minute black dot though it usually contains from eight to sixteen ostiola. The species is clearly distinct from *S. rubincola* Schw.

VALSA WOOLWORTHI *n. sp.*

Minute, erumpent; perithecia two to six, nestling in the inner bark; ostiola crowded, slightly prominent, barely exserted through the longitudinally ruptured epidermis; spores crowded or biseriate, oblong or subfusiform, uniseptate, mostly four-nucleate, nearly colorless, .0004′ long.

Dead oak or hickory branches. Greenbush. May.

The clusters of perithecia are very numerous and usually occur in series, the epidermis being ruptured continuously from one to another. Respectfully dedicated to *Hon. S. B. Woolworth.*

VALSA LEIPHEMIA *Fr.*

Dead oak branches. North Greenbush. May.

VALSA OXYSPORA *n. sp.*

Pustules scattered, subconical, erumpent, blackish externally, surrounded by the triangularly or stellately ruptured epidermis; perithecia sunk to the wood, when broken off leaving a whitish spot circumscribed by a faint blackish line; ostiola few, short; spores crowded or biseriate, colorless, oblong-elliptical, slightly constricted in the middle, uniseptate, quadrinucleate, with a bristle-like appendage at each end, .0006′ long.

Dead oak branches. Sandlake. August. (Plate 2, figs. 26–29.)

VALSA OBSCURA *n. sp.*

Pustules minute, sunk to the wood, erumpent; ostiola three to eight, slightly prominent; asci subcylindrical;

spores crowded or biseriate, simple or obscurely uniseptate, oblong, narrower toward one end, hyaline, with a minute bristle at each end, .0003′ long.

Dead stems of raspberry, *Rubus strigosus*. Albany. May.

The septum is not always clearly visible. When present it divides the spore into two unequal parts.

The appendages are so small as to be easily overlooked. The bark is generally stellately split over the pustules.

Valsa mucronata *n. sp.*

Perithecia four to eight, rather large, nestling in the inner bark, surrounded by a black line; ostiola separately erumpent, not collected in a disk, slightly prominent, black, sometimes circumscribed by an obscure black line; asci lanceolate; spores crowded, large, uniseptate, colorless, .0016′–.0021′ long, generally with a short appendage or mucro at each end.

Dead willow branches. Sandlake. September. (Plate 2, figs. 10–13.)

This species is very distinct both in its separately erumpent ostiola and in its spores. The appendages are so short as to resemble a little mucro, whence the specific name. It is an aberrant species, the ostiola not agreeing well with the generic character.

Valsa acerina *n. sp.*

Pustules small, erumpent; perithecia sunk in the wood, covered above by a thin blackish crust and surrounded by a black line; ostiola prominent, elongated-conical or cylindrical; spores oblong or subelliptical, subacute, colorless, .0005′ long, the endochrome one to three times divided.

Dead branches of *Acer spicatum*. Indian Lake. July.

Valsa suffusa *Fr.*

Dead alder branches. Buffalo. *Clinton.*

Valsa femoralis *n. sp.*

Pustules small; perithecia few, nestling in the inner bark; ostiola few, black, short, erumpent through small and mostly transverse chinks, crowded or scattered; asci lanceolate; spores crowded, elongated, sublinear, straight or slightly flexuous, obtuse, slightly thickened at the ends, .0013′–.003′ long.

Dead alder branches. West Albany and Greenbush. Also on dead branches of basswood. Buffalo. *Clinton.*

Closely related to *Valsa suffusa*, but the spores are shorter and thickened at each end and the ostiola are not always crowded in the center of the disk. The perithecia adhere to the epidermis and are torn away with it. The name is suggested by the resemblance of the spores to a *femur*.

VALSA SAMBUCINA *n. sp.*

Pustules erumpent, sometimes seriately placed; ostiola slightly prominent, even or radiately sulcate, scattered or crowded; asci linear; spores eight, uniseriate, oblong, colored, triseptate, .0005′–.0006′ long.

Dead stems and branches of elder. Catskill Mountains. June.

When young the spores are paler. The pustules vary much in size, those on the branches being larger and more scattered than those on the main stems or trunks.

CUCURBITARIA ALNEA *n. sp.*

Perithecia cæspitose, erumpent, astomous, black, white within, the tufts closely surrounded by the transversely ruptured epidermis; spores uniseriate, uniseptate, subacuminate, constricted at the septum, nearly colorless, with one or two nuclei in each cell, .0008′–.001′ long.

Dead alders, Center. May.

Torula alnea is associated with this species and may be a condition of it.

CUCURBITARIA SERIATA *n. sp.*

Perithecia cæspitose, erumpent in long flexuous interrupted lines, small, nearly globose, black, white within, sometimes collapsing, the stroma if present merely cortical and subferruginous; asci cylindrical or subclavate; spores uniseriate or rarely crowded, uniseptate, oblong-elliptical, slightly constricted at the septum, hyaline, .0004′–.0005′ long.

Dead bark of Euonymus. Albany. October. *Dr. C. Devol.*

LOPHIOSTOMA JERDONI *B. & Br.*

Bark of elm. New Baltimore. *Zabriskie.* Dead stems of raspberry. West Albany. October.

LOPHIOSTOMA SCROPHULARIÆ *n. sp.*

Perithecia scattered, minute, covered by the epidermis; ostiola small, compressed, piercing the epidermis; asci cylindrical; spores crowded or biseriate, subfusiform, uniseptate, with two large nuclei in each cell, strongly constricted at the septum and sometimes also between the nuclei, straight or slightly curved, colorless, .001′ long.

Dead stems of *Scrophularia nodosa.* Green Island. October.

Sometimes a small additional nucleus is seen at the extremities of the spore, thus making three in each cell. The smaller spores will separate this species from *L. angustilabra* and *L. sexnucleata*, to which it is related.

LOPHIOSTOMA TRISEPTATA *n. sp.*

Perithecia scattered, sunk in the wood, black, with a narrow compressed ostiolum; asci linear; spores uniseriate, rarely crowded, oblong-elliptical, triseptate, colored, .0006′–.0007′ long, slightly constricted at the septa.

Decaying wood. Buffalo. *Clinton.* Sterling. Cayuga county. August.

LOPHIOSTOMA SPIRÆÆ *n. sp.*

Perithecia scattered, sunk to the wood, closely covered by the bark which is pierced by the compressed ostiola; spores crowded or biseriate, elongated-fusiform, straight or curved, colorless, about seven-septate, usually with a nucleus in each cell, .0016′–.0023′ long.

Dead branches of *Spiræa opulifolia.* Rhinebeck. June.

The septa of the spores are not very distinct, especially toward the extremities. The nuclei are not regularly placed, and sometimes one or two very small additional ones occur in some of the cells. Rarely one of the central cells is swollen.

LOPHIOSTOMA MACROSTOMA *Fr.*

Bark of maple trees. Northampton. August.

The spores in our specimens are a little longer than in the European plant, and are occasionally nine-septate. The terminal cells, too, are slightly colored, but paler than the others.

SPHÆRIA CALLISTA *B. & C.*

Dead branches of *Cornus alternifolia*. Buffalo. *Clinton.* Sandlake. Autumn and spring.

I do not know that any description of this species has been published, but our specimens agree with those representing it in Ravenel's *Fungi Exsiccati Caroliniani.* The perithecia become pezizoid-collapsed, and the asci contain numerous small curved colorless spores, as in some species of Nectria.

SPHÆRIA PHÆOSTROMOIDES *n. sp.*

Conidia. Flocci simple or branched, septate, some of them nodose, globosely inflated at the apex ; spores apical, oblong, obtuse, uniseptate, centrally constricted, colored, .0005′–.0007′ long.

Ascophore. Perithecia gregarious, minute, globose, then collapsing, rugulose, seated on a black subiculum ; asci subfusiform ; spores crowded, subfusiform or cylindrical, slightly curved, triseptate, colored, .001′ long, the terminal cells colorless, the others sometimes nucleate.

Dead branches lying on the ground. North Greenbush. September. (Plate 2, figs. 30–35.)

This plant appears to be the American analogue of *S. phæostroma*, from which it scarcely differs except in its shorter spores and uniseptate conidia. So closely does the subiculum of our plant resemble *Cladotrichum triseptatum*, that it might readily be taken for a Cladotrichum with uniseptate spores.

SPHÆRIA SUBCORTICALIS *n. sp.*

Perithecia rather large, thin, sometimes collapsed, black, involved in a dense blackish-brown tomentum which is sometimes confluent, forming a subiculum; spores oblong, colorless, .0003′ long.

Dead bark of water beech, *Carpinus Americana.* North Greenbush. June.

When the perithecia are crowded the tomentum runs together forming a subiculum, when scattered, it surrounds each separately. They are seated on the inner bark and are entirely concealed by the epidermis. When this is torn away the perithecia usually come off with it. The specific name is given in allusion to the place of growth. This and the two preceding species belong to the *Byssisedæ.*

SPHÆRIA HIRTISSIMA *n. sp.*

Perithecia scattered or crowded, superficial, ovate or subglobose, black, densely clothed with rather short rigid black hairs; asci linear; spores uniseriate, broadly elliptical or subglobose, colored, .0005′ long.

Decaying pine wood. Center. November.
The perithecia are a little smaller than those of *S. hirsuta.* The asci are quite fugacious. The species belongs to the *Villosæ.*

SPHÆRIA EXIMIA *n. sp.*

Perithecia free, ovate or subconical, clothed with short hairs, black; ostiola smooth, papilliform; spores crowded, elliptical, colored, .001′–.0012′ long, with a very long fine hyaline appendage at each end, the base of one attached to a firm tapering point or process at one end of the spore.

Dung of hares in wet places. Kasoag, Oswego county. July. (Plate 2, figs. 14–17.)
This species is remarkable for the extremely long, slender appendages which are several times the length of the spore.

SPHÆRIA VALSOIDES *n. sp.*

Perithecia sunk in the matrix, scattered, black, with a few rigid bristle-like processes at the apex; asci subclavate; spores crowded or biseriate, oblong-elliptical, at first greenish, then brown, .0011′–.0013′ long, generally with a single nucleus and a short stem-like colorless appendage at the base.

Cow dung. Sageville. August.
The caudate appendage is usually about half as long as the spore. The erect processes at the apex of the perithecia are suggestive of a minute species of Valsa, whence the specific name.

SPHÆRIA MINIMA *Awd.*

Dung of hares. Providence. Also on horse dung. Beth lehem. August and September.

SPHÆRIA CANINA *n. sp.*

Perithecia minute, scattered or crowded, free, subglobose, reddish-brown or dark amber color, then blackish; asci broad, oblong or oblanceolate; spores numerous, elliptical, slightly colored, .00025′–.0003′ long.

Dung of dogs. Bethlehem. May.

SPHÆRIA ACERVALIS *var.* JUNIPERI *West.*

Dead wood and branches of red cedar, *Juniperus Virginiana.* Buffalo. *Clinton.*

SPHÆRIA MONOSPERMA *n. sp.*

Perithecia scattered, convex or hemispherical, partly covered by the fibres of the wood, smooth, black, pierced; asci oblong or lanceolate, containing a single spore; paraphyses numerous, filiform; spores very large, oblong or subfusiform, obtuse, fenestrate, sometimes obscurely multiseptate, yellowish or pale-brown, .003′–.006′ long.

Decorticated birch wood. Forestburgh. September. (Plate 2, figs. 36–39.)

Remarkable for producing but one spore in an ascus. When young the asci are filled with a granular endochrome which is gradually absorbed in the formation in each of a single large cellular spore which scarcely differs in color from the original contents of the ascus. In the best developed specimens the ostiolum when magnified appears to occupy the center of a small orbicular depressed disk.

SPHÆRIA SCORIADEA *Fr.* *Verrucaria conferta* Tayl.

Dead birch branches. Center. June.

There is some doubt whether this is a fungus or a lichen.

SPHÆRIA PLATANICOLA *Howe.*

Branchlets of *Platanus occidentalis.* Yonkers. *Howe.*

SPHÆRIA PULICARIS *Pers.*

Dead stems of Indian corn. North Greenbush. October.

Not having access to Persoon's description, our specimens were determined by comparison with those in Ravenel's *Fungi Exsiccati Caroliniani.* *Sphæria pulicaris* Fr., now referred to the genus Nectria, seems to be different.

SPHÆRIA RUBEFACIENS *n. sp.*

Perithecia minute, scattered, subglobose, smooth, black, nearly free, abruptly tapering into the long slender subulate ostiola; asci clavate, fugacious; spores elliptical, colored, .00018′–.0002′ long, .00012′ broad.

Decorticated wood of deciduous trees. Forestburgh. September. Buffalo. *Clinton.*

The surface of the wood on which it grows is variegated with red stains, whence the specific name. The long ostiola crowned by the mass of spores have the appearance of some minute species of Calicium. The plant belongs to the *Ceratostomæ*, and is closely related to *Sphæria pilifera*, but the type of that species grows on pine wood and produces no red stains. Its spores appear to be unknown, and unless they shall be found to correspond with those above described, this must be considered a distinct species.

SPHÆRIA URTICÆ *Rabh.*

Dead stems of nettles. Greenbush. May.

The spores are shorter in our specimens than the dimensions given in the description, but this difference is probably only varietal.

SPHÆRIA DATURÆ *Schw.*

Dead stems of *Datura Tatula.* Buffalo. *Clinton.* October.

SPHÆRIA TUBÆFORMIS *Tode.*

Fallen alder leaves. West Albany. May.

SPHÆRIA MIRABILIS *n. sp.*

Perithecia scattered, innate, subglobose, membranaceous, tough, black, ostiola long, slender, curved or flexuous, lateral; asci broadly fusiform; spores crowded, elongated, subfusiform, hyaline, generally four to many-nucleate, .0011′–.0013′ long, with a slight appendage at one or both ends.

Fallen birch leaves. Bethlehem. June. (Plate 2, figs. 18–21.)

The species is remarkable for its lateral ostiola, which are about equal in length to the diameter of the perithecia.

SPHÆRIA PERISPORIOIDES *B. & C.*

Upper surface of living leaves of *Desmodium Canadense.*

I find no description of this species, and make the determination by comparison with Ravenel's specimens in *Fungi Exsiccati Caroliniani*, with which ours agree in habit, although his occur on Rhyncosia leaves and are destitute of fruit. To this extent ours must be regarded as doubtful.

SPHÆRELLA OBLIVIA *Cooke.*

Fallen leaves of *Rhododendron maximum.* Buffalo. *Clinton.*

SPHÆRELLA CARPINEA *Fr.*

Fallen leaves of *Carpinus Americana.* Buffalo. *Clinton.* North Greenbush. May.

SPHÆRELLA SPARSA *Awd.*

Fallen leaves of beech and basswood. Buffalo. *Clinton.* Also on chestnut leaves. North Greenbush. May.

SPHÆRELLA INDISTINCTA *n. sp.*

Perithecia minute, innate, slightly prominent, scattered or subgregarious, globose, black; asci subcylindrical, .0014′–.0018′ long; spores crowded, elongated, hyaline, simple or obscurely uniseptate, .001′–.0011′ long, generally slightly curved.

Dead leaves of *Pteris aquilina.* Center. June.

The perithecia are so small as to be easily overlooked. The spores are quite unlike those of *Sphærella Pteridis*, being twice as long and not distinctly septate.

SPHÆRELLA ORBICULARIS *n. sp.*

Perithecia minute, innate, covered by the epidermis which is at length pierced or ruptured, occupying distinct or subconfluent orbicular brownish spots; asci subcylindrical; spores oblong, uniseptate, colored, .0004′–.0005′ long.

Upper surface of fallen poplar leaves. Center and North Greenbush. June.

The spots on the leaves resemble those of *Venturia orbicula* on oak leaves. Sometimes the epidermis peels off revealing the perithecia beneath. These are often more numerous near the margin of the spot than in the center.

VENTURIA MYRTILLI *Cooke.*

Fallen leaves. New Scotland. Albany county. June.

VENTURIA MACULANS *n. sp.*

Perithecia very minute, innate, seated on small irregular more or less confluent grayish-brown spots, crowned by a few rigid black hairs or setæ; asci rather broad, often narrowed above; spores crowded or biseriate, at first hyaline, then yellowish, uniseptate, with the cells unequal, slightly constricted at the septum, .00035′–.0005′ long.

Fallen leaves of *Betula populifolia*. Center. May.

VENTURIA CLINTONII *n. sp.*

Gregarious in indeterminate suborbicular patches; perithecia nearly free, globose, black, hispid with few straight black bristles; asci linear; spores obovate, uniseriate, uniseptate, yellowish or yellowish-brown, .0004′ long, the septum usually nearest the small end.

Under surface of fallen leaves of *Cornus circinata*. Buffalo. *Clinton*. May. (Plate 2, figs. 22–25.)

The decidedly colored uniseriate spores afford a peculiar character in this species.

VENTURIA KALMIÆ *n. sp.*

Perithecia minute, prominent, centrally aggregated on small orbicular brown spots or scattered along the midrib, black-bristly with straight rigid divergent black hairs; asci subcylindrical, .0013′ long; spores oblong or subfusiform, minutely nucleate, .00035′ long.

Upper surface of living leaves of *Kalmia glauca*. Kasoag. July. (Plate 2, figs. 6–9.)

The affected leaves are the older ones occupying the lower part of the stem.

NEW STATIONS OF RARE PLANTS, REMARKS AND OBSERVATIONS.

BRASENIA PELTATA *Pursh.*

Mud Pond near the base of Mt. Dix. Also in many other lakes and ponds of the Adirondack region. *V. Colvin.*

SOLEA CONCOLOR *Ging.*

Manlius. *Wibbe.* Pine Plains. *L. H. Hoysradt.* "New Lebanon near the Shaker Settlement." *Beck Herbarium.*

POTENTILLA TRIDENTATA *Ait.*

Top of Stissing Mountain near Pine Plains. *Hoysradt.*

AMELANCHIER CANADENSIS V. OLIGOCARPA *T. & G.*

The fruit of this variety, as it occurs in the Adirondack region, is ellipsoid. It is not quite as juicy and pleasant to the taste as the globose fruit of the other varieties.

NARDOSMIA PALMATA *Hook.*

Buttermilk Glen, Ithaca. *Prof. Prentiss. G. W. Wood.* Machias, Wyoming county. *Clinton.*

RHODODENDRON MAXIMUM *L.*

Machias. *Clinton.* Also near West Hurley, Ulster county.

PRIMULA MISTASSINICA *Mx.*

Fall Creek Gorge, Ithaca. *Prof. Prentiss.*

PINGUICULA VULGARIS *L.*

Cascadilla Ravine, Ithaca. *Prof. Prentiss.* Portage. *Clinton.*

AMARANTUS SPINOSUS *L.*

Waste places about Brooklyn. *M. Ruger.*

ARCEUTHOBIUM PUSILLUM *Pk.*

Kasoag, Oswego county; also Providence, Saratoga county, thus making five counties in the State in which this plant has been found. In all these localities it inhabits spruces in low grounds or marshes. At Kasoag there are a few dead trees giving evidence of having been inhabited by this parasite to which possibly their death is due.

ABIES BALSAMEA *Marshall.*

This occurs in the Stony Clove, Catskill Mountains, in a prostrate or ascending bush-like form resembling the common juniper, the American yew and the prostrate form of the black spruce as it is found on the high Adirondack summits.

ARISÆMA TRIPHYLLUM *Torr.*

This plant with us is quite constantly diœcious. During two or three successive seasons I have examined scores of plants in various localities in the vain effort to find a specimen with monœcious inflorescence. Can it be that the monœcious character is giving way, under altered climatic conditions, to a diœcious one?

TRILLIUM ERECTUM V. ALBUM *Pursh.*

Ithaca. *Prof. Prentiss.*

ALLIUM CANADENSE *Kalm.*

Alluvial banks of the Hudson. North Greenbush. June.

SCLERIA VERTICILLATA *Muhl.*

Near Woodside, Long Island. *Kruger.* Mr. Kruger observes that the fresh plant has a pleasant vanilla-like odor. Rev. J. A. Paine also speaks of its fragrance.

ORYZOPSIS CANADENSIS *Torr.*

Sandy soil near Center.

POA ALSODES *Gray.*

Shaded banks. Catskill Mountains.

MILLIUM EFFUSUM *L.*

Stony Clove, Catskill Mountains.

PANICUM AGROSTOIDES *Spreng.*

Near Northampton, Fulton county.

ASPIDIUM NOVEBORACENSE V. FRAGRANS.

New Pond, Essex county. *Mrs. L. A. Millington.* Mrs. Millington observes that the fronds are very tall, "sometimes three feet high," that the sori at length spread over the whole under surface and that there is a marked vanilla-like odor which persists even in the dried specimens.

LYGODIUM PALMATUM *Sw.*

Hunter. This, so far as I know, is the only New York station for this rare fern. The credit of its discovery belongs, I believe, to *Miss M. C. Reynolds.* Fertile specimens have been sent me by *Mr. J. T. Lockwood.*

BOTRYCHIUM LANCEOLATUM *Angst.*

Near Northampton and Northville. August.

AZOLLA CAROLINIANA *Willd.*

Black Creek near Oneida Lake. *Warne.*

PANNARIA PETERSII *Tuck.*

The specimen reported under this name and also those reported as *Verrucaria pinguicula* Mass. are not in good condition and therefore uncertain. *Willey.*

AGARICUS ADMIRABILIS *Pk.*

A variety with brown pileus and white stem was found at Lake Pleasant associated with the typical form.

AGARICUS SYLVATICUS *Schæff.*

Ground under pine trees. Northampton. August.

CORTINARIUS SQUAMULOSUS *Pk.*

This species was discovered in 1869 and had not since been observed by the writer until the past season. It is manifestly a species of rare occurrence.

PHALLUS IMPUDICUS *Fr.*

When this plant begins to decay the odor is extremely offensive and not unfrequently is the first intimation given of the presence of the fungus. The carrion beetle, *Necrophila Americana*, sometimes feeds upon this loathsome substance, doubtless deeming it equal to putrefying flesh.

PHYSARUM CÆSPITOSUM *Pk.*

Since the publication of this species I find that the name was preoccupied, and as a reexamination shows it to be a better Licea than Physarum, I would substitute *Licea cæspitosa* Pk. for the above name.

PUCCINIA MESOMAJALIS *B. & C.*

The species published under this name has been redescribed in Grevillea, by Rev. M. J. Berkeley under the name *Puccinia mesomegala* B. & C.

USTILAGO MONTAGNEI *Tul.*

On *Rhynchospora glomerata.* Long Island. *Miller.*

The spores are a little larger than in the form found on *R. alba*. It is probably *U. Montagnei* var. *major* Desm.

PHRAGMIDIUM MUCRONATUM *Lk.*

The typical form occurs on rose leaves in Oneida. *Warne.*

American specimens generally have the spores more opaque and with two or three more septa than the typical form. This variant form might be called var. *Americanum.*

PERIDERMIUM ELATINUM *A. & S.*

Glens Falls. *Mrs. Millington.* Also in Stony Clove, Catskill mountains. Thus far we have seen it on the leaves of the balsam only, and several interesting and peculiar features are indicated. Unlike our other species this one attacks *all the leaves* on an affected branch. These have a sickly yellowish hue, stand out on all sides of the branch and do not attain more than half their usual size. They fall off each year so that leaves are found only on the *terminal* shoots of the affected branches, the internodes of the previous years being entirely destitute of foliage. The fungus therefore appears in reality to be *perennial*, for having once attacked a branch it reappears year after year on the successive crops of leaves, apparently loosening its vampire-like hold only upon the death of the branch. Fortunately it spreads only *outwardly* or in the direction of growth. Hence all the affected branches of a tree if traced back will be found to have a common origin and at this common starting point there is usually a swollen or seemingly injured place in the main branch. From this point the ramification becomes excessive and crowded, exactly similar to that so often seen in spruce trees when attacked by *Arceuthobium pusillum.* All the branches given off below this point are unaffected, all given off above it are affected. Whether the fungus originates this affected point in the branch or not is yet a question, also how long an affected branch will continue to live and support its parasite and whether by the application of sulphur or any other antidote the fungus may be killed and the life of the branch preserved. An obvious remedy would be to cut off the branch below the affected point.

MORCHELLA ESCULENTA *Fr.*

This species, with us as in Europe, is quite variable. The most common form about Albany is whitish or pallid throughout and answers to the variety *rotunda* except in the form of the pileus which is obtusely conical rather than rounded. Whenever I have met with this form it has been under or in the vicinity of pine trees. Another form has the pileus narrowly conical and darker colored than the stem, which is frequently equal to the pileus in diameter. This is nearest the variety *conica*. It has been found at Albany, *Prof. J. Hall*, and near Utica, *Hon. H. Seymour*. A third form has the stem quite long, even exceeding the pileus in length. It merits the name of variety *longipes*. I have seen dried specimens only and do not know the color of the fresh specimens. They were collected near Oneida by *H. A. Warne*.

SPATHULARIA FLAVIDA *Pers.*

There are two varieties of this, one having a pale or whitish stem, the other having a reddish-brown or bay stem. I do not find the pileus hollow, though it is said to be so in some descriptions.

GEOGLOSSUM GLUTINOSUM *Pers.*

Our specimens were erroneously referred to this species, the description on which we relied making no mention of the fruit. Our plant has been separated by reason of the different spores and is *Geoglossum Peckianum* Cooke.

TORRUBIA OPHIOGLOSSOIDES *Tul.*

Northville and Lake Pleasant.

XYLARIA CORNIFORMIS *Mont.*

A variety occurs with the club irregular and much flattened or compressed. It might be called variety *irregularis*.

HYPOXYLON MORSEI *B. & C.*

There is a variety of this in which the stroma is confluent in patches an inch or more in diameter. It is found on dead poplar branches. Sandlake.

DOTHIDEA PTERIDIS *Fr.*

Mrs. Millington sends an early state of this plant in which there are no asci but numerous spore-like bodies (spermatia ?) oblong, colorless, .0004′–.0005′ in length. When moist they ooze out and form a whitish or pale amber-colored globule.

MELANCONIS ELLIPTICA *Pk.*

Further observation induces me to place this species in the genus Diatrype. The spores are sometimes .0018′ long. When young they are six nucleate.

In the preceding pages when no name is added to the station or stations the plant has been found therein by the writer. Dates signify the time of collecting the specimens and therefore indicate to some extent the time of the occurrence of the plant.

Grateful acknowledgments are rendered to those Botanists whose names appear in the preceding pages, for their kind aid and their generous contributions of specimens.

Respectfully submitted,

CHARLES H. PECK.

ALBANY, *January* 13, 1875.

PRELIMINARY NOTICE OF THE DISCOVERY

OF THE REMAINS OF THE NATATORY AND BRANCHIAL APPENDAGES OF TRILOBITES.

By C. D. WALCOTT.

In making sections of trilobites, from the Trenton Limestone, at Trenton Falls, N. Y., specimens were used, which were embedded in rocks varying in their character, from the common gray to the dark, fine grained, bluish-gray limestone. In only two layers of a fine, bluish-gray sediment, were trilobites found, which had structural remains preserved beneath the dorsal shell.

The remains, with the exception of the hypostoma, appear to be of a semi-calcified nature, as if a thin membrane had inclosed them until the organic substance had been replaced. Frequently all traces of structure are destroyed by the presence of crystalized calcite. The species *Asaphus megistos*, *Calymene senaria*, *Ceraurus pleurexanthemus*, and *Acidaspis Trentonensis*, have afforded evidence of the presence of organic structure beneath the dorsal shell; *Ceraurus pleurexanthemus* and *Calymene senaria* furnishing the greater portion of the evidence.

Twenty-one individuals of the species *Ceraurus pleurexanthemus*, show the axial appendages. Each segment of the thorax, of the pygidium and the three posterior of the head, have a pair beneath the axial processes. The appendages beneath the thorax and pygidium, appear to be, from transverse and longitudinal sections, short, unjointed, cylindrical supports for swimming lobes, or the remains of rudimentary, ambulatory legs. The three pair of appendages beneath the head, present an obscurely jointed structure. Twelve specimens of *Calymene senaria* show the axial appendages. One individual has twenty-one on one side. The appendages in this species appear to be attached to the ventral surface of the visceral cavity, while in *Ceraurus pleurexanthemus* they are either attached to the axial processes, or were attached to the thin membrane which must have extended outward from the axial lobe beneath the pleural lobes. Sections of forty-one trilobites of the above species show two hundred and eighty-eight axial appendages.

In sections of fifteen individuals of the species *Ceraurus pleurexanthemus*, remains of the branchial appendages have been found. They occur beneath the pleural lobes near the union with the free pleuræ. In nine sections of the fifteen trilobites, in which these appendages have been discovered, forty-three distinct appendages are to be seen. Transverse sections of the trilobite show the appendage to be a row of obliquely inclined bars, arranged one beneath the other, under the pleuræ. Three sections show the support to which the bars were attached. This support must have been of a fleshy character, probably muscular, as in most of the sections where the bars are in position, the support is not to be seen. The greatest number of bars seen in position, belonging to one appendage, is fourteen. It is very rare to find them in position at all. Longitudinal sections at the union of the pleural lobes and free pleuræ, show the branchial appendages as rows of dots, varying from square to oblong in shape. One section shows forty-eight such dots. The branchial appendages were longer, by one-half, than the axial appendages. A section of *Calymene senaria* shows the branchial appendages in position. They appear to be the same as those of *Ceraurus pleurexanthemus*. Numerous central longitudinal sections of *C. pleurexanthemus*, show the membrane covering the visceral cavity beneath the axial lobe. In coiled specimens it is corrugated by the folding. Several sections show that there was a thickening of the membrane opposite each thoracic segment. One section has eight such thickenings, or membraneous arches. Sections cut through the pleural lobes, have not, as yet, given evidence of the presence of a ventral membrane.

Sections of *Acidaspis Trentonensis* show it to be closely related to *Ceraurus pleurexanthemus*, in the structure of its ventral surface.

From the evidence obtained from sections of *Asaphus (gigas) platycephalus*, and the paper published by Prof. E.

Billings,* it appears that the ventral surface in this species was strengthened by arches, to which the double row of appendages were attached.† From the evidence thus far obtained, the conclusions are, that trilobites swam on their backs (see notes on *Ceraurus pleurexanthemus*, Ann. Lyc. Nat. Hist., N. Y., Vol. XI, p. 155, November, 1875), and that they had a double row of appendages on each side of the central axis.

The central or axial series were either the attachments of swimming lobes, or rudimentary, ambulatory, legs. The lateral series were branchial in their structure, the bars serving as points of attachment for their lamellæ. It is probable that they were also used in swimming. Many sections show appendages beneath the head, but nothing satisfactory can be established from them. As the writer has a large amount of material from the same locality, which is unworked, he hopes to present in a future article a series of descriptions and illustrations, giving the structure of the ventral surface and appendages of the trilobite.

TRENTON FALLS, *May* 26, 1876.

Note of Additional Evidence Obtained since the above was Written.

Additional evidence, obtained from sections of *Calymene senaria*, proves that the central, or axial, appendages, were articulated to the thickened arches of the ventral membrane, on a line with the outer edges of the alimentary canal. The structure of the appendages, as shown in numerous microscopic, transparent and opaque sections, leads me to the conclusion that they were the support of swimming lobes. What may have been a portion of the swimming lobe has been seen in several sections near the end of the appendage. These appendages terminate either in a round blunt point or else appear as if crushed. The form and outline of the swimming lobe could not well be preserved. Transverse sections show the ventral membrane between the axial appendages, the space occupied by the alimentary canal, and the axial and branchial appendages. The branchial appendages were attached

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* Notes on some specimens of Lower Silurian Trilobites, by E. Billings, *Quarterly Journal Geological Society*, November, 1870.

† A conclusion also given by Messrs. Dana, Verrill and Smith, after examining Prof. Billings' specimen. *Am. Jour. S. & A.*, *3d series*, I, p. 320.

to the sides of the visceral cavity, just above the axial appendages; they are longer than those of *Ceraurus pleurexanthemus*, and somewhat modified. In that species, they are attached beneath the pleural lobes and curve forward and downward, while in *Calymene senaria* they extend outwardly beneath the pleural lobe, following its curvature nearly to the extremity of the pleuræ. It is on the evidence furnished by three sections, that the conclusion is reached, that a second branchial appendage was attached on each side just below the other. A section of a partially coiled specimen shows fine branchial appendages on each side, brought into this position by the rolling up of the animal. These sections show that the axial are but one-third the length of the branchial appendages. The perfect state of preservation of the delicate branchial appendages and the ventral membrane precludes the idea of the destruction of any thing of a stronger texture than fleshy swimming lobes attached to the axial appendages. The axial appendages could not have reached to the surface upon which the edges of the pleuræ rested, which negatives the view of their being in any way ambulatory, in case the non-presence of articulations, in the appendages, should be called in question. The axial appendages of each series approximate each other near the posterior end of the hypostoma. What may be called oral appendages extend out between the hypostoma and the dorsal shell, or else they were articulated to a membrane connecting the hypostoma and dorsal shell of the head.

Of over two hundred trilobites, which have furnished evidence of appendages, etc., all were resting with the dorsal surface downward.

N. Y. STATE MUSEUM OF NAT. HIST.,
December, 1876.

(2) - See Front - 28th ann. Rep. etc —
Dec 2d 1875

(3) DESCRIPTIONS OF NEW SPECIES OF FOSSILS

FROM THE TRENTON LIMESTONE.

(4) pp. 93-97 Figs

(1) BY C. D. WALCOTT.

CONULARIA MILLER MS. (1818).

CONULARIA QUADRATA *n. sp.*

Slender, pyramidal, quadrate; angles sulcate; surface marked by oblique transverse ridges which alternate upon opposite sides of a central longitudinal ridge; the transverse ridges are sharp near the apex, growing broader at the mouth, toward which they incline; each side is slightly depressed along the central ridge.

Formation and locality.—Upper third Trenton Limestone, Prospect Bridge, Oneida Co., N. Y.

CONCHOPELTIS *Gen. nov.*

(*Κογχη — shell ; πελτη — shield.*)

Shell univalve, patelliform, more or less conical, apex central or subcentral; surface vertically striated, in older specimens marked by concentric lines of growth.

The shell was of a membraneous character. A crushed individual shows two sides doubled at an acute angle, while a split extends nearly to the apex. The substance of the shell is not preserved in any specimens found.*

CONCHOPELTIS ALTERNATA *n. sp.*

Margin undulated, nearly equally four-lobed, margin of each lobe slightly contracted at the center, height one-fifth the diameter. Surface marked by concentric lines of growth,

* Associated Lamellibranchiates, and Gasteropods, *Bellerophon bilobatus*, *Bucania bidorsata*, etc., have the shelly structure preserved.

vertically by strong radiating striæ, extending from near the apex to the margin; shorter interstitial striæ alternate near the margin.

The shell was thin and readily distorted by pressure. Of seven entire individuals, two only appear to be in a normal condition; the others are compressed, so that the apex of each is placed in a different position, with relation to any given portion of the margin.

Formation and locality.— Trenton Limestone, upper third. Trenton Falls, N. Y.

CONCHOPELTIS MINNESOTENSIS *n. sp.*

Shell obtusely conical; base slightly elliptical; apex excentric, variable in different individuals; height one-half the greatest diameter. Shallow undulations of growth occur one-half the distance to the apex, finer lines near the margin. Substance of shell not preserved.

The casts preserving the lines of growth indicate the same character of shell as that of *C. alternata*, from the Trenton Limestone of New York.

Formation and locality.— Trenton Limestone, four miles below Medford, Canon River, Minn.

BATHYURUS BILLINGS *

BATHYURUS LONGISPINUS *n. sp.*

General outline oval, strongly convex. Head semicircular, convex; width twice the length, margin broad, slightly con-

* As specimens of different species of BATHYURUS, present characters of the genus BATHYURELLUS *Billings*, and ASAPHISCUS *Meek*, a comparison of the three genera has led me to the conclusion, that BATHYURELLUS and ASAPHISCUS have been separated from BATHYURUS on specific, rather than generic differences. Professor Billings gives, as the generic difference of BATHYURUS and BATHYURELLUS, that the former, as represented by the typical species *B. extans* Hall, *B. Nero* and *B. Cybele* Billings, has a subcylindrical glabella, rounded in front, strongly convex and with obscure glabellar furrows; while in the latter the glabella is conical or pointed in front and exhibits no traces of glabellar furrows; the pygidium also, differs in not being strongly convex, in having a shorter axis, and, in general, a wider border. Professor Meek gives, as the generic differences of ASAPHISCUS and BATHYURELLUS, the decidedly depressed conical glabella, the margin of the head, first convex and sloping forward into a deep, transverse, mesial furrow, then rising in the form of a convex margin to the front, the mesial lobe of the pygidium being also proportionally longer, and the free margins of the same much narrower, and less flattened and alate. BATHYURELLUS can hardly claim the title of subgenus, as given by its author. The presence of faint glabellar furrows, conical glabella, grooved pleuræ, nine thoracic segments, and pygidium of the same character in all essential particulars, clearly indicates, according to the description of the author, that ASAPHISCUS is not to be separated from BATHYURUS by generic characters.

cave, posterior lateral angles produced into long flattish spines, composed of the extended marginal rim and a broad extension of the lateral halves of the occipital segment, giving a slight concavity to the outer surface, slightly incurving and tapering to acute points, terminating opposite the pygidium at its posterior third. Glabella prominent, oblong, convex, broadest at the center, anteriorly rounded and somewhat abruptly curved downward, separated from the cheeks by shallow dorsal furrows. Occipital segment broad, well-defined, thickened at the posterior margin, separated from the glabella by a broad shallow furrow, which, narrowing, extends back of the eyes, two-thirds the distance from the base of the glabella to the lateral margins of the head. Eyes large, prominent, sublunate, visual surface finely reticulated.* Movable cheeks subtriangular in form, sloping rapidly from the base of the eye to the margin, upper angle truncated to form the base of the eye. Facial suture, cutting the occipital segment at its posterior edge on a line with the outer margin of the eye thence passing obliquely inward to the posterior angle of the eye, and curving outward around the top of the eye to the anterior angle, it curves down, with a slight outward obliquity, to the inner edge of the border, then curving forward terminates opposite the widest part of the glabella upon the frontal margin.

Thorax: axial lobe, strongly convex, the segments, nine

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*The facets are arranged upon the visual surface in oblique lines, the crossing of which gives the reticulated appearance. The outer corneas in all specimens examined were absent, which left the facetted surface exposed. The facetted surface of the eye of *Asaphus platycephalus*, has essentially the same arrangement; a short hexagonal prism extends from each facet to the inner surface of the eye, perpendicular to the surface of the facet to which it belongs. The prisms are closely arranged, each side resting against a side of each of the six surrounding facets. The cornea is smooth upon its outer surface, and closely and firmly attached to the facetted surface. In trilobites that have attained their growth the cornea is usually opaque; in younger specimens it is thinner and shows the facetted surface through it, or else bears the impression of the facets upon its outer surface. The fortunate discovery of a specimen showing the interior of both eyes, and, on a section, the prismatic structure and cornea, has enabled me to determine the structure of the eye with accuracy.

The visual surface of the eye of *Bathyurus longispinus* has an area of .0461 of a square inch; area of one facet, 1-102400 of a square inch; number of facets in eye, 4,720. Size of head; length, 1 inch, breadth, 1¾ inches.

Area of visual surface of the eye of *Asaphus platycephalus*, .0736 of a square inch; area of one facet, 1-102400 of a square inch; number of facets in eye, 7,536. Size of head; length, 1¾ inches, breadth, 2⅜ inches.

The eye of *Ceraurus pleurexanthemus* was found to have four hundred facets; the arrangement of the prisms is the same as in *Asaphus platycephalus*. Each facet is slightly convex upon its outer surface; the cornea covering the facetted surface partakes of the convexity of each facet, hence the peculiar granulated visual surface, noted by Professor Hall, Pal. N. Y., Vol. 1, p. 242

in number, arch slightly forward, pleural lobes flat for one-half the width, where they curve downward with a slope of about forty-five degrees to the extremities of the segments, the pleuræ of each segment terminating in blunt extremities, a strong pleural groove extends from the anterior inner margin to the lower edge of the curve a little back of the center of the pleura. Anterior margins of the pleuræ depressed, permitting them to lap beneath those of the preceding segment when the animal was coiled.

Pygidium broadly semicircular, convex, with the anterior lateral angles obliquely truncated; axial lobe subconical, extending two-thirds the distance from the anterior to the posterior margin; two axial rings cross the anterior third; pleural lobes, with the exception of a level triangular space each side of the axial lobe, slope rapidly from the axial lobe to the margin, slightly concave all around between the triangular spaces and the margin; three well-defined segments besides the half-segment joining the thorax, extend outward across the triangular spaces and then curve downward and backward, increasing in width toward the margin. Surface: glabella, cheeks and occipital segment finely tuberculated, the remaining parts are ornamented with fine waving lamelliform striæ.

Formation and locality.— Black River Limestone, Trenton Group, Quarry of William Buck, Esq., Russia, Herkimer Co., N. Y. This species also occurs in the Trenton Limestone at Plattsville, Wisconsin.

ASAPHUS Brongniart (1822).

Asaphus Romingeri *n. sp.*

Head semicircular, convex; margin narrow, concave, with a wire-like rim rising somewhat abruptly; postero-lateral angles produced into strong spines, slightly concave upon the outer surface. Glabella: central portion obovate, subacute behind, broadly rounded in front, separated from the fixed cheeks by shallow furrows; two slight, elongate elevations extend obliquely forward from each lateral third of the posterior third of the glabella; upon the depressed posterior portion of the glabella are three tubercles, equidistant between the convex obovate portion and the occipital segment, the central one rising in a short spine. Occipital segment separated from the glabella by a shallow furrow, merging into the fixed cheeks laterally; occipital node minute, central; fixed cheeks broadly expanded in front, contracting nearly to the glabella at the anterior angle of the eye; at the posterior margin uniting with the occipital segment and forming a lanceolate point extending beyond the outer margin of the eye, and curving downward and slightly backward: palpebral lobes large, somewhat depressed at the center; movable cheeks subtriangular, crowned by the eye, postero-lateral angles with a terminal spine.

Surface ornamented with peculiar elevated tortuous striæ.

The cast of a head shows the movable cheeks attached to the central portion of the head. Numerous detached movable cheeks occur in the same layer with the separated glabella.

Formation and locality.— Black River Limestone, Quarry of William Buck, Esq., Russia, Herkimer Co., N. Y., also, in the Trenton Limestone at Quimby's Mill, Lafayette Co., Wis.

ASAPHUS WISCONSENSIS *n. sp.*

Head semicircular, convex; postero-lateral angles produced into strong broad spines; margin broad, slightly concave, the concavity continuing on the spines. Glabella: central portion turbinate, subquadrate in front; three tubercles occur equidistant between the turbinate glabella and occipital segment. Occipital segment scarcely defined by a shallow groove; palpebral lobe large, with a depression between the center and margin; fixed cheeks expanded in front, contracting at the eye and forming acute points at the posterior margin; movable cheeks subtriangular, crowned by the eye.

Formation and locality.— Same as *A. Romingeri*, and also found in the Trenton Limestone at Mineral Point and Plattsville, Wis.

This species differs from *A. Romingeri* by having a wider and less concave margin, with the glabella more convex and subquadrate in front. Varietal differences occur between individuals of the same species from New York and Wisconsin; but as far as the specimens at hand indicate, these are not of specific importance.


Lower Helderberg Group.
Onondaga Salt Group.
Niagara Group.
Longitude West from Washington
L. SUPERIOR
L. MICHIGAN
L. HURON
GEORGIAN B.
LAKE ERIE
L. ONTARIO
ONTARIO
QUEBEC
WISCONSIN
MICHIGAN
IOWA
ILLINOIS
INDIANA
OHIO
PENNSYLVANIA
NEW YORK
VERMONT
N. HAMPSHIRE
MASSACHUSETTS
CONNECTICUT
N. JERSEY
DELAWARE
MISSOURI
KENTUCKY
WEST VIRGINIA
VIRGINIA
ARKANSAS
TENNESSEE
NORTH CAROLINA
MAP
ILLUSTRATING THE PAPER ON THE RELATIONS
OF THE
NIAGARA & LOWER HELDERBERG FORMATIONS
AND THEIR
GEOGRAPHICAL DISTRIBUTION.
BY
JAMES HALL.
1874.

THE FAUNA OF THE NIAGARA GROUP, IN CENTRAL INDIANA.

By JAMES HALL.

A paper upon this subject was read before the Albany Institute, April 29th, 1862, and published in Volume IV of its Transactions. An abstract was issued, as a separate pamphlet under date of May 2d, 1863, entitled, "*Notice of some New Species of Fossils from a Locality of the Niagara group in Indiana, with a List of Identified Species from the Same Place.*"

A revision of this paper, with description of additional species, was in preparation at the time the Documentary edition of this report was being printed, but owing to the requirement for publishing the volume of "*Illustrations of Devonian Fossils*" during the same year (1876), it was impossible to complete this paper in time for the publication of that report. The plates illustrating the fossils, with names of species, and explanations of figures having been prepared, were issued with that edition. Since no copies of the report were ordered for the State museum until 1878, it has given an opportunity of revising the published matter of 1863, with additional knowledge derived from subsequent collections, and of adding descriptions of the Corals and Bryozoa not included in the original paper.

The species herein described and figured are all from a single locality on Conn's Creek in the town of Waldron, Decatur county, Indiana, where the calcareous shales of the group, with some thin seams of limestone occur. Many of the same species are found in more calcareous beds at the neighboring locality of St. Paul in the same county, and also at localities farther south on Conn's Creek.

Since the publication of the original paper, a series of the specimens therein described has been placed in the State Museum, and later collections have enabled us to increase the series, so as to include not only all the species of this paper, but to add a considerable number of new forms, the descriptions of which are now being printed in the current volume (X) of the *Transactions of the Albany Institute.*

These new forms, with some additional material of similar character, will form the subject of a supplementary paper in a future report of the State Museum.

The investigation has proved an interesting one, especially as an aid to our knowledge of the geographical distribution of the Niagara fauna.

In the *Twentieth Report on the State Cabinet of Nat. Hist.*, I have given a pretty full illustration of the predominant forms of this fauna as represented in the Niagara formation of Wisconsin, where the prevailing rock is a magnesian limestone. Dr. F. Roemer, in his *Silurische Fauna des Westlichen Tennessee*, has given an illustration of the fauna of this period as known in that State. To these publications we may add volume II of the *Palæontology of New York*, which illustrates the fauna of the Niagara period in its typical locality, and we have the means of comparison between the prevailing forms from four widely separated regions.

Comparing the collections from Waldron, we find a greater proportion of species identical with those of New York than in any other western locality, while the new forms are of the same genera, and often quite nearly allied to those of the Niagara region. It is a little remarkable, however, that while we have in the Indiana locality, twice as many crinoidal forms as in New York, and more than ten times as many individuals, we have not seen a single specimen of CARYOCRINUS, which is the most abundant form among the crinoidea in New York, occurring also in Wisconsin and Iowa quite frequently, and is more abundant in Tennessee than in any of the other localities. The physical conditions originally existing at Waldron were more similar to those of Western New York, than to those of any other locality. In Wisconsin and Iowa, the outcrops are chiefly of magnesian limestone, and the Gaseropoda and Cephalopoda predominate over other forms, while the Cystidæ are almost equally conspicuous with the Crinoidea. At the Waldron locality, cystidean forms are extremely rare, and but few are known in Tennessee; and though not abundant in New York, there are here more species known than in both the other localities named. I conceive, however, that in this comparison we are not dealing with the same beds in each one of these localities. While I regard the prevailing fossiliferous beds in western New York as essentially parallel with those of Waldron and of Western Tennessee, those of Wisconsin and Iowa are to a considerable extent of newer age, being the higher beds of the series, while the others occupy the lower and middle portions of the formation.*

It would appear from what we know of the physical conditions of this ancient sea, that it was generally shallow and the bottom extremely uneven.

The Niagara group in its easterly outcrop, from Eastern New York to Virginia, indicates a nearly uniform shallow sea, with the deposition of calcareous beds of magnesian character, which, in their south-western extension, become in part replaced by, or alternate with, argillaceous deposits. Along this line the formation is everywhere thin, and, in fact, is so inconspicuous, that it has usually been considered only as a subordinate member of the succeeding formation. It is here usually marked by the presence of a few species of corals, which are extremely abundant, some forms of brachiopods, a few lamellibranchs, gasteropods and cephalopods, and more rarely some remains of trilobites. These are of forms identical with, or nearly allied to, those which characterize the formation in its more western localities. In a westerly direc-

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* The relations of the different members of the Niagara formation, in Wisconsin, Iowa and other western localities, with those of New York, have not been fully determined. It is known that in Canada West the limestones of the lower part of the formation acquire a greatly increased thickness over the same beds in Western New York; and that they likewise include the limestones of the Clinton group, since they are characterized by the presence of *Pentamerus oblongus* and some other Clinton forms of New York. In their western extension these limestones gradually lose their shaly partings and the thin seams and beds of shale, becoming massive and of a nearly uniform ashen or drab color. In this condition the entire mass is recognized as a part of the Niagara formation, and the Clinton group is restricted in its acceptation to arenaceous and shaly beds, sometimes with thin calcareous bands, corresponding more nearly in physical characters with the same formation in Herkimer and Oneida counties in the State of New York.

tion, within the limits of New York, the formation has a very moderate development until we reach the eastern part of Wayne county, where the shaly member of the formation becomes marked and gradually increases in thickness to Niagara county; the superior limestone increasing in thickness in the same direction. The shaly fossiliferous beds, which are so conspicuous a feature on the Genesee River at Rochester, in Wayne and Niagara counties, and upon the Niagara river, thin out to a great extent within fifty miles west of the river, and are nowhere met with along the outcrops in a westerly and north-westerly direction. This shaly member of the formation was apparently deposited in a wide, shallow depression in the bed of the ancient ocean, which became gradually filled with fine calcareous mud, and which, during this slow process, afforded opportunity for the development of a most abundant fauna.

In Indiana, also, these shaly beds were probably deposited in a wide depression of the ocean bed, similar to that of western New York, while the area to the northward was a more shallow sea. We have a less accurate knowledge of the physical conditions which prevailed to the south and southwest of the localities named; but it would appear, from what we know of the distribution of the fossils, that there were similar areas of depression with a most abundant fauna, while the intermediate shallower areas are marked by the presence of calcareous deposits, with a moderate development of a somewhat distinct fauna, in which corals are usually conspicuous, and carrying the aspect of an interrupted and imperfectly developed coral reef.

PROTOZOA.

RECEPTACULITES *De France.*

Receptaculites subturbinatus.

Plate 3, Figs. 1–3.

Receptaculites subturbinatus Hall. Transactions of the Albany Institute, vol. iv, p. 224. Abstract, p. 30; May, 1863.

Body small, or sometimes approaching the medium size of species of this genus; subhemispheric or depressed subturbinate; base of attachment broad; upper side flat or slightly depressed in the middle for a space of about half the diameter, thence curving outwards and downwards to the periphery; cell-apertures on the sides and exterior portions of the upper surface distinctly rhomboidal, the width from the lateral angles being greater than the height; cell-margins very prominent; the cells in the central portion obscure.

This small species, in the specimen originally described, has a diameter of nearly 25 mm., with a height about half as great. It differs essentially from any of the species previously known to me, but approaches in character to the *R. hemisphericus* of the Niagara formation of Wisconsin.

ASTYLOSPONGIA *Roemer.*

Astylospongia præmorsa *Goldf.*

Plate 3, Figs. 4–11 and 14.

Siphonia præmorsa Goldf. Petref. Germ., i, 17, t. 6, f. 9. 1826.
Siphonia excavata Goldf. Petref. Germ., i, 17, t. 6, f. 8. 1826.
Siphonia præmorsa Hisinger. Leth. Suec., 94, t. 26, f. 7. 1837.
Siphonia præmorsa Eichwald. Silur. Schichtensyst. in Esthland, 209.
Siphonia præmorsa Maximilian. Herzog von Leuchtenberg, Beschreibung einiger neuen Thierreste der Urwelt aus den Silurischen Kalkschichten von Zarskoje-Selo. St. Petersburg, 1843, 24.
Siphonia præmorsa Ferd. Roemer. i. Leonh. u. Bronn's Jahrb. 1848, 684.
Siphonia præmorsa Ferd. Roemer. i. Lethæa geognost. ed. 3 Th. ii, 154, t. 27, f. 21. 1852–1854.
Siphonia excavata Bronn. i. Leth. geogn. ed., 3 Th. v, 75. 1851-1852.
Siphonia stipitata Hisinger. Leth. Suec. 94, t. xxvi, f. 8.
Jerea excavata d'Orbigny. Prodr. de Pal. strat. ii, 286. 1850.
Astylospongia præmorsa Roemer. Die Silurische Fauna des Westlichen Tennessee, p. 8, pl. 1, figs. 1, 1a–1e. 1860.
Astylospongia præmorsa (Goldf.) Hall. Trans. Alb. Inst., vol. iv, p. 228. Abstract, p. 34; May, 1863.

This widely distributed species which has been illustrated by Goldfuss, Hisinger, Bronn, Roemer and other authors, is a common form at Waldron, but it rarely or never attains the dimensions which it has in the same horizon in Tennessee, where it is even more common than in Indiana.

The usual dimensions of the Waldron specimens vary from ten to twenty millimetres in lateral diameter, with a vertical diameter of about one-sixth less than the lateral. There is much variation in the strength and number of the furrows and prominence of the lobes, and also in the depth and diameter of the depression at the center of the summit.

The interior structure is represented in figs. 9, 10, 11, as it appears under an ordinary lens. In all the specimens which have been cut, there is evidence of an original central cavity, filled with mineral matter which does not preserve structure.

Astylospongia præmorsa var. nuxmoschata *n. var.*

Plate 3, Figs. 12, 13.

Form, an oblate spheroid with the entire surface traversed by numerous interrupted and unequal grooves or subconfluent pits giving a rugose aspect; the sides marked by a few narrow scarcely defined sulci which do not reach the summit; summit elevated and without the central depression possessed by typical forms of the species. Entire surface covered by minute pustulose elevations which under an ordinary lens do not show structure. The minute interior structure has not been determined.

This form was included under *A. præmorsa* in the Documentary edition of this report. It is herewith separated as a variety. It occurs in association with the other forms of Petrospongia at the Waldron locality.

Astylospongia imbricato-articulata *F. Roem.*

Siphonia imbricato-articulata Ferd. Roemer, in Leonh. und Bronn's Jahrb. 1848, 685, ix, fig. 3.

Astylospongia imbricato-articulata F. Roem. Die Silur. Faun. des Westl. Tenn., p. 12, pl. 1, figs. 5, 5 a. 1860.

A single specimen of this species or a closely allied form, has been observed among some recent collections from Waldron.

ASTYLOSPONGIA (PALÆOMANON) BURSA.

Plate 3, Figs. 15, 16.

Astylospongia? (Palæomanon) bursa HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 3, figs. 15, 16. 1876.

Compare *Palæomanon cratera* ROEMER. Die Silur. Faun. des Westl. Tenn., p. 13, pl. 1, f. 4, 4 a. 1860. Also *Aulacopina Granti* BILLINGS. Canadian Naturalist and Geologist, 1875.

Body calyciform, elongate semi-elliptical in outline, regularly rounded below and curving upwards, the sides above the middle of the height nearly straight.

Surface finely punctate and marked by elongate subconfluent pits.

The specimen figured has been laterally compressed, so that the true form would be narrower than represented in figure 15. Some specimens of recent collections with shorter and comparatively broader cups, have essentially the same general aspect of surface as this; but the large pits upon the surface are less confluent, and it is possible that these forms may be allied to *Palæomanon cratera* of Roemer, but their condition of preservation does not admit of satisfactory reference.

A single specimen with a proportionally narrower form than shown in fig. 15, presents, on a part of its surface, numerous and closely arranged stelliform spiculæ which appear to be superficial, while the surface beneath is finely punctate.

The imperfect preservation of all the larger forms of sponges in the Waldron collections is such as to render difficult and unsatisfactory any specific determinations from external form and character alone.

CORALS AND BRYOZOA.

STREPTELASMA *Hall.*

STREPTELASMA RADICANS.

Plate 5, Figs. 1-4.

Streptelasma (*Aulacophyllum ?*) *radicans* HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 5, figs. 1-4. 1876.

Corallum simple turbinate, usually irregular in its growth below, or truncate, from attachment to other bodies; sometimes with radiciform extensions, often curved near the base; calyx circular, deep; dissepiments strong; a section shows twenty to twenty-two extending half-way to the center, with an equal number of short intermediate ones. A single specimen cut longitudinally shows no horizontal diaphragms, and the inner margin of the rays are crenulate.

Exterior strongly marked by the radiating ridges of the dissepiments, and usually pretty regularly enlarging from the base, though sometimes showing irregularities due to contraction and expansion of growth. Height of specimens from 25 to 40 mm.

This species is of common occurrence in the Waldron locality.

STREPTELASMA (DUNCANELLA) BOREALIS.

Plate 5, Figs. 7, 8.

Duncanella borealis NICHOLSON. Ann. and Mag. Nat. Hist., 4th series, vol. xiii. 1874.

Streptelasma minima HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 5. 1876.

Corallum simple elongate-obconical; calyx deep, circular, scarcely expanding at the margins beyond the general enlargement of growth; rays, coarse and strong; epitheca strongly marked by vertical striæ indicating the rays, and usually by distinct striæ of growth which sometimes obscure the rays; epitheca rarely covering the base, leaving the rays exsert; these, to the number of nine or ten, and sometimes twelve, coalesce in the center, gradually increasing in number with the growth of the coral till there are from seventeen to nineteen at the margin of the calyx. Length, 20 mm.

With the exception of the exsert septa at the base, this coral has all the characteristics of STREPTELASMA in the arrangement of the radiating septa which coalesce near the base and for some distance upwards, above which the lamellæ approach the center, leaving a cylindrical cavity which gradually expands above.

ZAPHRENTIS *Rafinesque.*

ZAPHRENTIS CELATOR.

Plate 5, Figs. 5, 6.

Zaphrentis? celator HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 5, figs. 5, 6. 1876.

Corallum turbinate, rapidly expanding from below, with irregularities of growth, producing expansion and contraction of the cup. Calyx deep and broadly expanded, the width of the specimen figured nearly as great as the height. Dissepiments, sixty or more.

This species is of rare occurrence in the collections from the Waldron locality.

AULOPORA *Goldfuss.*

AULOPORA PRECIUS.

Plate 9, Figs. 5, 6.

Aulopora precius HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 9, figs. 5, 6. 1876.

Corallum parasitic, consisting of elongate tubular cells, which in their progress of growth usually conform to the surface on which they grow, somewhat gradually enlarging to the aperture. Calyces budding laterally in a direct line or sometimes geminating and diverge at an angle of from 45 to 80 degrees. After budding, the parent cup turns upwards and ceases to grow in that direction. The corallum sometimes spreads over a considerable extent of surface, and in other examples the calyces are crowded and grow nearly directly upwards, attaining an elevation above the attached base of three to five millimetres. In the procumbent forms the distance between the budding is about four to five millimetres, the diameter of the tube at its origin is less than one millimetre, the aperture including the exterior walls being about two millimetres.

This species bears some resemblance, in its mode of growth, to the *Aulopora Schohariæ*, but is a stouter species, except in rare examples where the tubes are more slender than in the prevailing forms.

FAVOSITES *Lamarck.*

FAVOSITES SPINIGERUS.

Plate 4, Figs. 1-5.

Favosites Niagarensis var. *spinigera* HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 4, figs. 1-5. 1876.

Favosites excretus HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 9, figs. 1 and 2. 1876.

Favosites spongilla ROMINGER. Fossil Corals, page 24 ; reference under the head of *Favosites pyriformis*, 1876.

Form hemispheric or pyriform, often spreading and becoming lobed above. Tubes small, ranging from one to one and a half mm., the lateral walls with radiating spinulæ ; diaphragms essentially flat, mural pores not determined, cell-apertures irregularly margined by spiniform processes.

This small species occurs in subhemispheric forms of from ten to twenty-five mm. in diameter and of somewhat less elevation ; it also assumes pyriform shapes of similar dimensions, often becoming expanded and variously lobed above. The apertures of the cells, as usually presented, are extremely variable in size, and there is not unfrequently a group of smaller cells arranged around a larger one, and in the irregular mode of growth the margins become free and more or less curved. In rare examples the apertures are free, rounded, and a little dilated, while on the margins of the mass the tubes are subcylindrical with individual epithecæ. In such forms the apertures present an appearance as of one cell budding from the calyx of another, but this aspect is probably due to a thickening of the cell-wall or of an abrupt contraction of growth.

In specimens where the aperture is expanded, the diaphragms, visible from above, are convex with a little boss in the center.

This is undoubtedly the species indicated by Dr. Rominger as *F. spongilla*, but at the time of printing the explanations of plates for the Documentary Edition of this Report, his work had not been published.

FAVOSITES FORBESI var. OCCIDENTALIS *n. var.*

Plate 4, Figs. 6–15.

Favosites Forbesi?. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 4, figs. 6-15. 1876.
Compare *F. Forbesi* EDWARDS & HAIME. British Fossil Corals, p. 258, pl. 60.

Corallum hemispheric, subglobose or pyriform; calyces very unequal in size, the larger ones often subcircular and about three mm. in diameter, while the smallest cells are often not more than one mm. at their apertures. In rare specimens the diameter of the larger calyces does not exceed two millimetres. A vertical section shows the walls to be of medium thickness, while in the calyces they appear strong and are often crenulate from the longitudinal striæ. Mural pores, situated near the angles, in one or two ranges, depending on the size of the cell. Cell-wall granulose, the granulæ arranged in transverse lines.

The form and dimensions of the coral are fairly represented in the figures on plate 4, and few larger specimens have been observed than the one illustrated in figure 10. The species is very abundant, occurring in great numbers in the shaly limestone deposits of Waldron and vicinity. In many of the specimens the epitheca is extended from the base over the sides of the coral, covering the cell-apertures, and not unfrequently some of the larger cells upon the upper face of the coral are partially closed by an individual epithecal covering, which growing inward from the margins finally closes the aperture, after the manner of an operculum with a central node. In some examples this epithecal growth begins within the calyx walls, presenting a distinct ring with a central circular opening, giving the appearance of budding from the parent cell, but in the progress of growth the space betwen the cell-walls and the epithecal ring is closed and the central opening becomes in like manner filled.

This species has been identified with *F. Forbesi*, chiefly from its similarity with the young of that species, as represented by Edwards & Haime, *British Fossil Corals*, plate 60, though our specimens very rarely assume the form there illustrated, which is similar to one figured by Dr. F. Roemer, from the Silurian of West Tennessee. We have no specimens presenting the characters of the older individuals represented from the Wenlock limestone, though the few larger specimens which have come under my examination do not show the great diversity in the size of the calyces which appears in the smaller corals. The position and character of the mural pores in the European species is not stated in the description. The strongly pustulose character of the cell-walls as represented in the British specimens has not been observed in the American forms.

CHÆTETES *Fischer.*

CHÆTETES CONSIMILIS.

Plate 9, Figs. 7-14.

Compare *Trematopora solida* HALL. Pal. N. Y., vol. ii, p. 153, pl. 40 A, figs. 6 *a*, 6 *b*, 6 *c*. 1852.

Chœtetes? consimilis HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 9, figs. 7-14. 1876.

Frond solid, ramose, frequently branching, branches in the larger specimens having a diameter of six millimetres. Cell-tubes polygonal rising from the center of the branches and gradually diverging to the surface. Cell-walls thin, strongly corrugated, transverse diaphragms extremely rare or entirely wanting. Apertures .35 mm. in diameter.

In well-preserved specimens the cell-walls at the apertures are granulose and have minute spines at the angles of the cells.

This species occurs in such forms as are figured on plate 9, presenting in the different conditions of weathering, the phases represented in the enlarged figures 8, 10, 12 and 14.

TREMATOPORA *Hall.*

TREMATOPORA OSCULUM.

Plate 10, Figs. 5-8, 11-14.

Trematopora osculum HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 10, figs. 3-12 (3 and 4 in error). 1876.

Comp. *T. ostiolata* HALL. Pal. N. Y., vol. ii, p. 152, pl. 40A, figs. 5*a*-5*n*. 1852.

Frond ramose, hollow with an interior epitheca, branching infrequently: diameter of branches from one and a half to two millimetres; thickness of the substance of the bryozoum .35 mm. Cell-tubes oval: apertures .3 mm. in length, closely arranged in quincunx order, forming oblique rows, opening upward and outward; usually the lower side of the aperture is margined by a projecting semicircular lip, which partially covers the opening; rarely the upper margin of the aperture is also elevated.

This is the most common form of the genus in the Waldron locality, and is very abundant.

TREMATOPORA INFREQUENS.

Plate 10, Fig. 3 in part, and fig. 4.

Trematopora infrequens HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 10, figs. 13, 14 (in error for 3 and 4). 1876.

Frond ramose, hollow, the inner surface marked by a wrinkled epitheca; branches from one and a half to two millimetres in diameter; bryozoum about .35 mm. in thickness. Cell-tubes oval, rising obliquely from the epitheca to the exterior surface. Length of aperture about .3 mm., with the margin distinctly and equally elevated, occasionally presenting a serrated appearance; apertures separated by distances equal to their diameters, arranged in quincunx order, presenting a spiral arrangement around the branches.

This species may be distinguished from *T. osculum* by its larger cells, and by the cell-margins being strongly and equally elevated in every portion, while in that species the lower margin of the aperture is almost always more strongly elevated than the upper portion.

TREMATOPORA VARIA.

Plate 10, Figs. 15-23.

Trematopora varia HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation pl. 10, figs. 15-23. 1876.

Frond ramose, hollow, inner surface transversely wrinkled; branches frequent, from two to seven mm. in diameter. Bryozoum about one mm. in thickness. Cells tubular, oval or circular, from 1 to 1.5 mm. in length; for the first half of their extent growing nearly parallel with the inner surface, and then turning abruptly outward; diameter at the aperture .25 mm., varying from circular to elongate-oval, arranged irregularly from contiguity to a distance equal to the diameter, with frequent maculæ, which are destitute of cells. Cell-margins in well-preserved specimens distinctly elevated, and frequently finely serrated.

In specimens where the maculate surface is well-preserved, the adjacent cell-apertures often have their longest diameter in a radiating direction from the center of the maculæ. The cell-apertures in this species vary from circular to elongate-oval or ovate, both forms sometimes occurring on the same specimen, while in worn specimens the apertures appear to be polygonal.

TREMATOPORA ECHINATA.

Plate 11, Figs. 1-5.

Trematopora echinata HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 11, figs. 1-5. 1876.

Bryozoum solid, ramose; branches from .75 to 1.5 mm. in diameter, frequently widely diverging, sometimes at an angle of 80° or 90°. Cell-tubes polygonal, generally hexagonal, commencing at the center of the branch and gradually diverging to near the surface, where they turn abruptly outward. Cell-apertures longer than wide, length from about .3 mm. to .55 mm., the width being from one-half to two-thirds their length, having at the angles of the margins slender, sharp spines.

This species is very abundant, often nearly covering the surfaces of the calcareous slabs, and imbedded in the softer shales. It presents much variation in the size of the cell-apertures, and their distribution on the surface is sometimes interrupted and irregular. The prevailing form is represented in fig. 4, plate 11. In many examples the smaller stipes and branches are marked by the larger cell-apertures.

TREMATOPORA GRANULIFERA.

Plate 11, Figs. 6, 7.

Trematopora granulifera. HALL. Pal. N. Y. vol. ii, page 154, pl. 40 A. figs. 9a, 9c. 1852.
Trematopora granulifera (n. sp. in error.) HALL. Doc. Ed., 28th Rep. St. Mus. Nat. Hist. explanation of pl. 11, figs. 6, 7. 1876.
Compare *T. regularis* HALL. 26th Rep. N. Y. St. Mus. Nat. Hist., p. 106. 1873.

Bryozoum ramose, solid; branches one millimetre or less in diameter. Cells tubular oval, rising from the center of the branch and increasing by interstitial additions. Length of apertures .3 mm., with a width of .15 mm., arranged upon the surface in a somewhat quincunx order, being in right lines longitudinally, and in a spiral order around the stipe. Margins of apertures elevated and strongly granulose; the spaces between being flat or channeled. The borders of the apertures are sometimes coalescent, and present no intermediate groove.

TREMATOPORA MINUTA.

Plate 11, Fig. 8.

Trematopora? (Trachypora?) minuta HALL. Doc. Edit. of 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 11, fig. 8. 1876.

Bryozoum ramose, very slender; branches frequent, widely diverging, diameter .5 mm. Cell-apertures elongate-oval, length about .4 mm. and width .2 mm., distance from each other longitudinally about equal to the length of an aperture, arranged in spiral rows along the branch. Margins distinctly elevated and granulose, and separated from each other by tortuous lines of nodes.

This species differs from *T. macropora** by its more elongate cell-apertures and the more prominent granulose ridges.

TREMATOPORA VARIOLATA.

Plate 11, Figs. 9, 10.

Trematopora variolata HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 11, figs. 9, 10. 1876.

Bryozoum ramose, hollow, diameter of the branches from 1 to 1.5 mm. Cell-apertures oval, margins distinctly elevated, length .3 mm., width .2 mm., sometimes closely arranged, and in other cases irregularly scattered; surface with numerous maculæ which are quite destitute of cells.

This species can readily be distinguished from any other form in this association by the scattered and irregular distribution of the cell-apertures and the numerous maculæ without cells.

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* *T? macropora* HALL. *Transactions of the Albany Institute*, vol. x, p. 60.

TREMATOPORA SPICULATA *n. sp.*

Plate 11, Figs. 11, 12.

Trematopora spinulosa HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 11, figs. 11, 12. 1876.

Not *Trematopora spinulosa* HALL. Pal. N. Y. vol. ii, p. 155, pl. 40 A, figs. 11a, 11b. 1852.

Bryozoum solid, ramose; branches frequent and not widely diverging; diameter from 1.5 to 2 mm. Cell-tubes polygonal, arising from the center of the branch and gradually diverging till within half a millimetre of the surface when they turn abruptly outward; at the point of turning, the cell-walls, previously thin, become thickened. No transverse septa are visible till near the surface, where they are numerous and distant from each other about the width of the cell-tubes. Cell apertures variable in size, the larger ones being about .16 mm. in diameter, irregularly arranged and having short, stout spinules at the angles.

This species is readily distinguished by its solid aspect, minute cells which are variable in size, and the comparatively strong spinules which disguise the cell-apertures and give a uniform asperate aspect to the surface. Sometimes the cell-margins are worn flat and the cells appear oval. It differs from *T. echinata* in its more robust aspect, and the smaller and less elongate cells.

CALLOPORA *Hall.*

I continue the use of the name CALLOPORA, which is claimed by some authors to be identical with FISTULIPORA of McCoy, for the reason that the author of the latter genus (*British Palæozoic Fossils*, p. 11) says that "this genus was proposed to include the *Manon cribrosum* (Gold.) of the Eifel, &c., and some new species." The *Manon cribrosum* of Goldfuss is recognized by European palæontologists as a specimen of *Heliolites interstincta*. Again, in describing *F. decipiens*, the author says: "So exactly does this resemble the *Palæopora interstincta*," etc. The figures of *F. decipiens* scarcely resemble CALLOPORA in its ordinary forms. See *Descriptions of Lower Helderberg Corals and Bryozoa* for further observations on these genera.

CALLOPORA SINGULARIS.

Plate 10, Figs. 1, 2.

Callopora singularis HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 10, figs. 1, 2. 1876.

Frond ramose, solid, diameter of branches two millimetres. Cells tubular, oval, or polygonal, arising from the center of the branch and gradually diverging till near the surface when they turn and open nearly directly outward. Cell-apertures .3 mm. in length, with a width of .2 mm., irregularly arranged, varying in distance from contiguity to a space equal to the length of the aperture ; margins distinctly elevated, frequently crenulated by minute spinules. Intercellular spaces on the surface occupied by minute pits, which are observable only on well-preserved specimens.

Translucent sections of the stipes or branches present no evidence of intercellular vesiculose structure, and have all the aspect of a TREMATOPORA. This condition may come from a solidifying of the intercellular substance during the process of petrifaction, leaving only the intercellular pits upon the surface.

CALLOPORA ELEGANTULA.

Callopora elegantula HALL. Pal. N. Y., vol. ii, p. 144, pl. 40, figs. 1*a*–1*n*. 1852.

This species has recently been found at Waldron. It preserves the characters so well shown in the same species from the Niagara formation in New York.

CALLOPORA EXSUL.

Plate 9, Figs. 3, 4.

Alveolites exsul HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 9, figs. 3, 4. 1876.

Bryozoum consisting of lamellose expansions, free or incrusting other organic bodies, celluliferous on one side ; lower surface formed of a wrinkled epitheca ; substance of frond sometimes very thin, and often thickened by successive accretions of growth. Cell-apertures oval, from .3 to .5 mm. in length, and usually about two-thirds as wide as long, sometimes nearly circular, closely and irregularly arranged. Intercellular space usually occupied by a single series of angular pits. Margins of cell-apertures elevated, and ornamented by from two to five short spinules. A transparent section shows an intercellular vesiculose structure, with transverse septa in the cell-tubes.

The more recent collections from Waldron contain a considerable number of specimens of this species in various conditions of preservation. The better specimens preserve the short spinules surrounding the cell apertures, with a distinct row of pits marking the intercellular space. In some of the specimens the spinulæ are more or less worn away or irregularly preserved, and in further wearing, the intercellular spaces appear as thick, solid walls separating the cell-apertures. The specimen originally figured as *Alveolites exsul* is evidently a CALLOPORA encrusting and only partially covering the surface of *Ceramopora confluens*. The illustration in figure 4 of plate 9 is incorrect in representing the cell-apertures as angular and oblique, while the cells open directly upwards; the intercellular spaces are thicker and covered with granulæ, and are formed by numerous very small angular pits or pores.

It is distinguished from a condition of *Ceramopora confluens* by the intercellular granulæ and pits.

LICHENALIA *Hall.*

LICHENALIA CONCENTRICA.

Plate 5, Figs. 9–16; Plate 6, Figs. 1, 2, 4, 7–10, and Plate 7, Figs. 3–11.

Lichenalia concentrica HALL. Pal. N. Y., vol. ii, p. 171, pl. 40E, figs. 5*a*–5*g*. 1852.

The name LICHENALIA* was originally applied by me to circular or flabelliform epithecal expansions, one side of which is concentrically wrinkled, and when in perfect condition is usually marked by fine radiating and concentric striæ, which vary in character and degree in different species. The opposite side is celluliferous. The celluliferous face is usually adherent to the stone, and the exposed surface presents the ordinary characters of the epithecal covering of a coral or bryozoum. In well-preserved examples the fine concentric and radiating striæ are apparently characteristic of the genus, and in some specimens the cell-bases are visible from the non-celluliferous face. When the exte-

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* *Palæontology of New York*, vol. ii, p. 171.

rior surface is worn, it presents a grooved and striate appearance, indicating the mode of growth in the cells and cell-walls, which are usually procumbent at the commencement of their growth, and then turn upward. The celluliferous face presents numerous cell openings which may be closely or more distantly arranged, and which vary from circular to oval, and even subquadrangular in form, depending upon their mode of growth and in part upon the condition of preservation. These bodies do not always preserve the expanded form indicated, but the margins become contracted and infolded, so that the non-celluliferous faces come into near contact, and assume an apparently solid form, with cell-apertures covering the entire surface. In their young state they are frequently found attached to other fossils, and this is probably the condition of all in their earlier stages of growth; the mode of growth and ultimate form being greatly dependent upon the nature of the body to which the germ has originally been affixed. In the expanded forms the cell-tubes are short, and the increase is by lateral extension of new cells, until the fronds sometimes reach a diameter of thirty centimetres. When the frond becomes corrugated or infolded in its young state, and assumes a compact form, the cell-tubes become elongated as shown in fig. 11 of plate 5, but I am unable to find that any of them assume characters incompatible with the genus in its typical forms. After examining a large number of specimens, I am unable to distinguish any characters marking a specific difference between the expanded forms, like figs. 4, 9 and 10, of plate 6, and those which assume an irregular and more solid aspect, as in figs. 9, 11 and 12, of plate 5.

LICHENALIA CONCENTRICA var. PARVULA.

Plate 7, Figs. 1, 2.

Lichenalia concentrica var. *parvula* HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 7, figs. 1, 2. 1876.

This form, indicated as a variety of *L. concentrica*, is distinguished by its smaller cell-apertures, as shown in fig. 2, which is enlarged to the same degree as fig. 7. In its mode of growth and other characters it does not differ from the ordinary forms of LICHENALIA.

LICHENALIA CONCENTRICA var. MACULATA *n. var.*

Plate 6, Figs. 3, 5 and 6.

Celluliferous face, flat, concave or convex; cell-apertures round, or broadly oval, and when entire, preserving a projecting lip on one side ; variable in their distance from each other, and sometimes quite closely arranged. Surface marked by elevated maculæ, upon which there are a few larger cell-apertures irregularly disposed, the center of the tubercle being sometimes quite free from cells.

The specimen figured has a convex exterior surface, owing to the contraction of the epitheca, and on some weathered portions, where the cell-apertures are distant, the interspaces are apparently cellulose. This feature, however, is not a prevailing one, nor has it any specific signification. In a specimen where the celluliferous face is concave, the exterior or epithecal side presents the same aspect as that of ordinary forms, and is undistinguishable from them. The maculate form of surface, or its incipient condition, is very common upon all forms of the celluliferous face of this fossil.

The variety is herewith separated from the forms figured as *L. concentrica* in the Documentary Edition of this Report.

SAGENELLA *Hall.*

SAGENELLA ELEGANS.

Plate 7, Figs. 12, 13.

Sagenella elegans HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 7, figs. 12, 13. 1876.

Compare *S. membranacea* HALL. Pal. N. Y., vol. ii, p. 172, pl. 40E, figs. 6 *a*, 6 *b*.

Bryozoum a thin membraniform expansion growing upon the surface of other organic bodies. Cells subcylindrical, flattened for the greater portion of their length and continuing nearly parallel with the plane of the epitheca ; arranged in a more or less diverging or radiating order, with intercalated ranges, presenting a subimbricated aspect, turning abruptly and opening upward. Cell-apertures circular, about .2 mm. in diameter.

The arrangement of cells and form of cell-apertures differ from CERAMOPORA in the rounded form and more directly upward opening. The genus differs from LICHENALIA in the more extended procumbent portion of the cell-tube, in the form of the cell-aperture, and in the much thinner and persistently adhering epitheca.

CERAMOPORA *Hall.*

CERAMOPORA LABECULA.

Plate 8, Figs. 1-3.

Ceramopora (*Berenicia?*) *labecula* HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 8, figs. 1-3. 1876.
Compare *Ceramopora imbricata* HALL. Pal. N. Y., vol. ii, p. 169, pl. 40E, figs. 1*a*-1*i*. 1852.

Bryozoum growing in circular or subcircular discoid forms upon other organic bodies; greatest diameter observed about seven mm. Cell-tubes short, cylindrical, radiating from the center and increasing by lateral additions, those in the central portion being nearly vertical, and becoming more and more oblique as they recede from this point, until the marginal ones are nearly parallel with the epitheca; arranged in alternating and imbricating series. Apertures arched or somewhat triangular, .25 mm., or less, in diameter.

This species is found attached to the bases of crinoids, to gasteropods, and other fossils.

CERAMOPORA CONFLUENS.

Plate 8, Figs. 4, 5.

Ceramopora confluens HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 8, figs. 4, 5. 1876.

Bryozoum, consisting of lamellose expansions growing upon the surface of other organic bodies, and attaining a thickness of from .25 to 1 mm. Cell-tubes short cylindrical, closely arranged in alternating and imbricating order. Surface often elevated in nodose prominences which are sometimes destitute of cells. Cell-apertures arching or triangular, about four in the space of one millimetre.

This species occurs in large expansions growing upon shells and upon the calyces of crinoids. The surface of the expansion rises into low rounded nodes and irregular undulating ridges, the summits of which are sometimes free from cellules, while in many examples there are a few larger cellules marking the sides of the elevation. The cell-apertures are usually closely arranged, sometimes more distant, and when entire, have the typical arching form, but where the surface is worn, they are round or broadly oval.

This species differs from *C. agellus* in not showing lines of cellules radiating from the maculæ or nodes, and in the less distinct elevation of the cell-tubes upon the surface.

CERAMOPORA AGELLUS.

Plate 8, Fig. 6.

Ceramopora agellus HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 8, fig. 6. 1876.

Bryozoum consisting of a thin expansion covering the surface of other organic bodies ; cells subcylindrical, short, very oblique, rapidly expanding toward the apertures. Cell-apertures, when entire, arching and angular, and when worn, broadly elliptical ; about four in the space of a millimetre on the greater part of the surface, and upon the maculæ, two or three in the same space.

The surface of the frond is marked by numerous maculæ which do not rise into nodes, but are covered by cells of from once and a half to twice the diameter of the ordinary cells. The cellules of the entire frond appear to radiate from a single point, which is not the center, and again from each of the maculæ are distinct radiating lines of cellules in the direction of the growth. In these characters the species differs from *C. confluens*. This species occurs upon the surface of Gasteropoda and Brachiopoda, but has rarely been seen upon the calyces of crinoids.

PALESCHARA *Hall.*

PALESCHARA OFFULA.

Plate 8, Figs. 7, 8.

Paleschara offula HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 8, figs. 7, 8. 1876.

Bryozoum consisting of a thin expansion attached to other organic bodies, one side being celluliferous ; cellules polygonal, from five to seven-sided, varying from .25 to .50 mm. in diameter.

This species presents the usual character of the species of this genus, having wide, shallow polygonal cells which are larger than those of *P. maculata*. The specimens of this species, so far as known, present no maculæ of larger cells or of barren spaces.

PALESCHARA MACULATA.

Plate 8, Figs. 9-13.

Paleschara maculata HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 8, figs. 9, 10. 1876.

P.? aspera HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 8, figs. 11-13. 1876.

Bryozoum a thin foliate expansion encrusting other organic bodies. Cells polygonal, contiguous, about three to four in the space of one millimetre, with maculæ of larger cells unequally distributed over the surface.

The cells appear to be arranged in somewhat concentrically radiating lines, and are longer in the direction of these lines, the length being sometimes twice as great as the width. In well-preserved specimens there are distinct short spinules at the angles of the cells.

The figures referred to *Paleschara? aspera*, on Plate 8, are representations of a phase of *P. maculata*, and the cell-apertures are incorrectly delineated.

PALESCHARA INCRASSATA *n. sp.*

Bryozoum occurring as thin, or more or less thickened, expansions encrusting other organic bodies. Cellules oval; apertures margined with coarse granulæ or spinules, and in specimens somewhat worn, the cellules are separated by a distinct intercellular space or a thickening of the cell-walls.

This form is distinguished from *P. maculata* by the smaller oval cell-apertures, the thicker interspaces and coarser granulæ at the margins of the cells. It may be only a variety of that species possessing these distinctive features.

PALESCHARA ? (CHÆTETES ?) SPHÆRION.

Plate 8, Figs. 14, 15.

Paleschara? sphærion HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 8, figs. 14 and 15. 1876.

Bryozoum incrusting or free, occurring in flattened, irregularly circular, or depressed hemispheric masses of one or two millimetres in thickness; in its more complete condition asuming a spheroidal hollow form. Cells polygonal, contiguous, about four in the space of one millimetre, with maculæ of larger cells, the centers of which are distant from each other about four millimetres; the larger cells two or three times the size of the smaller ones.

In its mode of growth this form resembles CHÆTETES, but no specimens have been seen where the depth of the cells is more than two millimetres. The cell-apertures are somewhat more regularly hexagonal than in the preceding forms, and by this character it is readily distinguishable from *P. confluens*. This species is also distinguished from the latter by the character of the maculæ and the larger cells. In *P. maculata* the maculæ are less conspicuous, and the larger cells do not differ so much in size from the ordinary ones.

STICTOPORA *Hall.*

I continue the use of the generic term STICTOPORA for branching forms of this character, where the cell-apertures are round or oval, or sometimes partially covered by a projecting lip; and where the intervening space may be plain or marked by slender carinæ, striæ or elevations separating the rows of cells. These fossils are not properly PTILODYCTIA, as claimed by some authors, the latter being simple non-branching stipes with cells of different character from those of STICTOPORA.

STICTOPORA SIMILIS.

Plate 11, Figs. 13-16.

Stictopora similis HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 11, figs. 13-16. 1876.

Compare *S. punctipora* HALL. Pal. N. Y., vol. ii, p. 157, pl. 40 B, figs. 2*a*, 2*b*, 2*c*. 1852.

Bryozoum ramose, branches flattened, width from two to three millimetres; margins destitute of cells. Cell-apertures oval, opening directly outward, closely arranged in oblique rows; length .35 mm., width .18 to .25 mm.

This species differs from *S. orbipora**, occurring in the same locality, by its thinner branches and oval cell-apertures.

* HALL, Trans. Alb. Inst., vol. x. p. 61.

FENESTELLA *Lonsdale.*

FENESTELLA AMBIGUA *n. sp.*

Plate 11, Figs. 17-21.

Hemitrypa dubia HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 11, figs. 17-21. 1876.
Not *Fenestella dubia* LONSDALE.

Bryozoum broadly funnel-form; branches, eight in the space of five millimetres; on the non-poriferous side regular and somewhat rigid in appearance, flattened, striated; striæ sharp, slightly sinuous and sometimes granulose, two to three on each branch. Dissepiments strong, frequently as wide as the branches, six in the space of five millimetres, expanding at their junction with the branches and on the same plane; striated on the non-poriferous side. Fenestrules oval to subcircular, from nearly equal to twice the width of the branches, and from one-third longer to nearly twice as long as wide.

Cell-apertures in two ranges, small, circular, separated from each other by a distance greater than the aperture, four in each fenestrule, opening nearly directly upward, with a distinctly elevated margin. Ranges of cellules separated by a thin partition which extends upward to an elevation equal to twice the thickness of the branch below, and then expanding laterally on each side, forms a pseudo-branch. These pseudo-branches are connected by dissepiments which arise from the upward growth and expansion of the narrow edges of the dissepiments below, in the same manner as in the branches proper, and the surface of both the pseudo-branches and dissepiments are striated as on the non-poriferous face. In well-preserved specimens there are rows of minute pits between the striæ. This accessory surface differs, however, in some degree from the non-poriferous face proper, in the apparently more sinuous character and irregularity of growth in branches and dissepiments, giving a different aspect to the fenestrules.

FENESTELLA PARVULIPORA.

Plate 12, Figs. 1-9.

Fenestella parvulipora HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 12, figs. 1-9. 1876.

Frond broadly funnel-shaped, and growing very luxuriantly; branches somewhat slender, from eight to ten in the space of five millimetres; bifurcations frequent and irregular. On the non-poriferous side, branches rounded, marked with fine, but distinct striæ, of which there are from five to seven on the width of the branch. Dissepiments slender, about one-third as wide as the branches, and expanding at their junction, rounded on the non-poriferous side and sharply angular or carinate on the poriferous side; five to seven in the space of five millimetres. Fenestrules subquadrangular or broadly oval, width varying from one-half to twice the width of the branches, length once and a half to twice the width. Cell-apertures in two ranges; generally four and sometimes five in the space of each fenestrule, circular or slightly oval, opening nearly directly upward; distance from each other less than the diameter of the aperture; margins distinctly elevated and slightly indenting the border of the fenestrule; space between the ranges of cellules carinated; carina sharp, elevated and nodose, the nodes in well-preserved specimens prominent, about fifteen in the space of five millimetres.

A characteristic of this species is the nodose carina, a feature not observed in any other species from this locality.

FENESTELLA ACMEA.

Plate 12, Figs. 10-14.

Fenestella acmea HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 12, figs. 10-13. 1876.
Fenestella sp.? HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 12, fig. 14. 1876.
Compare *F. Nervia* HALL. 26th Rep. N. Y. St. Mus. Nat. Hist., p. 93. 1874.

Bryozoum funnel-form, narrowly expanding below and spreading above, sides undulated. Branches rigid, eleven or twelve in the space of five millimetres; non-poriferous sides slightly rounded, longitudinally striated; striæ very strong and prominent, three or four in the width of the branch. Dissepiments about half the width of the branches as they appear on the non-poriferous side, about seven or eight in the space of five millimetres, expanding at their junction with the branches and transversely striated; on the poriferous side depressed and angular. Fenestrules broadly oval, a little wider than the branch, length from one and one-third to twice the width, appearing narrower and sometimes nearly obsolete on the poriferous side. Cell-apertures small, circular, in two ranges, distant from each other more than their diameter, opening nearly directly upward; margins distinctly elevated and indenting the border of the fenestrule. Space between the ranges of cells carinate, the carina thin and elevated, abruptly expanding on each side above, and again narrowing to a thin carina.

The elevated and expanded carina which is again carinate, and the partial closing of the fenestrules on the poriferous side are characteristics of this species.

The specimen, *Fenestella sp?* fig. 14, ut cit., proves to be identical with undoubted *Fenestella acmea*, and differs from *F. bellastriata* n. sp. in its regular oval fenestrules, having a length never greater than twice the width, and eight to nine fenestrules in the space of 5 mm. In *F. bellastriata* there are six fenestrules in the space of 5 mm., and they have always a length greater than twice the width.

A small fragment of the poriferous side of the specimen figured presents the character of *F. acmea*.

FENESTELLA PUNCTOSTRIATA.

Plate 12, Figs. 15, 16.

Fenestella punctostriata HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 12, figs. 15, 16. 1876.

Frond flabelliform, branches strong, six in the space of 5 mm.; on non-poriferous side rounded, striated; striæ very distinct, five to ten on each branch, finely granulose. Dissepiments variable, sometimes slender, often thickened, and the branches sometimes anastomosing from lateral contact. Fenestrules variable in shape, width about the same as the branches, length from three to five times their width. Cell-pores in from three to five ranges, five or six pores in the length of a fenestrule. Apertures polygonal, contiguous and alternating, forming oblique rows across the branch; partitions thin, sharp and slightly granulose.

The poriferous side of the frond of this species was unknown at the time of giving the illustrations on plate 12. The study of many specimens shows that there is considerable variation in the fenestrules, which is not indicated in fig. 15. The striato-punctate character of the non-poriferous side, and the poriferous side with large angular cellules in more than two rows, are distinguishing features of the species.

THAMNISCUS *King*.

THAMNISCUS NIAGARENSIS.

Plate 11, Figs. 22-25.

Thamniscus ? Niagarensis HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 11. figs. 22-25. 1876.

Bryozoum fruticose, often somewhat broadly funnel-shaped, numerous stems growing from a common base, bifurcating but not uniting laterally; branches much thickened below the bifurcations; celluliferous on the exterior side; non-celluliferous side striated; striæ strong, sinuous, often granulose, from three to five in the width of the branch; poriferous side frequently angular in the middle; cell-apertures contiguous, round, or polygonal from contact of the margins with each other, irregularly arranged, from .15 to .25 mm. in diameter.

This species occurs as a ramose frond rising from a single base, or spreading equally on all sides and broadly funnel-shaped. The poriferous sides of the branches are round or angular. No other species of the genus is known to me in the Niagara formation.

CRINOIDEA.

SACCOCRINUS *Hall*.

SACCOCRINUS CHRISTYI *Hall*.

Plate 13, Figs. 12-20.

Actinocrinus Christyi HALL. Trans. Alb. Inst., vol. iv, p. 196. Abstract, p. 2; May, 1863.

Not *Actinocrinus Christyi* SHUMARD. 1st and 2d Rep. Geol. Surv. Miss., pt. ii, p. 191, pl. A, fig. 3. 1855.

Actinocrinus Whitfieldi HALL. 20th Rep. N. Y. St. Cab. Nat. Hist., p. 326; Doc. Edit., 1868.

Actinocrinus (*Saccocrinus*) *Whitfieldi* HALL. 20th Rep. N. Y. St. Cab. Nat. Hist., pp. 370, 430; Revised Edit. [1870.]

Saccocrinus Christyi (HALL) M. & W. Geol. Rep. Ill., vol. iii, p. 347, pl. 5, fig. 1. 1868.

Megistocrinus Marcouanus W. & M. Mem. Bost. Soc. Nat. Hist., vol. i, p. 87, pl. 2, fig. 5. 1866.

Megistocrinus infelix W. & M. Mem. Bost. Soc. Nat. Hist., vol. i, p. 110, pl. 11, fig. 7. 1866.

Body below the arms elongate, urn-shaped, or subovate, very slightly spreading at the arm-bases. Basal plates proportionally small, more abruptly spreading than the succeeding plates, their lower margins somewhat produced near their junction with the column. First radial plates of moderate size, height and width equal, those of the postero-lateral rays smaller; second radial plates hexagonal, somewhat wider than high; third radials heptagonal, higher than wide, smaller than the second, supporting a pair of supraradials on each upper sloping side, one above the other, the upper one a bifurcating plate, and supporting a series of brachial plates on each upper side, giving four arms to each ray. Interradial plates numerous, the first one hexagonal, intermediate in size between the first and second radials, supporting two in the second and third ranges; about five other ranges above, of two or three plates each, gradually decreasing in size toward the summit. First anal plate heptagonal, equal in size to the largest first radial, but shorter, and supporting three smaller plates in the second range with a large number of smaller plates above. Intersupraradial spaces occupied by from five to seven plates each, which gradually decrease in size from below. The summit, in older specimens, is depressed convex, composed of a large number of polygonal plates, having near the anal side an aperture (or proboscis ?) which is surrounded by smaller plates. The plates of the radial series are marked along their centers by an elevated ridge, which is interrupted at the sutures of the first, second, and third radials, being a simple elongate node on the first radial, becoming more distinct in the supraradial series, and strongly elevated on the brachials ; bifurcating on the fourth plate and again on the second above, with two or three plates of the brachial series above these, before the separation of the arms from the body.

Surface, in well-preserved specimens of the plates, toward their margins (except the horizontal faces of the direct radial series), marked by fine, sharply elevated radiating striæ, which cross the suture line uniting with similar ones on the adjacent plate ; there are, likewise, sometimes, short ridges, or elongate nodes, radiating from near the margins of the interradial plates and uniting with similar ones on the adjacent plates. All the plates are marked by a finely granulose surface, the granulæ being arranged in concentric lines parallel to the margin of the plates. Column enlarging just before reaching the base of the cup, composed of very thin discs, which are coarsely granulose on their margins.

This species has some resemblance to *Actinocrinus* (*Saccocrinus*) *speciosus* (Pal. N. Y., vol. ii., p. 205, pl. 46, fig. 1), but differs in the proportional size and form of the plates, in the ridges of the radial series, and the bifurcation of the arms previous to their separation from the body.

MACROSTYLOCRINUS *Hall.*

In the second volume of the Palæontology of New York, published in 1852, I proposed the name MACROSTYLOCRINUS for a crinoid having three basal plates, and five rays of three plates each, from which proceed the arms ; the interradial series consisting of about five plates. In 1860, Dr. F. Roemer proposed CYTOCRINUS* for a crinoid of precisely the same structure and of similar form. The latter, though published eight years later, has the advantage of being a more euphonious name.

The genus CTENOCRINUS of Bronn, as described by Pictet, possesses a structure resembling, or identical with, CYTOCRINUS and MACROSTYLOCRINUS, though the exterior character is very distinctive ; for the present I retain the latter name.

MACROSTYLOCRINUS STRIATUS.

Plate 13, Figs. 1-4.

Macrostylocrinus striatus HALL. Trans. Alb. Inst., vol. iv, p. 207. Abstract, p. 13; May, 1863.

Body depressed turbinate: calyx to the summit of the first radials hemispheric in form. Rays from the second radials spreading; interradial spaces depressed or not expanding beyond the upper edge of the first radial plate; basal plates comparatively large ; first radials large, prominent in the middle near the upper margins; second radials hexagonal, not half as large as the first, wider than high ; third radials smaller than the second, pentagonal, wider than high, supporting arm plates on the upper sloping sides ; first interradials larger than the second radials, hexagonal, supporting two plates in the second range.

Surface finely and beautifully striated by fine, sharp, undulating striæ, about twelve of which traverse the lower side of the first radial plate, meeting similar ones from the basal plates; the apices or junction of the striæ are in the line from the center to the angles of the plates in the basal, first radial and interradial plates, while on the surface of the smaller plates these lines are sometimes broken into granules.

This species resembles the *M. ornatus* from the shale of the Niagara group at Lockport, N. Y.; but the rays are more spreading and the surface markings are finer.

MACROSTYLOCRINUS STRIATUS var. GRANULOSUS *n. var.*

Among the collections from Waldron there is another species of this genus, or a constant variety, which presents a uniformly finely granulose surface. The prominent short ridge from the

* *Silurische Fauna des Westlichen Tennessee*, p. 4, Tab. 4, figs. 2 a, 2 b, and 2 c.

first radial which supports the arm is not so marked and is more angular. There is likewise a slight angularity of the body at the base of the radial plates, and the base of the calyx at its junction with the column is trilobate. The arms are long and slender and are not observed to bifurcate above the summit of the calyx. In a specimen having a height of calyx of 5 mm. the length of the arms is 21 mm.

MACROSTYLOCRINUS FASCIATUS.

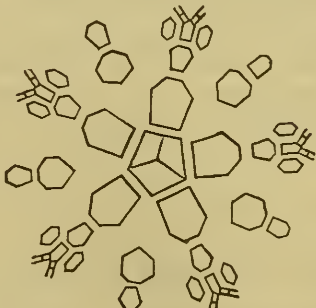
Plate 13, Figs. 5, 6.

Cyathocrinus fasciatus HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 13, figs. 5, 6. 1876.

Body rotund, calyx symmetrically cup-shaped ; basal plates apparently three (not satisfactorily determined) closely anchylosed, and supporting five hexagonal first radial plates ; upper side of the first radial shortly truncated and supporting a small second radial, which in direct line supports a smaller one, from the upper sloping sides of which proceed two small arms. The first radial plates, on their adjacent sloping faces, support a heptagonal interradial plate, above and adjacent to which are three other interradials not fully determined.

Surface granulose-striate, the striæ sometimes in strong fascicles, to the almost entire exclusion of granulæ. Fascicles of striæ radiating from the basal plates to the margins of the plates above and uniting in a prominent stellate arrangement on the centers of the first radial plates. From the center of the first radial plates upward proceeds a distinct rounded ridge which extends to the third radial where it bifurcates to the arm plates.

Height of body to bifurcation of the arms 9–11 mm. Diameter of cup 7–8 mm. Column at base 1.5 mm.



The structure of the body above the base is that of the simplest form of ACTINOCRINUS, but without any distinctive feature of an anal side. The surface markings are characteristic of the species, and in some specimens the fasciculate striæ are raised into strong ridges of a more prominent character than those represented in the figure. In a single specimen observed the striæ are subdued and separated, with the interspaces marked by fine granulæ. The preceding diagram illustrates the structure so far as it has been observed.

Observations upon the genera GLYPTOCRINUS, GLYPTASTER, BALANOCRINUS *and* LAMPTEROCRINUS.

In the first volume of the *Palæontology of New York*, I proposed the genus GLYPTOCRINUS for a lower Silurian form, common in the blue shaly limestone of the Hudson River group at Cincinnati and elsewhere in the west. This genus is characterized by the presence of five basal or subradial plates, succeeded by five series of radial plates of three each, below the first subdivision of the ray. The column at its junction with the body is pentalobate. The genus has been recognized and several other species described by different authors. A careful examination of the basal cavity of some of the specimens gives indication that the last joint of the column may be divided, representing five undeveloped basal plates.

In the genus GLYPTASTER, five basal plates and five subradials are distinguished, with the rays consisting of three plates each, below the first subdivision.

The distinction between these genera is, therefore, as follows: In the first, the non-development of true basal plates, while the ray is twice subdivided before becoming free; and in the typical species the arms are not again subdivided. In the second, a moderate development of the true basal plates, with subradials above, while the ray is but once subdivided before becoming free.*

At the time of proposing the genus GLYPTASTER, I was not acquainted with the structure of BALANOCRINUS of Troost. The latter genus I recognized in the Wisconsin Report of 1860. Upon further examination, it appears that BALANOCRINUS of Troost has the structure of GLYPTASTER, with this exception, that the basal plates are much more fully developed, while the rays do not bifurcate before becoming free. Notwithstanding, therefore, the great similarity and near identity of structure in these forms, there seems good reason for the generic separation.

The genus LAMPTEROCRINUS of Roemer is identical with

* See illustrations of structure, on pp. 206, 207, *24th Report on the State Museum of Natural History.* 1872.

the genus BALANOCRINUS of Troost. The latter name was first published in Troost's Catalogue in 1849. The name LAMPTEROCRINUS was published in 1860, and in that year I recognized the genus BALANOCRINUS and described a species (*B. inflatus*) from the Niagara group of Wisconsin.*

The group of species referable to these genera is a very interesting one, and the following contribute some further information in relation to their geological distribution.

GLYPTOCRINUS *Hall.*

GLYPTOCRINUS CARLEYI.

Plate 14, Figs. 7-10.

Glyptocrinus Carleyi HALL. Trans. Alb. Inst., vol. iv, p. 203. Abstract, p. 9; May, 1863.

General form of body pentangularly turbinate, having the angles coincident with the rays and marked by a rounded ridge, the intermediate spaces concave. The upper disc of the column is marked by five divisions indicating the undeveloped basal plates; subradial plates (basal plates of the generic description), wider than high, each one marked by a single or double rounded radiating ridge. Radial series strongly marked by a longitudinal rounded ridge, which bifurcates with the first and second division of the ray, giving from four to eight arms to each ray as it leaves the body. Besides the longitudinal ridge, the plates of the radial, interradial and supraradial series are marked by sharp radiating ridges, with the intermediate spaces finely granulose. Rays bifurcating on the third or fourth plate, and again on the second or third above, and on the sixth or seventh of the supraradial series. Interradial plates, eight or more (probably ten or twelve), with many small intersupraradials.

Summit flat, depressed convex, or slightly concave, finely pustulose, composed of numerous small plates. Proboscis(?) small, subcentral.

In form this species resembles the *G. decadactylus* of the Lower Silurian strata, but is proportionally shorter and a little more rapidly expanding. The radiating ridges upon the plates are thinner and sharper, and the intermediate spaces more strongly granulose. The column and arms are unknown.

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*Published in the *Report of Progress of the Geological Survey of Wisconsin.* 1861.

GLYPTASTER *Hall.*

GLYPTASTER OCCIDENTALIS.

Plate 13, Figs. 7-11.

Glyptaster occidentalis HALL. Trans. Alb. Inst., vol. iv, p. 204. Abstract p. 10; May, 1863.

Body of medium size, broadly subturbinate; basal plates small, distinctly developed; subradial plates comparatively large, marked by a single rounded ridge which bifurcates in the middle of the plate, the divisions passing to the sutures of the radial plates. First radial plate large, the lower half marked by two rounded ridges which are continued from the two adjacent subradials, and unite on the middle of this plate, continuing along the second and third radials, and bifurcating on the latter, following the subdivisions of the ray. Interradials about three, with one interradial space (the anal) larger and containing a greater number of plates.

Surface of the ridge on the subradial and radial plates, marked by longitudinal striæ, while all the plates are marked by sharp radiating lines, which are continuous or interrupted and granulose, the granules being often arranged in more or less confluent lines; intermediate surface of plates granulose.

Column round above; arms unknown.

GLYPTASTER OCCIDENTALIS var. CREBESCENS *n. var.*

A specimen of somewhat more robust character than those described, has the ridges of the rays marked with undulating, subgranulose striæ, and the plates more distinctly striate, while the anal area is large and subventricose, showing three ranges of plates in the order of one, three and four, with a more numerous fourth range. The anterior ray gives some evidence of a second bifurcation before becoming free from the body.

Having but a single specimen of this character, I hesitate at present to designate it as a distinct species.

Glyptaster inornatus.

Plate 14, Figs. 1-6.

Glyptaster inornatus Hall. Trans. Alb. Inst., vol. iv, p. 205. Abstract p. 11; May, 1863.

Body somewhat urn-shaped, abruptly spreading at the base with the sides somewhat straight or moderately expanding; pentangular, the angles corresponding to the rays, and becoming ten-angled above the division of the rays. Basal plates much developed, distinctly pentangular, with the lower margins expanded and thickened, with a double or triple node on each one, and spreading beyond the column. Subradials large, six-sided except the one on the anal side which is seven-sided. First radials about equal in size to the subradials, heptagonal (as usual in the genus); second radials much smaller, quadrangular, and pentangular in the postero-lateral rays; third radials a little larger than the second, heptagonal. Supraradial series consisting of four or more plates before reaching the free arms, with an intersupraradial space which is occupied by five or more plates. First interradial plate octagonal, but little smaller than the first radial, and supporting two smaller plates in the second range, three in the third range, and several smaller plates above. On the anal side the first plate is octagonal, as large or larger than the first interradial plate, and resting on the heptagonal subradial plate, supporting four plates in the second range, with ten or twelve plates irregularly disposed above.

The subradial plates are prominent in the middle, with low undefined angular ridges extending to the sides of the plates, the intermediate spaces depressed. The ridges from the center to the upper sides of the plates are a little more prominent, and meet at the sutures with similar ridges on the lower sides of the first radials; these uniting on the center are continued in a stronger ridge along the center and following the subdivision become more prominent on the supraradial plates. The faces of the radial plates are marked by similar but less defined elevations extending to the sutures, and meeting similar ridges on the interradial plates. There are rarely some intermediate folds or undefined ridges upon the surface of the plates.

The surface has no peculiar markings. The column in its upper part is cylindrical, composed of unequal joints, which often appear to be made up of unequal or irregular plates.

This species differs from *G. occidentalis* and from *G. brachiatus* (*Pal. N. Y.*, vol. 2, p. 197) in the absence of surface sculpturing, nodes, or granules; in the greater development of basal plates, and the quadrangular form of the second radials.

CYATHOCRINUS *Miller*.

CYATHOCRINUS POLYXO.

Plate 15, Figs. 10-17.

Cyathocrinus Polyxo HALL. Trans. Alb. Inst., vol. iv, p. 199. Abstract p. 5; May, 1863.

Body broadly turbinate, base large and somewhat protuberant, sides angular from the prominence of the centers of the subradial and radial plates. Basal plates wider than high, the basal margins expanded at the junction with the column. Subradials large, wider than high; radials large, hexagonal, much wider than high, deeply notched on the upper margin; the articular scar is comparatively small and indenting the plate to about one-fourth of its depth. First anal plate quadrangular, nearly equal sided, resting upon two subradials, and supporting on one of its upper sides one end of the adjacent radial plate; second anal plate larger than the subradials, resting upon one subradial and the first anal, and between the radial plates of the adjacent rays.

The subradials, first radials and anal plates are prominent in the center, with low angular ridges extending to the sutures, the intermediate spaces being depressed, giving a strongly angular appearance to the cup. Entire surface smooth or very finely granulose. Summit, arms, and column unknown.

The body of this species is usually somewhat unsymmetrical from the anal side being more elongated or higher, and less ventricose than the other sides. The very large second anal plate, the protuberant base and large cicatrice for the column attachment, are distinguishing features of the calyx.

CYATHOCRINUS NUCLEUS.

Plate 15, Figs. 7-9.

Dendrocrinus nucleus HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 15, figs. 7-9. 1876.

Body of medium size, depressed-turbinate, width one-fourth to one-third greater than the height, pentalobate in the upper part. Basal plates short, truncated below by the large column; subradial plates wider than high, three of them pentagonal and two heptagonal. First radial plates large, gibbous and projecting laterally so as to give a distinctly pentalobate aspect to the fossil; second radials much smaller than the first, wider than high, and separated by a small intercalated plate which rests upon the short sloping upper lateral faces of the first radials; third radials subpentagonal and supporting an arm upon each upper sloping face; arms (in part) bifurcating on the third plate, and above the last radial; anal plates two. Surface finely and strongly granulose.

The specimens before me vary from a height of 8 to 11.5 mm. with a diameter of 10 to 15 mm. The base of the column in the smallest measures 3.5 mm. and of the largest 5 mm. The column is proportionally very large and firmly inserted at the base, the upper plates are comparatively thin, and below these are alternations of thicker and thinner plates.

The figures given on plate 15 are from a young specimen, and do not fairly represent the species. The cicatrices on the radial plates are too narrow, and incorrectly represented as arm-bases. The species is not a DENDROCRINUS, but a true CYATHOCRINUS in structure.

LECANOCRINUS *Hall.*

LECANOCRINUS PUSILLUS.

Plate 15, Figs. 1-6.

Cyathocrinus pusillus HALL. Trans. Alb. Inst., vol. iv, p. 200. Abstract p. 6; May, 1863.

C. pusillus HALL. 20th Rep. State Cab. Nat. Hist. p. 324; Rev. Edit. p. 366.

C. pusillus HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 15. 1876.

Calyx small, forming a broad shallow cup a little inflated on the anal side. Basal plates very small, covered for nearly one-half their length by the column. Subradials proportionally large, three hexagonal and two larger and heptagonal. First radials short, broad, pentangular, the width twice the height; the second radial is a short plate having a width five times as great as the height, curving gently downward in the middle, and succeeded by a short pentangular plate supporting on its upper sloping sides a series of short linear arm plates; in some of the rays there is a second subdivision on the fourth plate above. First anal plate quadrangular, a little longer than wide, resting obliquely upon the two heptagonal subradials, and supporting upon its upper side one end of the adjoining first radial plate; the second anal plate, which is larger than the first, hexagonal, resting upon the top of a subradial and against the upper end of the first anal, supported on the sides by the first radial plates of the postero-lateral rays. Column small, round at its junction with the body. Entire surface finely granulose.

This species was originally described from the calyx, including the first radials, and its relations to LECANOCRINUS were not fully apparent. A more extensive collection from the locality has brought a considerable number of specimens in the same state as the one figured, including a single individual retaining the arms. In this condition its relations with the above genus are very apparent. The base is more spreading and more symmetrical than in the New York species of the genus, and the subdivision of the arms is likewise different. The form of the calyx corresponds to *Poteriocrinus pisiformis* of Roemer, from the Niagara formation of Tennessee, but in the figure of that species there is no indication of an anal plate corresponding to the first anal plate of this fossil, though the figure is otherwise very similar.

ICHTHYOCRINUS *Conrad.*

ICHTHYOCRINUS SUBANGULARIS.

Plate 16, Figs. 11-13.

Ichthyocrinus subangularis HALL. Trans. Alb. Inst., vol. iv, p. 201. Abstract, p. 7; May, 1863.

I. subangularis HALL. 20th Rep. St. Cab. Nat. Hist., p. 325, pl. 11, figs. 15, 16; pp. 367, 429, of Revised Edit. [1870.]

I. corbis W. & M. Mem. Bost. Soc. Nat. Hist., vol. i, p. 89. 1865.

Body elongate, narrowly turbinate or obconic below, becoming cylindrical above, angular above the base by the prominence of the radial series; base truncate for the articulation of the rather large column. Basal plates rudimentary, concealed by the column. Subradial plates appearing pentangular from their junction with the column, somewhat higher than wide. The primary radial series consists of three plates each; the first one pentangular, with the upper angles slightly truncated; the second quadrangular; the third pentangular, supporting on its upper sides the first plates of the second radial series. The second radial series consists of ten ranges of rectangular plates, four to five in each range. The third radial series is composed of twenty ranges of narrow rectangular plates, seven to twelve in each range. The fourth radial series consists of forty ranges of similar plates, the number not having been observed; but no evidence of free arms is shown up to the eighth plate of the fourth series. No interradial plates have been observed. The plates are all emarginate at the center of the upper margins and correspondingly produced on the lower side, except the upper plate of each range which is produced at both margins.

Surface of the radial plates elevated in the center; entirely smooth.

This character of the species, in the emargination of its plates, corresponds with that of the small patelloid plates of FORBESIOCRINUS, and in most respects it resembles that genus, except in the absence of interradial plates. This species differs from any other of the genus before described, in the narrowly turbinate form of the cup, the subangular outline of the basal portion, and the elongate cylindrical form of the upper part.

MELOCRINUS *Goldfuss.*

MELOCRINUS OBCONICUS.

Plate 14, Figs. 11–14.

Melocrinus obconicus HALL. Trans. Alb. Inst., vol. iv, p. 206. Abstract, p. 12; May, 1863.

Body narrowly subturbinate or obconical; basal plates forming together an elongate quadrangular prominence which scarcely expands above, and from which the body gradually enlarges to the base of the arms. Radial series of three plates each, the first of these heptagonal, and the largest plates in the body; second radials a little smaller than the first, octagonal; third radials much smaller, heptagonal, and supporting on each upper sloping side a series of two supraradials, the upper one apparently a bifurcating plate in some of the rays.

The interradial series, in three of the areas, are one, one, and two or three, and in the other two areas one, two and three or four. The summit is pentalobate, covered by small plates, and showing the base of a slightly excentric proboscis. The plates of the body are smooth in the middle, with short, abrupt, angular ridges near the margin, which meet similar ridges of the adjoining plates at the suture lines.

Height from the base to the summit but little more than half an inch, and greatest width at the arm bases about the same.

The genus TURBINOCRINUS of Troost differs from MELOCRINUS in having the first plate of one of the interradial spaces (or the first anal plate) truncating one of the basal plates, which does not occur in any known species of MELOCRINUS. The structure of TURBINOCRINUS above the basal plates is similar to ACTINOCRINUS, differing from that genus only in the presence of four basal plates.

RHODOCRINUS *Miller.*

Subgenus LYRIOCRINUS *Hall.*

RHODOCRINUS (LYRIOCRINUS) MELISSA.

Plate 15, Figs. 18-27.

Rhodocrinus Melissa HALL. Trans. Alb. Inst., vol. iv, p. 198. Abstract, p. 4; May, 1863.

Body depressed subspherical, or nearly hemispheric; base nearly flat or very depressed convex; central column cavity abruptly and deeply depressed; sides inflated in the lower part and contracted just below the arm-bases, where it is again a little expanded. Basal plates very small, concealed within the cavity and covered by the column. Subradial plates elongate heptagonal, their greatest width about one-third above their lower margin. Radial plates proportionally large; the first pentangular, wedge-form below; the second hexagonal, as large as the others; the third usually hexagonal (sometimes pentagonal), supporting on the upper sloping faces one or two large supraradial plates, with a very small bifurcating or axillary plate resting in an excavation in the middle of the upper margin of the second, above which commence the arm plates; resting partly on this small plate, and partly on the second supraradial plate above the third radial, and, upon the upper margin of the latter, there is a somewhat large, heptagonal, intersupraradial plate.

The interradial and anal series consist of four plates each; the first heptagonal, as large as the radials or larger, supporting two somewhat smaller hexagonal plates in the second range, one still smaller in the third, above which the brachial plates of the adjacent rays unite; the anal series is the same as the interradial in the best formed specimens; but there is sometimes a slight irregularity seen in one series, which we infer may be the anal side. Surface of plates flat or with only the general convexity of the body, covered by very fine confluent granules or interrupted radiating striæ, which unite at the sutures; each subradial plate is marked at the middle of the lower margin with a small triangular node and a somewhat elevated rim, giving a pentalobate border to the basal cavity. In many specimens the first radial plate is marked by a central node.

Summit nearly flat and depressed towards the margins or to the inner side of the arm-bases, composed of numerous small polygonal plates, with a subcentral proboscis, and on the inner side of each pair of arms a foramen opening into the cavity of the body. Plates of the dome irregular in size and varying in different individuals, the specimen figured having larger plates than some others which have been subsequently observed.

Arms two from each ray, each one composed of short, wide pentagonal plates which are interlocking at their adjacent edges; plates gradually becoming shorter and the arms gradually tapering to their extremities. Length of arms about 65 mm., lateral diameter at the base 8 mm. Column round, not enlarging at its junction with the body, and uniformly cylindrical for some distance below ; composed of thin plates, each fourth plate being thicker and armed with a row of strong nodes.

In general form and the symmetrical arrangement of plates, this species has much the appearance of EUCALYPTOCRINUS ; but the subradial plates and greater number of interradials, and the absence of the elongate plates separating the pairs of arms as in that genus, are distinguishing characters. In the flatness of the plates, their peculiar surface markings, and their arrangement, this species differs from all others of the genus RHODOCRINUS described.

The relation of this species to *Lyriocrinus* [*Rhodocrinus*] *dactylus* of the Niagara formation in New York (Pal. N. Y., vol. ii, p. 197, plate 44) is very obvious, though there are differences which make it desirable to continue the specific distinction.

The difference between the species here noticed and the typical forms of RHODOCRINUS seem to me to warrant the continued use of the designation LYRIOCRINUS, at least as a subgeneric term.

EUCALYPTOCRINUS *Goldfuss.*

EUCALYPTOCRINUS CRASSUS.

Plate 17, Figs. 1-11; Pl. 18, Figs. 1-9; Plate 19, Figs. 2, 4, 5.

Eucalyptocrinus crassus HALL. Trans. Alb. Inst., vol. iv, p. 197. Abstract, p. 3; May, 1863.

E. crassus HALL. 20th Rep. St. Cab. Nat. Hist., p. 323, pl. 11, figs. 2, 3. Rev. Edit., p. 365.

Body massive, turbinate from the base to the arms, and with the interbrachial plates and arms attached, it has a general subovate form with a truncate base, which in most specimens is deeply impressed at the column attachment. Basal plates small, concealed in the basal cavity. First radial plates much larger than the succeeding ones, height and width subequal ; second radials quadrangular, length and breadth equal, the greatest width at the base ; third radials hexagonal, the lower lateral and upper sides shorter than the other three. First supraradials somewhat smaller than the third radials, pentangular in well formed specimens ; second supraradials less than half as large as the first, pentangular, supporting on each upper sloping side a small triangular plate, upon which rest the first arm plates. The interradial plates are one large and two smaller to each field ; the large one is ten-sided and elongate-ovate, its greatest width above the middle ; the others are nearly as long but narrow, united at their margins the entire length, greatest width below the middle, the summits reaching as high as the fourth or fifth pair of arm plates. The intersupraradial plate is single, having the form of the two upper interradials when united, but smaller.

This species is extremely variable in form and proportions of the body, the older specimens being often more elongate, and sometimes constricted near the middle of the cup, giving a concavity to the sides. The base is much broader in some specimens, giving to the first radials a greater proportional breath. It differs from the *E. lævis* and *E. Phillipsi* of Troost, in the much greater height of cup, greater elongation of plates, and in having a less proportion of the first radial plates within the basal cavity.

A measurement of the calyx in some of the larger specimens gives a height of 50 mm., with a diameter across the top of 60 mm., and across the base of 27 mm. One specimen having a height of 50 mm., has a diameter at the base of 23 mm. One individual of more cylindrical form than usual has a height of 30 mm. with a diameter of the calyx at the summit of 28 mm. and a basal diameter of 16 mm. The figures 6, 7 and 8 of plate 17, and figures 1, 2, 4 and 6 of plate 18 are good illustrations of the prevailing forms of this abundant species.

EUCALYPTOCRINUS CÆLATUS.

Plate 16, Figs. 1-10; Plate 19, Figs. 1, 3.

Eucalyptocrinus cœlatus HALL. Pal. N. Y., vol. ii, p. 210, pl. 47, figs. 4*a*–4*e*. 1852.
E. cœlatus HALL. Trans. Alb. Inst., vol. iv, p. 226. Abstract, p. 32; May, 1863.
E. cœlatus HALL. 20th Rep. St. Cab. Nat. Hist., pp. 321, 329. Rev. Edit., pp. 363, 366.

Body ovoid ; base somewhat broadly truncate, and concave for the attachment of the column ; calyx broadly cyathiform, shallow, height equal to one-third of the entire height of the body. Basal plates concealed in the cavity and covered by the summit of the column. Subradial plates strong, gently incurved at their basal margins which are covered by the column, thence expanding outward they are recurved above the middle, leaving the basal margins but little below the plane of the upper margins of the same plates. Second radial plates quadrangular, wider than high; third radials pentagonal, wider than high, and with the large ten-sided interradial plate, giving great expansion to the upper part of the calyx. Arm plates narrow in the lower part, but becoming gradually wider above, giving an elongate elliptical area between the solid interbrachial plates. Summit flat, depressed, convex or slightly concave.

Column round, and near the summit composed of strong thick plates, with the margins projecting and rounded. Surface ornamentation always conspicuous and characteristic though subject to considerable variation. The plates of the body are covered with round, angular, or elongated nodes, and sometimes with straight or tortuous ridges often arranged in lines somewhat parallel to the margins of the plates. The younger specimens are much more strongly nodose than the older. The arms are usually marked by two parallel ranges of rounded nodes along the central part, while there is a range of smaller nodes on the exterior margins. These nodes are sometimes confluent, and appear as transverse ridges. The interbrachial plates are marked by two ranges of rounded or transversely elongated nodes.

Figures 4 and 8 of plate 16 exhibit the base and upper margins of a large individual. The largest specimen of the calyx observed has a diameter of 50 mm. with a height of 25 mm.

The distinguishing features of this species, as it occurs in the Waldron collections, are the general rotund ovoid form, broad spreading calyx, with about one-third the height of the first radials covered by the column; the arms stout and each pair in length about three to three and a half times their greatest width.

For diagram of structure of *E. cœlatus* see 20*th Report on the State Cabinet of Natural History*, page 321; Revised edition, page 363.

EUCALYPTOCRINUS OVALIS *Troost.*

Plate 17, Figs. 12, 13.

Eucalyptocrinus ovalis TROOST. Catalogue of Crinoidea. 1849.

Eucalyptocrinus ovatus (in error for *E. ovalis*). Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 17, figs. 12, 13. 1876.

Body oval-ovoid, outline curved from base to summit; the calyx somewhat deeply cup-shaped, and having a height equal to two-thirds the height from the base of the arms to the summit. Basal plates covered by the column. First radial plates strong, the greater portion of their height visible exterior to the column; second and third radials wider than high. Arms attaining their full width near the base, and continuing of the same width to about the middle of their length, and thence gradually tapering to the summit. The solid interbrachial plates narrow in the lower and middle part, and greatly expanded at the summit.

Column strong, composed of thick joints with rounded margins, alternating with an equal number of much thinner joints with flattened edges.

I have identified this species with the *E. ovalis* of Troost, from a comparison of the original specimens, which in the better preserved individuals have the same form and proportions. It differs from the young of *E. crassus* in the regularly elliptical outline of the entire body, the curving of the sides of the calyx, the less incurvation of the first radial plates into the column cavity, which is proportionally smaller than in that species. It is also especially distinguished from both *E. cœlatus* and *E. crassus*, by the great expansion of the interbrachial plates upon the summit, if such features are to be regarded as of specific value.

Compare fig. 13 of plate 17, with figs. 5 and 7 of plate 16, and with figs. 5 and 7 of plate 18.

Roots of EUCALYPTOCRINUS.

Plate 19, Figs. 6–8; and Plate 20.

The condition of the ancient ocean bed in the region of country now occupied by central Indiana, was apparently one of the most quiet and sheltered situations known during the Silurian period, and life was as prolific as in any tropical region of the present day.

Large surfaces of the more calcareous layers are covered with numerous forms of Bryozoa and corals; and the abundant roots of Crinoidea, with the bases of the stems, still remain as they grew upon the muddy bottom, the roots penetrating the ancient deposit, or commencing their growth upon some other organic body, and not unfrequently upon the bodies of the same species, or others of the genus which have been overthrown, and the more fragile portions dismembered by the slow process of maceration in a quiet sea.

From what we know of the locality, it is quite certain that many thousands of the bodies of Eucalyptocrinus have been gathered from the strata within an area of a few hundred yards, and the roots of these bodies, to the number of many hundreds, have been collected and preserved. These organisms appear to have grown in great abundance and in close proximity, with their stems of only moderate length, and the whole aspect must have been like a garden of lilies or tulips.

The specimen figure 5 of plate 17 may serve as an example of the manner of growth. The illustration is from a young individual of *E. crassus*, lying horizontally upon the calcareous shale, the stem turned downward from the natural vertical position to a horizontal one, without breaking or dismemberment, and the rootlets still remaining as they grew, penetrating the calcareous sediment. The prolific condition of this ancient sea is shown from the fact that the stems of crinoids while still living have been overgrown by corals; and shells of Gasteropods, in their most perfect and unworn condition, are overgrown by Bryozoa and Articulata.

The specimen, figure 8 of plate 19, is an example of the base of Eucalyptocrinus, remaining apparently in precisely the original condition, with the rootlets penetrating the calcareous mud in which it grew. The figures 6 and 7 show the bases of columns and the rootlets of two strong individuals attached to the overturned calyx of a large *Eucalyptocrinus cœlatus*. In the vertical view, there are visible two other roots of smaller very young individuals. In the lateral view, figure 7, the rootlets are broken off by the removal of the shale which embedded them, and it is here seen that a Bryozoon has encrusted the rootlet upon one side. These bases of columns and rootlets are also found growing upon the shells of Platyostoma and Strophostylus, as well as upon the calyces of Crinoids.

One of the larger examples of these roots of Eucalyptocrinus is illustrated on plate 20. The extension of the rootlets in their finest fibres has been several inches greater than shown in the figure, and the entire extent was probably not less than ten inches. Portions of specimens sometimes occur where the rootlets are much more extended, becoming quite filiform, but rarely if ever traceable to their final extremities in consequence of the breaking or exfoliation of the shale.

The great numbers of these undisturbed roots and the finer rootlets, standing in the position in which they grew upon the sea-bottom, is one of the best evidences of the extremely quiet condition which prevailed during the slow deposition of these calcareous shales of the Niagara Group.

STEPHANOCRINUS *Conrad.*

STEPHANOCRINUS GEMMIFORMIS.

Plate 14, Figs. 15-20.

Compare *Stephanocrinus gemmiformis* HALL. Pal. N. Y., vol. ii, p. 215, pl. 48, fig. 2.

The details of the structure of the genus STEPHANOCRINUS, and of the species *S. gemmiformis*, are given in vol. 2 of Pal. N. Y., as cited above. The specimens figured on plate 14 of this Report are larger and more rotund than those usually occurring in the Niagara shales in New York, but other specimens from later collections at Waldron are of smaller dimensions, and show a range of variation in size and proportions, which clearly proves the identity of the Western forms with those of New York.

The structure of the calyx and the arrangement of parts in the summit and ambulacra appear to be identical with CODASTER, and a small smooth form in the same association, referred to that genus, has the same structure as the fossil under consideration.

STEPHANOCRINUS GEMMIFORMIS.

CALCEOCRINUS *Hall.*

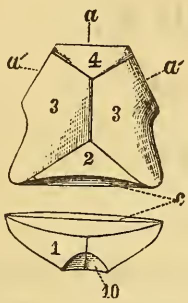
CALCEOCRINUS *Hall.* Pal. N. Y., vol. ii," p. 352, pl. 85, figs. 5, 6. 1852.
CHEIROCRINUS *Hall.* 13th Rep. St. Cab. Nat. Hist., p. 122. 1860.

At the time the genus CHEIROCRINUS was proposed for this form, I overlooked the fact that I had before published a notice of the fossil, though conscious of having studied it; being misled by the absence of any reference in the index of vol. ii, Pal. N. Y., the description being under the head of Additions and Corrections.

The following diagrams illustrate the generic structure:

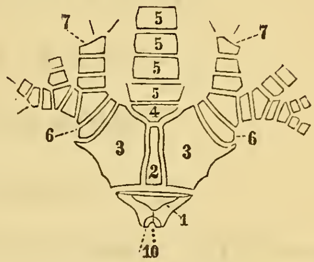
Fig. 1 has the general form and proportions of plates shown in *C. stigmatus* of Plate 19. Fig. 2 shows a different proportion of the parts.

1



CALCEOCRINUS TUNICATUS.

2



CALCEOCRINUS CHRYSALIS.

Fig. 1.—1 The basal plate with cicatrix for the column attachment 10; 2 the dorso-basal plate; 3 3 the dorso-lateral plates; 4 the dorso-radial plate; *a* the face of attachment for the dorsal arms; *á á* faces of attachment for the lateral arms; c the faces of attachment for the strong ligament between the basal and lower dorsal plates.

Fig. 2 has the same general structure, except that the dorsal plate 2 is narrow and elongate: 3 4 and 10 have the same significance as in Fig. 1; 5 5 5 5 are plates of the dorsal arm; 6 6 lateral brachial plates; 7 7 the lateral arms and their subdivisions.

CALCEOCRINUS STIGMATUS.

Plate 19, Figs. 9-11.

Cheirocrinus stigmatus HALL. Trans. Alb. Inst., vol. iv, p. 225. Abstract, p. 31; 1862.

In the collection at present before me, this species is illustrated by the basal portions of the body, some fragments of the arms, and a single specimen which preserves the basal plate of the dorsal arm. The dorso-lateral plates are so closely anchylosed that no line of separation is observable, and the same is often true of the dorso-radial plate and the second or lower dorsal plate, which bears upon its lower margin the cicatrices for the muscular attachment of the basal plate. The cicatrices for the three sets of arms are well preserved.

The species differs from any other known to me in the closely anchylosed condition of the dorso-lateral plates, which also involves the lower dorsal plate. The surface is marked by fine granulæ or undulating and tortuous granulose striæ.

BRACHIOPODA.

CRANIA *Lamarck.*

CRANIA SILURIANA.

Plate 21, Figs 3-7.

Crania Siluriana HALL. Trans. Alb. Inst., vol. iv p. 208. Abstract p. 14; May, 1863.

Compare *Crania Siluriana* DAVIDSON. "British Brachiopoda," Part vii, No. 1, pl. 8, figs. 19, 20. 1866.

Shell subcircular or transverse, very depressed-conical, apex excentric, slightly curved, situated one-third the diameter of the shell from the cardinal border. Exterior surface of upper valve smooth, with concentric lines of growth. Ventral or lower valve consisting of little more than a thickened rim, deeply marked on the cardinal margin by the somewhat large, distant, posterior, adductor, muscular scars; the substance within the thickened border, not sufficient to preserve the muscular or vascular markings.

Transverse diameter of full grown specimens nearly 20 mm.; height of upper valve of the same a little less than 6 mm. Where well preserved the surface is minutely granulose or subpunctate.

This species is usually found adhering to other fossils which are in a more or less dilapidated condition; showing that the Craniæ became attached after the death of the individuals on which they are found.

CRANIA SETIFERA.

Plate 21, Figs 8-10.

Crania setifera HALL. Trans. Alb. Inst., vol. iv, p. 209. Abstract p. 15; May, 1863.

(In error) *C. setigera* HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 21, figs. 8-10. 1876.

Shell circular, depressed-convex, apex central or slightly excentric, small, pointed or mammiform. Surface of upper valve closely covered with minute setiform spines, directed from the apex toward the margin. Ventral or lower valve with the exterior portion merely a calcareous ring, and the central area without any decided character.

When the setæ are removed, the surface appears strongly punctate — a character which distinguishes this form from *C. Siluriana.*

PHOLIDOPS *Hall.*

PHOLIDOPS OVALIS.

Plate 21, Figs 1 and 2.

Pholidops ovalis HALL. Trans. Alb. Inst., vol. iv, p. 209. Abstract p. 15; May, 1863.

Shell round-oval, somewhat broader anterior to the middle; valves equally convex; apex situated about one-third the length of the shell from the posterior end. Surface marked by concentric lines of growth, which are strongly lamellose toward the margin.

This species differs from *P.* (*Orbicula*) *squamiformis* of the Niagara group of New York, in the greater convexity, more closely arranged concentric lines of growth, and in being more regularly and broadly oval. Rare.

ORTHIS *Dalman.*

ORTHIS HYBRIDA *Sowerby.*

Plate 21, Figs 18-25.

Orthis hybrida SOW. MURCH. Sil. Syst., p. 630, pl. 13, fig 11. 1839.
Orthis hybrida SOW. HALL. Pal. N. Y., vol. ii, p. 253, pl. 52, figs. 4*a*-4*o*. 1852.
Orthis hybrida? SOW. HALL. Trans. Alb. Inst., vol. iv, p. 209. Abstract p. 15; May, 1863.

This species is very common in the locality. The numerous specimens examined can be easily separated into two distinct varieties, one of them narrow and ventricose, with the anterior margins thickened and strongly lamellose, presenting strong varices of growth; another, broader and less ventricose, with sometimes a wide sinuosity in front. Few of the specimens have the broad sinuosity of the ventral valve and ventricose upper portion of the shell, so characteristic of the New York species which has been referred to *O. hybrida.*

ORTHIS ELEGANTULA *Dalman.*

Plate 21, Figs 11-17.

For *Synonymy*, see Pal. N. Y., vol. ii, p. 252. 1852.

Compared with the New York representatives, this species, as found at Waldron, is much longer, wider in front, and the beak of the ventral valve not so pointed.

STREPTORHYNCHUS *King.*

STREPTORHYNCHUS TENUIS.

Plate 23, Figs 11-13.

Streptorhynchus tenuis HALL. Trans. Alb. Inst., vol. iv, p. 210. Abstract p. 16; May, 1863.

Shell large, semicircular or broadly semielliptical, cardinal line less than the greatest width of the shell, cardinal extremities rounded. Ventral valve slightly concave; area narrow; beak slightly elevated. Dorsal valve moderately convex, umbo not prominent, arcuate near the front margin, and compressed near the cardinal extremities.

Surface marked by moderately fine, rounded, alternately large and small thread-like striæ, which are strongly curved on the lateral portions of the shell, crossed by very fine concentric striæ, giving, under a lens, a beautiful rugose character. Substance of shell very thin.

Length of one specimen, 40 mm., with a breadth of 50 mm.

This species differs from any other of the genus known to me in rocks of this age, in the rugose surface and rounded cardinal extremities; in this respect it has more the character of the carboniferous forms of Streptorhynchus. But few individuals of the species have been observed in the extensive collections made at the locality.

STREPTORHYNCHUS SUBPLANA (*Conrad*).

Plate 21, Figs. 26-33.

Strophomena subplana CONRAD. Journ. Acad. Nat. Soc. Phil., vol. viii, p. 258. 1842.
Leptæna subplana (CONR.) HALL. Pal. N. Y., vol. ii, p. 259, pl. 53, figs. 8-10. 1852.
Streptorhynchus subplana (CONR.) HALL. Trans. Alb. Inst., vol. iv, p. 226. Abstract, p. 32; May, 1863. 16th Rep. State Cab. Nat. Hist., p. 63. Geol. Rep. Wis. 1862, p. 436.

This species occurs somewhat abundantly, and differs but slightly from the New York form. It is proportionally wider and shows less of the tendency to become mucronate at the cardinal angles.

STROPHOMENA *Raf.*

STROPHOMENA RHOMBOIDALIS *Wilckens.*

Plate 22, Figs. 4-10.

Conchites rhomboidalis WILCKENS. Nachricht von seltener Verst, p. 77, pl. viii, figs. 43, 44. 1769.
For *Synonymy*, see Pal. N. Y., vol. iii, p. 195, under *Strophomena rugosa*; and ibid. vol. iv, p. 76.

This variable species is very abundant, and occurs of somewhat larger size than those figured. Specimens having a width of 50 mm. are not uncommon.

STROPHODONTA *Hall.*

STROPHODONTA PROFUNDA.

Plate 23, Figs. 9, 10.

Leptæna profunda HALL. Pal. N. Y., vol. ii, p. 61, pl. 21, figs. 4, 5. 1852.
Strophodonta profunda HALL. 20th Report State Cab. Nat. Hist., p. 369, pl. 13, figs. 3, 4. 1867. Revised Ed., p. 376, pl. 13, figs. 3, 4. [1870.]

Shell large, broadly semioval, the full grown individuals having a width of about 60 mm. with a length of about 40 mm.; greatest width along the hinge-line; deeply concavo-convex, point of greatest convexity in front of the middle. Cardinal angles slightly extended and subauriculate, in the casts often obtuse or rounded.

Ventral valve very convex, beak slightly elevated, cardinal margin sloping and a little concave to the cardinal angles, moderately convex for more than half the length, and rapidly descending to the margin. Hinge area narrow ; foramen triangular, width about equal to the height; covered by a strong deltidial callosity. The crenulations or teeth on the interior margin are oblique, diverging from the beak, extending from the foramen less than half-way to the cardinal angles. Muscular impression subtriangular or flabelliform, extending for two-fifths the length of the shell. A central longitudinal callosity extends from the apex, sometimes for one-third of the length of the muscular impression.

Dorsal valve very concave, nearly following the contour of the ventral valve. Hinge area narrower than that of the ventral valve ; foramen covered by a callosity.

Surface marked by strong, large, radiating striæ, alternating with four or five smaller striæ and increasing by implantation ; radiating striæ crossed by very fine, sharp, crowded, regular, continuous, crenulating concentric striæ ; the small radiating striæ often become stronger, forming the larger and less regular striæ ; interior of valves papillose or punctate.

The surface of many of the older specimens is more irregularly fasciculate, and the stronger striæ rise in unequal ridges. This latter feature is, in a greater or less degree, impressed upon the casts of the interior, which, combined with strong vascular markings, gives a distinguishing character to specimens in that condition.

A fine large specimen in the collections from Waldron shows several specific characters not observed in the imperfect material from which the original description was drawn.

STROPHODONTA STRIATA.

Plate 23, Figs. 1-6.

Strophomena striata HALL. Geol. of N. Y. Surv. 4th Geolog. Dist., p. 104, fig. 3. 1843.

Leptæna striata HALL. Pal. N. Y., vol. ii, p. 259, pl. 53, fig. 7. 1852.

This species is of common occurrence in the Waldron locality and the specimens are usually larger than those of the New York fauna. The figures given on plate 23, illustrate the interior structure which I have not been able to observe in any of the specimens from the Niagara formation of New York. In the ventral valve, the muscular area is limited by slightly curving dental lamellæ, and in well-preserved specimens there is a slender ridge along the center; the muscular impressions are not distinctly marked. The inner cardinal margins of the valves are marked by about fifteen slightly diverging crenulations on each side of the foramen, which occupy little more than one-third of the distance from the center to the extremities of the shell.

STROPHONELLA *n. gen.*

On several occasions, and notably in the *Sixteenth Report on the State Cabinet of Natural History*, and in Vol. IV of the *Palæontology of New York*, I have indicated the existence of a small group of strophomenoid shells which are not strictly included in the genera STROPHOMENA, STROPHODONTA or STREPTORHYNCHUS, though intimately related to these genera. The features are essentially those of STREPTORHYNCHUS in the resupinate position of the valves, and to a great extent in the muscular impressions; but the inner margins of the cardinal areas are crenulate, and the area usually solid with sometimes a triangular deltidium. These forms are separated from STROPHODONTA chiefly by their resupinate character, the strong and more restricted muscular impression of the ventral valve, which occupies a shorter and wider area, and by the muscular area and strong median septum in the dorsal valve. The cardinal process is similar to that of STROPHODONTA and also to some of the Devonian forms of STREPTORHYNCHUS. The characteristic features of these forms are as follows:

Shell semicircular or semielliptical, concavo-convex, resupinate, the ventral valve concave and the dorsal valve convex. Ventral area striated, solid, with or without a central deltidial scar or rarely a partial foramen, and similar features on the narrow area of the dorsal valve; inner margins of the cardinal areas of each valve crenulate, and from beneath the center of the ventral area there is often a strong process (frequently bilobed) which extends beyond the cardinal line. Muscular area of the ventral valve strongly marked, and limited by a prominent border. Dorsal valve with a narrow hinge area transversely or longitudinally striate or both, and marked in the center by a deltidial scar. Cardinal process double, each division notched or bidentate at the extremity; muscular area quadrangular, occupying a more or less elevated callosity, and a central carina rising from the lower part of this area is sometimes produced into a spiniform process in the center of the cavity.

The species at present known to me as possessing the characters of the genus are the following:

Strophonella semifasciata, Niagara group; *Strophonella Leavenworthana*, *S. cavumbona* and *S. punctulifera* (the two latter probably identical), Lower Helderberg group; *S. ampla*, Upper Helderberg group; *S. reversa*, Hamilton group, Iowa; *S. cœlata*, Chemung group.

STROPHONELLA SEMIFASCIATA.

Plate 22, Figs. 1-3: Pl. 23, Figs. 7, 8.

Strophomena (*Strophodonta?*) *semifasciata* HALL. Trans. Alb. Inst., vol. iv, p. 210. Abstract, p. 16; May, 1863.

Strophomena (*Strophodonta*) *semifasciata* HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of plates 22 and 23. 1876.

Shell large, concavo-convex, resupinate, transversely semicircular, width nearly twice the length; cardinal extremities somewhat rounded. Ventral valve with slightly elevated umbo and small pointed beak; the middle of the shell deeply concave and abruptly inflected toward the front; area narrow, with a distinct triangular callosity. Dorsal valve depressed-convex from the umbo to near the middle, becoming subgeniculate in front; area about half as high as that of the ventral valve. Both areas distinctly striate, and marked by crenulations of the inner margin.

Surface of the upper and middle portions of the shell, marked by strong, irregular, distant, rounded, elevated striæ; near the front of the shell the striæ become more crowded by the intercalation of finer ones. Entire surface marked by fine concentric striæ. Interior surface of valves marked by closely set pustules. Substance of shell very thin.

This species has some resemblance to *Strophomena euglypha* (Dalman), but is much more extended on the hinge-line, the length and breadth being as two to three; while in that species the proportions are nearly as three to four. This shell has not the fine intermediate striæ, nor the punctate surface represented in that species. It is quite rare, but few specimens having been obtained in the entire collection.

CHONETES *Fischer*.

CHONETES NOVA-SCOTICA.

Plate 22, Figs. 11-14.

Chonetes Nova-Scotica HALL. Silurian and Devonian Rocks of Nova Scotia, by J. W. Dawson, p. 13. 1860.
Chonetes Nova-Scotica HALL. Canadian Nat. and Geologist, vol. v, no. 2, p. 144. 1860.

Shell semielliptical, width varying from once and a half to nearly twice the length, greatest width near the middle. Ventral valve variably convex, and often showing a flattened or slightly concave space down the middle of the shell, with occasionally a stronger and more elevated ray along the median line, from beak to base of the ventral valve; cardinal margin ornamented by from two to five slender spines on each side of the beak; cardino-lateral margins often a little wrinkled. Dorsal valve moderately concave. Surface finely striated, striæ flexuous, dichotomizing and increasing by interstitial addition so that there are more than one hundred on the margin of the shell, stronger below the umbo; concentric striæ fine, close, rounded and slightly undulating.

This species resembles in form the *Chonetes cornuta* of the Clinton group of New York, but is a larger and more ventricose shell; the striæ are proportionally less numerous and more closely arranged, the interstices being less than the striæ, while in *C. cornuta* the interstices are wider than the striæ, and the latter increase only by interstitial additions below the middle of the shell.

All the specimens from Waldron belong to the variety with a strong median ray on the ventral valve. One specimen observed has a width of 16 mm.—considerably greater than the individuals figured.

Not common.

CHONETES UNDULATA *n. sp.*

Plate 22, Fig 15.

Chonetes minima HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 22, fig. 15. 1876. Not *Chonetes minima* SOWERBY. 1839.

Shell semicircular, length equal to six-tenths of the width, cardinal line straight, greater than the width of the shell below. Ventral valve regularly convex, the greatest convexity about the middle of the shell, somewhat abruptly curving to the anterior margin, cardinal angles very slightly flattened. Dorsal valve concave, ventral area linear, extending to the hinge extremities; foramen equal in height to the ventral area and wider than high. Dorsal area indicated only by the thickness of the shell.

Surface marked by obscure radiating plications which are broad and rounded below, and obsolescent toward the beak; cardinal margin of the ventral valve ornamented by two diverging spines on each side of the beak.

This species is especially characterized by the rounded plications, which are frequently obscure and often obsolescent on the center of the valve, where they appear as simple undulations of the surface. The bases of two spines on each side of the beak are usually preserved, and no specimen examined has shown more than that number.

SPIRIFERA *Sowerby.*

SPIRIFERA EUDORA.

Plate 24, Figs 13-18.

Spirifer Eudora HALL. Ann. Geolog. Report Wisconsin. 1861.

Spirifer Eudora HALL. Trans. Alb. Inst., vol. iv, p. 211. Abstract p. 17; May, 1863.

Spirifera Eudora HALL. 20th Rept. State Cab. Nat. Hist., p. 370, pl. 13, figs. 5, 7. 1867. Revised Edit., p. 377, pl. 13, figs. 5, 7. [1870.]

Compare *S. Niagarensis* var. *oligoptycha* F. ROEMER. Sil. Faun. Westl. Tenn., p. 68, pl. 5, fig. 8.

This species was originally described from casts from the limestone of Racine, Wisconsin. The casts show a higher area than the entire specimens, since the strongly incurved beak of the ventral valve covers much of the area, giving a less distance between the beaks of the opposite valves than is shown in the casts. The surface is marked by fine radiating striæ, which are precisely of the character of those of *S. macropleura* of the lower Helderberg group.

The species given by Roemer as *S. Niagarensis* var. *oligoptycha* differs from this species in the proportionally longer hinge-line; and when compared with specimens of *S. macropleura* from Tennessee, presents no essential differences of character.

SPIRIFERA CRISPA (*Hisinger*).

Plate 24, Figs 6-12 and 19.

For *Synonymy* and description of species, see Pal. N. Y., vol. ii, p. 262. 1852.

This species occurs in considerable numbers in the Waldron collections, presenting the same variety of form and proportions that we find in the same species in New York. Many of the specimens, however, are larger and more rotund than the latter.

There seems to be no sufficient reason for separating this form from *S. crispa* of Europe.

SPIRIFERA CRISPA var. SIMPLEX *n. var.*

Plate 24, Figs 1-5.

Spirifer crispus var. HALL. Trans. Alb. Inst., vol. iv, p. 212. Abstract p. 18; May, 1863.

There are numerous small symmetrical specimens which have almost uniformly a single plication on each side of the mesial fold, presenting three folds of nearly equal size. The ventral valve has two folds on each side of the mesial sinus, and the valves are almost equally convex. The surface is marked as in the larger specimens.

SPIRIFERA RADIATA *Sowerby*.

Plate 24, Figs 20-30.

For *Synonymy*, see 20th Rept. State Cab. Nat. Hist., p. 371. 1867.

Large and fine specimens of this species are found in considerable abundance. The individuals are larger and in a much finer state of preservation than those found in the Niagara shales of New York. The form is more rotund, the cardinal extremities more distinctly rounded, the ventral area of moderate height and distinctly striated longitudinally, and the foramen is often partially covered by a deltidium. The aspect of the interior of a well-preserved specimen of the ventral valve, as it occurs at Waldron, is well represented by fig. 25, of plate viii, in Mr. Davidson's *Introduction to the Study of the Brachiopoda.*

This form is regarded by Mr. Davidson and other authors, as a variety of *S. plicatella* of Linneus, but I have never seen among the American specimens any individual showing plications like the English and continental European specimens. The Waldron specimens have usually the form of those illustrated by Mr. Davidson* as *S. plicatella* var. *globosa.* This author says, in regard to the surface of the *S. plicatella* var. *radiata*, that "the external sculpture, when "well preserved, is extremely beautiful, and consists of radiat-"ing ribs (five in the width of a line in the middle of an "average sized specimen), not always quite regular in their "respective widths, but usually leaving an interspace between "each two of about the width of one of the ribs, and at times "toward the margin, there are smaller ribs interpolated; these "ribs are regularly crossed by equidistant, concentric, pro-"jecting ridges, which give to the shell surface a beautifully "imbricated appearance." This description of the character of surface of the English specimens is scarcely applicable to the American specimens which we refer to *S. radiata.* In the Waldron specimens, the radii are finer than above described, there being eight or more in the width of a line, while the interspaces are not more than half as wide as the radii. The radii are also distinctly flattened and are increased by bifurcation or dichotomizing, and rarely by intercalation of smaller striæ. These characters are illustrated in figure 30 of plate 24. The concentric striæ are obscurely visible or obsolete. Of the *Spirifera plicatella* var. *globosa*, Mr. Davidson says: "It is easily connected with *Spirifera radiata* of Sowerby. Indeed, there appears to be little by which it can be distinguished from the true *Spirifera radiata*, except the greater convexity or gibbosity of its valves and its finer striation."

The *Spirifera Niagarensis*, which has a similar form and surface markings is distinctly plicate, but it is not known to present the elevated area, incurved beak, and gibbous form, which is represented in the European specimens of *S. plicatella.* In the Niagara shales in the State of New York the *S. Niagarensis* is abundant, while *S. radiata* is comparatively rare. At Waldron *S. radiata* has acquired a remarkable development in numbers and in the size of the specimens, but we have not observed a single specimen of *S. Niagarensis* in all the collections made at that locality.

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* *Monograph of British Fossil Brachiopoda*, p. 89, pl. 9, figs 7 and 8.

MERISTELLA *Hall.*

Subgenus MERISTINA *Hall.*

MERISTINA MARIA.

Plate 25, Figs. 8-12.

Meristella Maria HALL. Trans. Alb. Inst., vol. iv, p. 212. Abstract p. 18; May, 1863.
Meristina Maria HALL. Pal. N. Y., vol. iv, p. 299. 1867.

Shell of medium or large size, ventricose, broadly ovate or subquadrangular. Ventral valve gibbous above, with a subangular ridge extending from the beak to near the middle, where it becomes flattened, sinuate and bent abruptly upward in a prolonged linguiform extension; beak obtuse, closely incurved over the opposite valve; cardinal slopes angular and the cardinal border inflected. Dorsal valve gibbous, strongly arcuate transversely, prominently subangular along the middle, and in the lower part presenting a broad undefined fold, deeply emarginate in front for the reception of the extension of the opposite valve; beak obtuse, strongly incurved.

Surface marked by strong concentric lines of growth. Interior of ventral valve marked by two strong diverging dental lamellæ which extend to near the middle, limiting a deep triangular muscular cavity.

This species is most nearly related to *Meristella* (*Merista*) *tumida* of European authors, but is less rotund, while that species does not possess the peculiar flattening of the cardinal half of the ventral valve and its accompanying subangular ridge. It differs from all the other species of the Niagara and lower Helderberg groups, but approaches in some characters to the *Meristella* (*Atrypa*) *crassirostra* of the Niagara group (Pal. N. Y. vol. ii). The *M. nitida* occurs with this species, and is readily distinguished from it by its emarginate front, and the absence of an elevated fold on the dorsal valve.

Very abundant at the Waldron locality.

Meristina nitida.

Plate 25, Figs. 1-7.

Atrypa nitida Hall. Geol. of N. Y. Surv. 4th Geolog. Dist. Tab. of Organic Remains, p. 11, no. 14 (no. 13 on plate), fig. 5. 1848.
Atrypa nitida Hall. Pal. N. Y., vol. ii, p. 268, pl. 55, figs. 1 *a*-1 *o*. 1852.
Merista nitida Hall. 12th Report State Cab. Nat. Hist., p. 78. 1859.
Meristella nitida Hall. Trans. Alb. Inst., vol. iv, p. 226. Abstract p. 32; May, 1863.
Meristina nitida Hall. Pal. N. Y., vol. iv, p. 299. 1867.

This species is very abundant and variable in character, and much larger than the New York specimens of this shell. The form varies from narrow ovate and very ventricose to broadly rhomboid ovate and strongly emarginate in front.

NUCLEOSPIRA *Hall.*

Nucleospira pisiformis.

Plate 25, Figs. 22-28.

Orthis pisum (Murch.) Hall. Pal. N. Y., vol. ii, p. 250, pl. 52, figs. 1 *a*-1 *e*. 1852.
Nucleospira pisiformis Hall. Pal. N. Y., vol. iii, Expl. pl. 28 B. 1859.
Nucleospira pisiformis Hall. Trans. Alb. Inst., vol. iv, p. 226. Abstract, p. 32; May, 1863.

This species is common. Many of the specimens are almost entirely covered with long fine setæ projecting beyond the margins, forming a marginal fringe.

RETZIA *King.*

Retzia evax.

Plate 25, Figs. 13-21.

Rhynchospira evax Hall. Trans. Alb. Inst., vol. iv, p. 213. Abstract p. 19; May, 1863.

Shell ovate, often broadly ovate, usually longer than wide, sometimes much longer; both valves gibbous in the middle and upper part, ventral valve a little deeper than the opposite, both valves sometimes marked by a shallow undefined sinus, causing an emargination in front. Ventral beak much elevated above the other, and incurved, so as to bring the plane of the foramen parallel to the axis of the shell; foramen distinctly rounded, with a visible triangular space below, which is occupied by two small deltidial plates. Dorsal valve regularly arcuate except near the front; beak closely incurved beneath the deltidial plates of the opposite valve. In some old specimens there is a broad undefined mesial elevation on the lower part of the valve including about five or six plications besides the central one, which is divided into two or three smaller ones (a generic feature). Sometimes there is a broad, undefined depression and frequently only a narrow depression caused by the subdivided central plication. The ventral valve has uniformly a longitudinal sinus, which includes two or three small plications arising from the subdivision of the central one, and sometimes including one or two on each side.

This shell is marked by radiating rounded or subangular costæ or plications, from eight to fourteen on each side of the central one; those on the cardinal slopes sometimes bifurcating or with interstitial additions, while in a few individuals bifurcating costæ occur on other parts of the valve; the interspaces are rounded grooves of about the same size as the plications. The surface is marked by fine concentric striæ and stronger, imbricating lamellose lines of growth.

This species differs from *R.* (*Atrypa*) *aprinis* of the Niagara group of New York, in being more ovate in form and less gibbous toward the front, while the ventral beak is more elevated. It approaches very nearly in character to the *R. formosa* of the Lower Helderberg group, and the shell is subject to similar variations of form, proportions and incurvation of the beak, which in some specimens of both species is closed upon the opposite beak. The central plication in both species is divided into two or three, and the dorsal valve likewise presents sometimes a mesial elevation and sometimes a depression.

The largest individual measured has a length of more than 25 mm., with a width nearly as great. The specimens vary from 2 mm. to about 25 mm. in length.

This species is comparatively numerous.

CŒLOSPIRA *Hall.*

Cœlospira disparilis.

Plate 25, Figs 39-43.

Atrypa disparilis Hall. Pal. N. Y., vol. ii, p. 277, pl. 57, figs. 6*a*-6*m*. 1852.
Leptocœlia disparilis Hall. 10th Rep. St. Cab. Nat. Hist., p. 108. 1857.

This species is comparatively rare. The specimens from the Waldron locality show considerable variation in form, convexity of the valves, and number of plications. Compared with specimens of *Retzia Barrandii* (Davidson, 1848) from Dudley, England, they seem to be very closely related, if not identical.

ATRYPA *Dalman.*

Atrypa reticularis (*Linn.*).

Plate 25, Figs 44-47.

For *Synonymy*, see Pal. N. Y., vol. iv, p. 316. 1867.

This is a very abundant species. Many of the specimens are more rugose than is usual in other localities. The concentric lamellæ are often produced and divided into subtubular short spines.

RHYNCHONELLA *Fischer.*

Rhynchonella neglecta.

Plate 26, Figs 1-6.

Atrypa neglecta Hall. Pal. N. Y., vol. ii, p. 274, pl. 57, figs. 1*a*-1*p*. 1852.
Rhynchonella neglecta Hall. 12th Rep. St. Cab. Nat. Hist., p. 78. 1859.

This is a common species at Waldron. It varies somewhat from the New York specimens in its decidedly more angular form, sharper plications, deeper and more prolonged sinus.

RHYNCHONELLA ACINUS.

Plate 26, Figs. 7-11.

Rhynchonella acinus HALL. Trans. Alb. Inst., vol. iv, p. 215. Abstract, p. 21; May, 1863.

Shell small, longitudinally ovate, subattenuate toward the beak, and truncate in front, valves subequally convex. Ventral valve subarcuate, flattened in the middle, below which it is sinuate; beak incurved. Dorsal valve somewhat flattened in the middle, and sometimes a little depressed in the upper part of the median line, two of the plications becoming elevated toward the front, corresponding to an abruptly depressed sinus in the ventral valve, in the bottom of which is a single plication; three and rarely four plications on each side of the mesial fold of the dorsal valve, and four on each side of the sinus of the ventral valve. Concentric lines of growth usually but faintly marked.

Length from 5 to 10 mm.; length and breadth usually about as four to three, and the depth about equal to the width, giving a subquadrate transverse section.

This species differs from the *R. bidentata* of Hisinger, in being larger, more robust and ventricose, and proportionally more elongate; the plications are more rounded, and the whole aspect less angular. It approaches in form the *R. bialveata* of the Lower Helderberg group, but it is more robust, and the plications are more rounded.

RHYNCHONELLA INDIANENSIS.

Plate 26, Figs. 12-22.

Rhynchonella Indianensis HALL. Trans. Alb. Inst., vol. iv, p. 215. Abstract, p. 21; May, 1863.

Shell broadly ovate or subtriangular, length and width nearly equal, the width sometimes exceeding the length; cardinal slopes in the more gibbous specimens, flattened. Ventral valve with the beak pointed and incurved, depressed-convex in the middle and gradually becoming depressed and sinuate in front, two or three of the plications included in the sinus. Dorsal valve a little the more gibbous, somewhat flattened forward of the umbo; three or four of the plications continuing direct, and forming a mesial elevation, the lateral ones arching downward to the margin. Shell marked by from nine to twelve strong, rounded or subangular plications, which sometimes become obsolete toward the beak. The concentric lines are very obscure. Length about 13 mm.

This species resembles the *R. neglecta* of the Niagara group of New York; but it is larger and more robust, with stronger and more rounded plications; it is associated with a more finely plicated species which I have identified with that one.

RHYNCHONELLA WHITII.

Plate 26, Figs. 23-33.

Rhynchonella Whitii HALL. Trans. Alb. Inst., vol. iv, p. 216. Abstract, p. 22; May, 1863.

Shell subcircular or transverse and broadly elliptical, usually not very gibbous. Ventral valve shallow, most prominent on the umbo, beak abruptly attenuate and pointed, slightly incurved, sides flattened, strongly sinuate in the middle and gently curving upward in front. Dorsal valve more gibbous; beak obtuse and incurved beneath the opposite, elevated in the middle, forming a distinct mesial fold, arching on the sides; from five to six strong plications on each side of the mesial fold and sinus, with usually a single plication in the sinus, and two on the mesial fold; rarely one of the plications on the fold is bifurcate. Interspaces wider than the plications. Surface marked by close concentric lines of growth.

This species bears some resemblance to *R.* (*Atrypa*) *dentata* (Pal. N. Y., vol. i, p. 148), but is less gibbous, the plications less strong, the mesial fold less elevated, and the sinus much narrower. It also is related to *R. borealis* Schloth. (Davidson's British Fossil Brachiopoda, No. iii, Pt. vii, p. 174, Pl. xxi, figs. 14–23), and is distinguished by its smaller and rounded form, less prominent plications, and by its surface-markings.

RHYNCHONELLA STRICKLANDII ? (SOWERBY).

Plate 26, Figs. 34-40.

Terebratula Stricklandi J. DE C. SOW. Sil. Syst., pl. 13, fig 19. 1839.
Terebratula crispata Id., pl. 12, fig 11. 1839.
Terebratula Stricklandi DAV. Bull. Soc. Geol. France, 2d Ser., vol. 5, p. 329. 1848.
Hypothyris Stricklandi D'ORBIGNY. Podrome, vol. i, p. 37. 1849.
Hypothyris Stricklandi MCCOY. Brit. Pal. Foss., p. 206. 1855.
Rhynchonella Stricklandi MORRIS. Catalogue of British Fossils, p. 146. 1854.
Rhynchonella Stricklandi SALTER. Siluria, 2d ed ; pp. 250, 544, pl. 22, fig. 11. 1859.
Rhynchonella Stricklandi LINDSTROM. Of v. K. Vet. Akad. Forhandl., p. 366. 1860.
Compare *Rhynchonella Tennesseënsis* ROEMER. Sil. Faun. Westl. Tenn., p. 72, pl. 5, fig. 14. 1860. HALL. Trans. Alb. Inst., vol. iv, p. 228. Abstract, p. 34; May, 1863. HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist., pl. 26, figs. 34-40. 1876.

The individuals belonging to this species were originally identified with *R. Tennesseënsis* Roemer, a species described from the middle Silurian of Tennessee. The specimens from Waldron, in their prevailing forms, are much larger than the figures of Dr. Roemer, and the plications less angular than represented. The species now under consideration occurs in Tennessee, but is always smaller, and in that respect corresponds with the figures cited above. There is, however, another form, occurring with those of the Tennessee locality, which is shorter and comparatively broader, with more angular plications and abrupt thread-like transverse striæ, a more abrupt sinus and more acute beak. This form corresponds with the figures of Dr. Roemer, but it is quite unlike the specimens from Waldron.

A comparison of the Waldron specimens, and of the similar Tennessee form, with the figures of Mr. Davidson in his monograph of the Fossil Brachiopoda of Great Britain, indicates the specific identity of the specimens from these three localities. The Waldron specimens differ from those of Dudley, England, in being less gibbous, proportionally longer, the beak slightly more extended, the ventral valve nearly flat in a transverse direction across the upper half of the shell, the plications larger and more rounded, the sinus wider and less abrupt. The same differences are observed in comparison with the original figures of Sowerby (cited above,) in the *Silurian System*. In both the works cited, however, the figures agree much more nearly with the Waldron specimens than those of Dr. Roemer.

RHYNCHOTRETA *n. gen.*

Type, *Rhynchonella cuneata* DALMAN.

Shell triangular, surface with angular plications. Ventral beak straight, produced beyond the dorsal beak, extremity perforate, the foramen with an elevated margin; space between the foramen and hinge-line occupied by a deltidium in two pieces, being divided by a longitudinal suture, and transversely striated. Valves articulated by two slender curving teeth, proceeding from a broad curving hinge-plate in the ventral valve, which fit into corresponding sockets in the dorsal valve. Cruræ rising from near the dorsal beak, and curving into the ventral cavity, and thence recurved toward the dorsal side, and probably uniting, as shown in figure 4, p. 167. Structure fibrous and apparently very minutely punctate.

The *Rhynchonella cuneata* of Dalman has been retained under that genus by nearly all authors. In 1859, Salter referred the species to RETZIA.* An examination of specimens in my possession, in 1863, revealed no satisfactory evidence of punctate structure, or internal cruræ or spires; and I still continued it under RHYNCHONELLA. The collections from Waldron have shown the punctate texture of the shell, and the existence of long curving crura, which are unlike any feature known in palæozoic RHYNCHONELLA, and assimilate this fossil to the Terebratulidæ.

This form is not congeneric with *Retzia Adrieni*, and cannot properly be referred to that genus, though approaching in external characters to *R. ferita*, which is represented as possessing internal spires. It becomes necessary, therefore, to characterize it as a distinct genus, for which I have proposed the name RHYNCHOTRETA. The accompanying figures illustrate its principal features.

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* Siluria, 2nd Edition, pl. xxii, fig. 8. 1859.

Fig. 1.

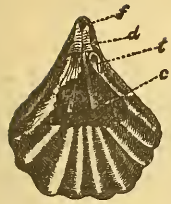

Fig. 2.

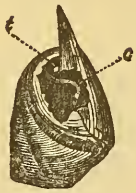

Fig. 3.

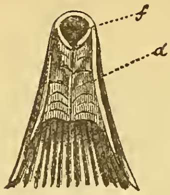

Fig. 4.

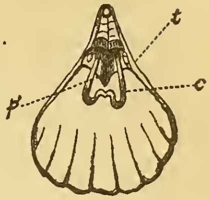

Fig. 1. Dorsal view, showing extent and divergence of the crural processes *c*, and one of the articulations of the ventral valve *t*.

Fig. 2. Lateral view, showing curvature and direction of crural processes.

Fig. 3. Enlargement to four diameters of the beak, showing the characters of the deltidium and foramen.

Fig. 4. Interior of ventral valve, and a portion of the dorsal valve, showing the attachment of the cruræ.

c. Cruræ uniting by a loop.
p. Hinge-plate, or pedicle sheath.
t. Articulations.

The additional features of the loop represented in this figure have not, as yet, been satisfactorily determined; all the positive evidence indicates this to be the arrangement and development of the parts shown in figs. 1 and 2.

Rhynchotreta cuneata var. Americana *n. var.*

Plate 25, Figs. 29-38.

Shell triangular, cuneiform, longer than wide, greatest width near the front, and tapering posteriorly into an angular beak. Valves moderately convex, the dorsal sometimes gibbous; ventral beak elongated, foramen subcircular, formed by the extremity of the beak and a portion of the area below, which is separated from the hinge-line by a deltidium in two pieces; sides of the beak compressed, flat or concave. Sinus wide, deep or shallow, according to the development of the shell, commencing at one-third the length of the shell from the beak, and becoming very conspicuous in front. Dorsal valve the more convex, the mesial fold beginning as a depression just below the beak, and becoming very prominent on the lower half of the shell. Surface marked by nine or ten strong angular plications on each valve, of which three are depressed in the sinus, and four are elevated on the mesial fold—the two central ones being much the more prominent; the plications are crossed by numerous, regular, fine thread-like striæ. The entire surface is minutely papillose.

This species is very common in the Waldron locality. The specimens are larger and in a better state of preservation than is usual in the New York localities.

Compared with its European congener, the American form is a more robust and larger shell, the surface marked by fewer and much stronger plications ; while the transverse striæ are a little finer and less distant, and the sinus is much deeper and more abrupt.

Specimens from Waldron, Indiana, from New York and from Dudley, England, have been cut on the dorsal side, and all show the crural processes, as in figure 1 of the accompanying illustrations.

ANASTROPHIA *Hall.*

ANASTROPHIA INTERNASCENS *n. sp.*

Plate 26, Figs. 41-49.

Compare *Atrypa interplicata* (Sow.) HALL. Pal. N. Y., vol. ii, p. 275, pl. 57, figs. 2*a*-2*g*. Not *Terebratula interplicata* (Sow.) MURCH. Sil. Syst., p. 631, pl. 13, fig. 28.

" *Atrypa brevirostris?* (Sow.) HALL. Pal. N. Y., vol. ii, p. 278, pl. 58, figs. 1*a*-1*f*. Not *Terebratula brevirostris* (Sow.) MURCH. Sil. Syst., p. 631, pl. 13, fig. 23.

" *Pentamerus Verneuili* HALL. Pal. N. Y., vol. iii, p. 260, pl. 48, figs. 1*a*-1*y*.

" *Anastrophia Verneuili* HALL. Pal. N. Y., vol. iv, p. 374.

" *Brachymerus* SHALER. Bull. Mus. Comp. Zoöl, vol. 1. 1865.

Anastrophia Verneuili HALL. Doc. Edit. 28th Rept. St. Mus. Nat. Hist. Explanation of pl. 26, figs. 41-49. 1876.

Shell transversely subelliptical, ovoid or subglobose in different stages of growth, the proportions of length and width being sometimes nearly equal. Valves of young specimens nearly equal in convexity ; in older ones the dorsal valve becomes the more gibbous.

Ventral valve moderately convex in young or medium-sized specimens, and gibbous in the upper part in older specimens ; the anterior portion depressed and marked by a broad undefined sinus ; beak short, acute, closely incurved over the umbo of the opposite valve ; area small, short and sharply defined. Dorsal valve gibbous, and in old individuals the umbo projects beyond the beak of the ventral valve, with the apex incurved beneath the beak of the latter ; central portion of the valve toward the front more elevated, and sometimes presenting a broad undefined mesial fold.

Surface plications abruptly elevated, rounded, angular or subangular, becoming depressed and sometimes obsolete on the cardinal slopes, usually simple, enlarging toward the front of the shell, rarely bifurcating or with an intercalated one on the middle of the shell, but bifurcating or intercalating in a remarkable manner on the sides, where the folds bend abruptly outwards to the cardino-lateral margins; plications crossed by arching imbricating striæ of growth, which are sometimes very conspicuous.

The individuals of this species measure from 11 to 17 mm. in length, from 12 to 19 mm. in width, and 9 to 12 mm. in depth.

This form, from the Waldron locality, differs from the *Anastrophia* (*Atrypa*) *interplicata*, ut cit. of the Niagara group of New York in its larger growth, with more rounded or less angular plications, and in being almost free from intercalated plications, which are constant and characteristic in that species, and in having no defined mesial sinus, which is always a feature in the New York form. Similar features are described as characteristic of *A. brevirostris*, of which I have no good specimens before me. It is quite probable that these New York forms, which are described as two species, are in reality but varieties of the same.

Noting these differences between the New York specimens and those from Waldron, I had originally (*Transactions Albany Institute*, vol. iv, p. 227) indicated the latter as more nearly approaching to *A. Verneuili*, from the Lower Helderberg group in New York. They however present several marked differences; this form is smaller, more rounded and less ventricose; the umbones less prominent and not so closely incurved; the sinus rounded and undefined, never deep nor angular; the plications more rounded, generally continuous to the beaks, and occasionally increasing by implantation or bifurcation, while the latter is a constant character in *A. Verneuili*.

EICHWALDIA *Billings*.

EICHWALDIA RETICULATA.

Plate 26, Figs. 50-54.

Rhynchonella reticulata? HALL. Trans. Alb. Inst., vol. iv, p. 217. Abstract, p. 23; May, 1863.
Eichwaldia reticulata HALL. 20th Rept. St. Cab., Nat. Hist., p. 275. 1867.

Shell varying from elongate-triangular to transversely elliptical, gibbous in the upper part, more attenuate in front, cardinal slopes flattened in most specimens, sometimes rounded. Ventral beak small, acute, flattened on the back, and closely incurved; the front half of the ventral valve marked by a broad, shallow, sometimes undefined sinus. Dorsal valve usually more ventricose, beak obtusely pointed and strongly incurved, a low, broad, scarcely defined mesial elevation marks the center and often occupies nearly one-third the entire width of the valve; often this fold is obsolete, leaving the valve regularly arcuate from side to side, while in other specimens the borders are depressed and the shell flattened in front.

Surface of the shell, except a small space on the umbo of the ventral valve, covered by a finely reticulate marking, with elongate, generally hexagonal pits or openings, with thin and sharp ridges between; these markings vary in different specimens, and also on different parts of the same individual, being generally finest on the cardinal slopes. The small triangular space near the ventral beak, which is destitute of marking, has the appearance of having been exfoliated, but since this is an invariable character in all the individuals examined, varying in size with the size of the shell, it is probably dependent upon organic causes.

This species resembles *Atrypa* [*Eichwaldia*] *corallifera*, Pal. N. Y., vol. ii, p. 281, but differs in being much broader and less ventricose, and also in the greater breadth and less prominence of the mesial fold.

LAMELLIBRANCHIATA.

AMPHICŒLIA *Hall.*

AMPHICŒLIA LEIDYI.

Plate 27, Fig. 1 and Fig. 2?.

Amphicœlia Leidyi HALL. 20th Rep. St. Cab. Nat. Hist., p. 339, pl. 14. figs. 13-15. Rev. Edit., p. 387.

The specimens from Waldron, which I have referred to this species, are in the condition of casts of the interior, and are more or less flattened in the soft shales. The fossil preserves the usual rhomboidal form of the species; the beak is much elevated, and this feature, in the specimen fig. 1, is apparently increased by the pressure to which the shell has been subjected. The hinge-line is more oblique than in the typical forms of the species, but this may be due to pressure.

The casts preserve some remains of concentric striæ, but there is no evidence of the fine radiating striæ which are characteristic of the genus. The length of the shell is equal to the height, as shown in specimens from other localities.

The specimen fig. 2, has a length greater than the height, the beak is less elevated and at a greater distance from the anterior margin, giving a more equilateral aspect to the fossil. This may be a distinct species, but owing to the condition in which the specimens occur, it would be impossible to indicate specific characters beyond the general form of the shell.

Almost all the specimens of Lamellibranchiata from the Waldron locality are in the condition of casts of the interior, the shell having been dissolved, while the shaly material, with which it was filled, preserves the characters in a very imperfect manner.

AMBONYCHIA ACUTIROSTRA.

Plate 7, fig. 12.

Ambonychia acutirostra HALL. 20th Rep. St. Mus. Nat. Hist., p. 336, pl. 14, fig. 2. 1867; Rev. Edit., p. 383.

Ambonychia acutirostra HALL. Under reference to *Sagenella elegans*. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 7, fig. 12. 1876.

Shell narrow ovate, subequilateral, length nearly twice the width; valves moderately convex, sloping very abruptly to the anterior margins ; posterior margins flattened ; beak acute, not elevated, projecting beyond the cardinal margin ; cardinal line straight. Substance of shell very thin, showing lamellose lines of growth ; margin depressed, crenulated from the impression of the surface striæ.

Most of the specimens are obscure casts of the interior, and present few characters beyond the general form.

Compared with *A. aphœa* HALL, a species with which it is associated in Wisconsin and Illinois, it is longer, with the beaks more elongate and attenuate. It many respects it resembles the *Myalina mytiliformis* HALL, of the Clinton group (Pal. N. Y., vol. ii, p. 100); but it is proportionately wider, and the beaks more attenuate.

MODIOLOPSIS *Hall.*

MODIOLOPSIS PERLATUS.

Plate 27, Figs. 3, 4.

Modiolopsis perlatus HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 27, figs. 3, 4. 1876.

Shell ovate, moderately convex, the greatest convexity a little anterior to the middle of the shell. Beaks slightly elevated above the hinge-line and scarcely more than one-fifth the length of the shell from the anterior end ; the greatest width of the shell about midway between the beak and the posterior extremity. The straight hinge-line extends about half the distance from the beak to the posterior extremity, thence curving into the posterior slope. Basal margin a little contracted immediately below the beak, and thence curving into the broadly rounded posterior extremity. Surface marked by fine lines of growth with a few stronger undulations.

Length of the shell three and a half centimetres ; width two and a half centimetres.

This shell differs from characteristic forms of *M. subalatus* in the more ascending direction of the hinge-line from the beak, the broader and more regularly rounded posterior extremity, and the lesser constriction of the basal margin beneath the beak.

MODIOLOPSIS SUBALATUS.

Plate 27, Figs. 5, 6.

Modiolopsis subalatus HALL. Pal. N. Y., vol. ii, p. 84, pl. 27, figs. 5 and 6. 1852.

Shell rhomboidal ovate, the proportions of length and breadth varying in different individuals, one of the specimens figured having a length once and three-fourths as great as the width, while the other is less than once and a half as long as wide. Hinge-line equaling or greater than one-half the length of the shell; umbo prominent, beak moderately elevated above the cardinal line; posterior side broadly rounded and subalate above; anterior side narrow, rounded or subacute; basal margin anterior to the center, and nearly beneath the beak, more or less distinctly arcuate. Surface marked by fine concentric lines of growth.

Length of shell 31 to 37 mm.; greatest width 22 to 23 mm.

The specimens from Waldron are much larger than those known in New York, but they are in other respects similar. Without a greater amount of material for comparison, I do not feel warranted in making any specific distinction.

PTERINEA *Goldfuss.*

PTERINEA BRISA.

Plate 27, Figs. 7-9.

Pterinea brisa HALL. 20th Rep. St. Cab. Nat. Hist., p. 337, pl. 14, fig. 1. 1867. Rev. Edit., p. 384. 1870.

Compare *Avicula emacerata* CONR. HALL. Pal. N. Y., vol. ii, p. 282, pl. 59, figs. 1*a*-1*e*. 1852.

Compare *Ambonychia* (*Pterinea*) *striæcostata* MCCHESNEY. New Pal. Foss., p. 88, pl. 9, fig. 4; and Trans. Chic. Acad. Sci., vol. i, p. 88, pl. 9, fig. 4. 1869.

Body of shell (left valve) obliquely subovate, extremely inequilateral; anterior wing moderately extended and strongly sinuate at its junction with the body; posterior wing not extending as far as the posterior extremity of the shell; umbo prominent, beak rising a little above the hinge-line; muscular impression in right valve large and nearly round, near the middle of the length of the shell. In the casts, beneath or just anterior to the beak, there is one short curving dental pit, with a smaller accessory one. This is a feature not observed in the Waldron specimens, which are usually found as the exteriors and often as imperfect interiors of the valves; the few casts which have been observed from this locality, do not show the muscular marking.

Surface marked by strong radiating and concentric striæ, with broad, little elevated, radiating ribs. The concentric striæ of growth are produced into prominent, recurving, fimbriated laminæ, the fimbriæ being infolded at their margins and bending backward in the form of long, hollow, semicylindrical spines, leaving a broad sinus between, in the bottom of which is a shorter spine. The younger specimens, as usually preserved, present simple fimbriated lamellæ.

MYTILARCA *Hall.*

MYTILARCA SIGILLA *Hall.*

Plate 27, Fig. 10.

Mytilarca sigilla. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 27, fig. 10. 1876.

Body of the shell ovate-acute, broadly rounded at the base alate posteriorly; hinge-line oblique. Length sixteen millimetres.

The specimen is a cast of the interior, and the surface-markings are unknown.

CYPRICARDINIA *Hall.*

CYPRICARDINIA ARATA.

Cypricardinia arata HALL. 20th Rep. St. Cab. Nat. Hist., p. 337, plate 14, fig. 6. 1867. Rev. Edit., p. 385. 1870.

Compare *Cypricardinia subovata* MILLER and DYER. Contributions to Palæontology, No. 2. 1878.

Shell subovate, varying from moderately to extremely gibbous, slightly alate at the postero-cardinal margin; beaks near the anterior end, which is short and rounded. Surface marked by strong concentric lamellose ridges.

The specimens from Waldron present no marks of specific distinction from those of the Niagara limestone of Wisconsin.

GASTEROPODA.

PLATYOSTOMA *Conrad.*

PLATYOSTOMA NIAGARENSE.

Plate 28, Figs. 1-12; Plate 29, Figs. 1-15.

Platyostoma Niagarensis HALL. Pal. N. Y., vol. ii, p. 287, pl. 60, figs. 1*a*-1*v*. 1852.

Shell ovoid or subglobose, volutions three to four, the last one very ventricose, spire varying from the plane of the outer volution to an elevation of one-fifth or one-fourth the height of the shell above.

Apex minute, somewhat rapidly expanding, the first two volutions usually symmetrical; the outer volution often unsymmetrical, very ventricose and regularly rounded upon the back, but not unfrequently extended and becoming free toward the aperture, and marked on the upper or lower side, or upon both, by a groove, along which the striæ are abruptly bent, indicating a sinus in the peristome during some period of its growth; peristome entire or undulated, sometimes distinctly notched in the margin, free or adhering on the columellar side and sometimes expanded and presenting a thickened callosity or columellar lip.

Surface marked by fine undulating striæ of growth, which sometimes become lamellose. In well-preserved specimens, finer revolving striæ cancellate the striæ of growth, and sometimes the surface is marked by revolving ridges.

The principal varieties of form and mode of growth are illustrated on plates 28 and 29. The large collections present numerous intermediate forms and varieties of surface-marking.

PLATYOSTOMA PLEBEIUM.

Plate 28, Figs. 14, 15.

Platyostoma plebia HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 28, figs. 14, 15. 1876.

Shell dextral, conical; volutions four, very convex, gradually increasing in size from the apex, the last volution free for a short distance above the aperture, the back sometimes flattened; aperture broadly elliptical, opening nearly parallel to the axis of the shell, without proper umbilicus; suture-line deeply impressed leaving more than three-fourths of the height of the volution exposed.

Surface marked by fine transverse striæ of growth, which are usually quite regular, but sometimes abruptly arching forward on the middle of the last volution, and receding above and below, in conformity to sinuosities in the lip.

This species is distinguished from *P. Niagarense* by the more elevated spire, and by the form and relative position of the aperture. The surface-markings are also usually finer than in that species.

STROPHOSTYLUS *Hall.*

STROPHOSTYLUS CYCLOSTOMUS.

Plate 30, Figs. 1-13.

Strophostylus cyclostomus HALL. Trans. Alb. Inst., vol. iv, p. 218. Abstract p. 24; May, 1863.

Shell subglobose or transversely broad oval. Spire moderately elevated; volutions about four, rounded, the last one extremely ventricose and very much extended on the upper side and at the sutural margin. Aperture circular or subcircular, very oblique to the axis; peristome thin, entire, without sinus or emargination, spreading over the surface of the next volution, rarely leaving a slight umbilicus. Columellar lip grooved in the lower part, with a rather strong spiral fold at about one-third the diameter from the lower side of the aperture. Suture not canaliculate.

Surface marked by strong, crowded lamellose striæ of growth parallel to the margin of the aperture, and by much finer revolving, undulating lines, producing a finely cancellate structure in well-preserved specimens.

This species, in the elevation of the spire, differs from any other described form of the genus, except *S. elegans* of the Lower Helderberg, and from that one in being more ventricose and more oblique.

STROPHOSTYLUS CYCLOSTOMUS var. DISJUNCTUS *n. var.*

Plate 30, Figs. 14 and 15.

Strophostylus cyclostomus? HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 30, figs. 14, 15. 1876.

The earlier volutions of this fossil have the characters of form and surface-markings of *S. cyclostomus;* but the last volution is less expanded, and becomes entirely disjoined toward the aperture, preserving no evidence of columellar lip or thickening of the peristome.

The surface-markings are characteristic of the genus.

BELLEROPHON *Montfort.*

BELLEROPHON TUBER.

Plate 30, Figs. 19, 20.

Bellerophon tuber HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 30, figs. 19, 20. 1876.

Shell convolute, subglobose, height and width about equal. Aperture expanded, broadly reniform, bilobate, with a broad sinus on the dorsal margin. Dorsum subcarinate toward the aperture.

Surface marked by fine striæ parallel to the lines of growth, commencing at the umbilicus and curving broadly over the side of the shell, and somewhat abruptly recurved on the dorsum.

This species is the only Bellerophon proper which has come under my observation from the Niagara group. The specimens of this species from Waldron are very imperfect, all of them having been macerated, and usually deprived of the shell. The example figured is less expanded than some others, from later collections, which are likewise distinctly carinate on the dorsum near the aperture.

CYRTOLITES *Conrad.*

CYRTOLITES SINUOSUS.

Plate 30, Figs. 16-18.

Cyrtolites sinuosus HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 30, figs. 16-18. 1876.

Shell convolute, volutions in the same plane, contiguous. Body of the shell strongly lobed, the dorsum being separated from the lateral portions of the shell by a distinct groove or sinus on each side. Aperture elongate, subquadrate, auriculate at the sides, and the peristome deeply sinuated in front.

The specimens of this species are casts of the interior, and the surface-markings are unknown. This form may be compared with *Bucania trilobata*, of the Medina Sandstone and Clinton group, but it is less gibbous, more abruptly trilobate, and is marked by a deep abrupt sinus in the anterior margin of the peristome—a feature not known in that species.

CEPHALOPODA.

ORTHOCERAS *Breyn.*

ORTHOCERAS SIMULATOR.

Plate 27, Figs. 11, 12.

Orthoceras simulator HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 27, figs. 11, 12. 1876.

Shell cylindrical, gradually enlarging, siphuncle subcentral; septa distant from each other about one-fourth of the diameter of the shell — from three to four in the space of 14 millimetres.

Surface finely striated transversely.

The diameter of the largest specimen observed is 25 millimetres.

The specimens are frequently flattened and in very bad condition, the shell being entirely destroyed, and usually the septa are obliterated.

TROCHOCERAS *Barrande Hall.*

TROCHOCERAS WALDRONENSE.

Plate 27, Figs. 13-15.

Trochoceras Waldronensis HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 27, figs. 13–15. 1876.

Shell dextral, making about two volutions; spire depressed, volutions slightly flattened; section subelliptical; gradually expanding, and the outer chamber continued in a more direct line; siphuncle excentric, nearer to the concave dorsal margin; septa moderately convex.

Surface marked by strong annulations, which are oblique and abruptly curved backward on the convexo-ventral side, very gradually increasing in distance from each other, to the outer chambers, beyond which the shell is marked by gentle undulations or lines of growth; the space between the annulations regularly concave. In well-preserved specimens (seldom in others) there are finer surface-markings consisting of longitudinal striæ of which there are five in the space of one millimetre; these are crossed by finer concentric striæ.

This species differs from any known form in the Niagara group, by its more slender and gradually enlarging volutions.

ANNELIDA.

SPIRORBIS *Lamarck.*

SPIRORBIS INORNATUS.

Plate 31, Figs. 14, 15.

Spirorbis inornatus HALL. Trans. Alb. Inst., vol. iv, p. 224. Abstract, p. 30; May, 1863; including *Spirorbis ? flexuosus* HALL. Trans. Alb. Inst., vol. iv, p. 224. Abstract, p. 30; May, 1863.

Convolute, discoid, adhering, deeply depressed or umbilicate, consisting of about two volutions, the outer one robust, transverse diameter the greater, margin subangular.

Surface smooth or with lines of growth which on the exposed edge of the volution sometimes become slight ridges.

The specimens of this species are comparatively numerous, but the greater part are without distinctive surface-markings, or incomplete in their volutions.

In a single specimen before me, the tube, after making about one volution and a half in contact, becomes free, assuming a sinuate or spiral direction, extending about two mm. from the point of divergence, and somewhat rapidly enlarging to the outer extremity, which is imperfect; in other respects this form has the character of *Spirorbis inornatus*. A similar feature has already been illustrated in *Spirorbis laxus* of the Lower Helderberg group (Pal. N. Y., vol. iii, page 349, plate 54, fig. 18).

The original specimens described as *Spirorbis ? flexuosus* are not now accessible, but it is presumed that they were similar to the one referred to, with the outer volution becoming free and continuing in a sinuate or direct line, and are probably not distinct from *S. inornatus*.

CORNULITES *Schlotheim.*

CONCHICOLITES *Nicholson.*
ORTONIA *Nicholson.*

CORNULITES PROPRIUS.

Plate 31, Figs. 1-13.

Cornulites proprius HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 31, figs. 1-13. 1876.

Elongate-tubular, obconical or trumpet-shaped bodies, rapidly enlarging toward the aperture which is campanulate with the margins always imperfect. Surface in the young usually sharply annulated and longitudinally striated; the section subcircular, a little flattened on the adhering side.

These bodies in their young state are parasitic (adhering to other organic bodies), occurring as slender tubes which are more or less curved or undulating, and rarely straight for a considerable portion of their length; the apices, when entire, are abruptly curved, often making half a volution or more; growing singly or in groups of two or more (as shown in figures 1–3, pl. 31,) and conforming to the contour of the surface to which they are attached for a varying distance of 10 to 20 mm. or more, and then becoming free, either by extending in a direct line and rising above the surface, or growing beyond the limits of the object to which the germ was attached, and continuing their growth; or becoming separated, leave the adhering basal portion, which is always imperfect or broken at the margins of the open extremity.

This is the prevailing, and almost universal condition of these bodies in their earlier stages of growth. The minute apex finally becomes solid, is absorbed, or otherwise disappears; the remaining tubular portion gradually loses its evenly annulated character in the progress of growth, the substance of the tube becomes thickened, the rings broader, less defined or obsolescent, merging into a generally undulating or subimbricating surface, which is marked by numerous thin irregular annulating ridges, sharply crenulated by the longitudinal striæ. In this condition the lower or early portions of the fossil are rarely preserved, the lower extremity being usually broken or sometimes cicatrized, having become free from the original attachment and continuing as an independent body in the form of a straight, trumpet-shaped tube. Many of them, however, still adhere to the original surface till they have acquired a large size (depending in some degree upon the nature and extent of the surface to which they are attached), as shown in fig. 5 of plate 31; the lower extremity has here become thickened, and the annulated character obsolete.

The annulations, so well-defined in the younger stages of growth, affect the interior of the tube, which is enlarged at these points; and from the interannular spaces, there are thin lamellæ projecting into the interior, and for some distance across the cavity of the tube. In some phases of wearing or decortication, these lamellæ give a partially septate character to the fossil; and it is due to the same cause that we have the annulated casts of the interiors, where the sharp constrictions mark the place of these projecting lamellæ.* The same feature occurs in all the species, and where the small parasitic tubes become worn down they present a septate appearance.

In the young state, the annulations and the interior projecting lamellæ are alternate and corresponding in number; but as the exterior becomes thickened and its growth irregular, the interior continues essentially uniform, and the projecting lamellar septa maintain much regularity in their occurrence. The thickening of the walls, and the irregularity of growth, is confined to the exterior, while the cavity of habitation maintains a regularly increasing size, very rarely encroached upon by the cellular tissue.

The interior structure of the walls is vesicular, but these walls vary greatly in thickness in specimens externally of the same size, as may be seen by comparing figures 9 and 10 of plate 31. Even the smaller parasitic tubes, like those of figures 1, 2 and 3, show a vesicular wall structure, although this is often limited to one or two ranges of vesicles; and the same is sometimes true of the larger specimens, as shown in figure 10, and in figure 11, where the wall on one side is thin and nearly or entirely destitute of cellular tissue. This texture is not only variable in extent, but also in the form of the vesicles (as shown in figures 12 and 13), and it sometimes so far invades the interior wall as partially to obliterate the evidence of annulations, as in the specimen figure 13, where this cellular tissue has formed upon the inner face of the tube.

Since this fossil occurs in such different phases (the prevailing one of which is shown in figures 1–3, and another in figures 4–7,) the identity is not readily observed; but a study and comparison of a large number of specimens has left no doubt of their identity; the different forms being simply the dif-

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* Illustrations of this feature are given in Murchison's *Silurian System*, plate 26, where both the casts and the interior of the tube are shown. Also in *Pal. N. Y.*, vol. ii, plates 28 and 85 (this latter supplementary plate is erroneously numbered 83 in some of the copies), where casts and partial casts of a species are illustrated. In *Pal. N. Y.*, vol. i, page 92, I have mentioned the septate character of the tubes of a species which I had referred with doubt to Tentaculites.

ferent stages of growth of the animal, which in its young state is parasitic, becoming free above and rapidly increasing in size in its later stages.

This manifestation of development, here illustrated, corresponds in all respects with the figures given by Sir R. I. Murchison in his *Silurian System*, as cited in a previous note, except that we do not possess casts of the interior, which are there illustrated in a very beautiful manner. Similar casts of another species are illustrated on plate 28, figs. 12, a. c. d. e., Pal. N. Y., vol. ii. The Waldron specimens, in their young condition, closely resemble those from Dudley in England, as they occur attached to the shells of PENTAMERUS and MERISTELLA.

The similarity of CORNULITES, in its young state, with TENTACULITES, has led to the reference of these bodies to the latter genus, and in some of their phases it is not easy to make the distinction.* The Tentaculites in all stages of growth, so far as we know, have been free floating shells ; but CORNULITES is always parasitic in its young state at least, and may either become free or remain attached throughout its existence. Some of the forms heretofore known as TENTACULITES in rocks of the Hudson River group in the western States, and possessing all the external characters of that genus, have also the vesicular texture belonging to CORNULITES ; and a more critical study of some of the species has shown them to be parasitic and gregarious in their earlier stages of growth. I have long known that *Tentaculites flexuosus* (Pal. N. Y., vol. i,) is a CORNULITES, and these facts have induced me to review some other species published as TENTACULITES.

Tentaculites flexuosus, ut cit. will therefore be placed under CORNULITES = *C. flexuosus*, a species growing singly or in groups, as illustrated in the original figures, *Pal. N. Y.*, vol. i, pl. 29, and of which we know nothing regarding its later stages, corresponding to the larger growth of *C. proprius*.

The figure described in the same volume, page 284, pl. 78, is apparently a distinct species ; and the specimens from western localities, considered identical with that from the Hudson river group of New York, have since been described under other names.

The form described as *Cornulites flexuosus* (*Pal. N. Y.*, vol. ii, p. 98, pl. 28,) is a true CORNULITES, the specimen 12a retaining a portion of the test, but preserving no distinct exterior annulations, while the other figures are casts of the interior. Since the specific name *flexuosus* is pre-occupied, I propose the name *Cornulites Clintoni*.

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* See illustrations *Pal. N. Y.*, vol. v, part ii, plate 115.

This species is allied to the *C. arcuatus* of Conrad, from the Niagara limestone of New York, in which the annulations of the cast are more rounded, and the shell more rapidly tapering.*

An examination of the original specimens of *T. distans*, of the Clinton group, proves it to be a CORNULITES, and it will therefore be indicated as *Cornulites distans*.

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* *Jour. Acad. Nat. Sci. Phil.*, vol. viii, p. 276, pl. 17, fig. 8.

CRUSTACEA.

LEPERDITIA *Roualt.*

LEPERDITIA FABA.

Plate 32, Figs. 1-3.

Leperditia faba HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 32, figs. 1-3. 1876.

Form subovate, gibbous, greatest convexity just anterior to the middle ; hinge-line straight and equaling two-thirds the length of the shell ; width of the shell equal to three-fifths of the length ; valves subequal, the left valve the larger and overlapping at the base ; posterior end rounded, narrower than the anterior ; base broadly and regularly rounded in outline, the line of junction of the two valves being slightly arcuate laterally.

Surface apparently smooth.

BEYRICHIA *McCoy.*

BEYRICHIA GRANULOSA.

Plate 32, Fig. 4.

Beyrichia granulosa HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 32, fig. 4. 1876.

Form broadly semioval ; dorsal side straight ; anterior and posterior lobe unequal ; the ventral, anterior and posterior sides bordered by a broad flattened rim ; subcentral node ovate, extending three-fifths the width of the test, and about one-fourth as wide as the length of the shell.

Surface finely tuberculate.

CALYMENE *Brongniart.*

CALYMENE NIAGARENSIS.

Plate 32, Figs. 8-15.

Calymene Niagarensis HALL. Geol. N. Y. Surv. 4th Geolog. Dist., p. 101, fig. 3, and p. 102. 1843.
Calymene Blumenbachii var. *Niagarensis* HALL. Pal. N. Y., vol. ii, p. 307, pl. 67, figs. 11 and 12. 1852.
Calymene Niagarensis HALL. 20th Rep. St. Cab. Nat. Hist., p. 400; Rev. Edit., p. 425. For synonymy of the species, see Pal. N. Y., vol. ii. p. 307.

This species is the most abundant form among the trilobites of the Waldron locality. The specimens present no modification of characters from those in the Niagara shale of New York, although they are usually of larger size. A large proportion of the individuals in the earlier collections, are fragmentary, having been macerated upon the sea bottom before they were covered by the sediments. In the collections recently made are several individuals which preserve all the parts entire.

This species is associated with CYPHASPIS, HOMALONOTUS, ILLÆNUS, LICHAS and DALMANITES.

HOMALONOTUS *Konig.*

HOMALONOTUS DELPHINOCEPHALUS (*Green*).

Plate 32, Figs. 17, 18.

Trimerus delphinocephalus GREEN. Monograph of Trilobites, p. 82, pl. 1, fig. 1. 1832. For synonymy and other references, see Pal. N. Y., vol. ii, p. 309.

This species occurs at the Waldron locality, mostly in a fragmentary condition. One specimen preserving the head and thorax nearly entire has been observed. Exclusive of this specimen, the species is only represented by fragments of the cephalic and caudal shields. These portions of the fossil bear all the characteristic marks of identity with those from the Niagara shale in New York.

CYPHASPIS *Burmeister.*

CYPHASPIS CHRISTYI.

Plate 32, Figs. 5-7.

Cyphaspis Christyi HALL. Trans. Alb. Inst., vol. iv, p. 220. Abstract, p. 26; May, 1863.

General form of body elongate-oval, the length nearly twice the greatest width of the thorax.

Head semioval, the posterior margin slightly concave, highly elevated in the middle, bounded by a proportionally strong thickened rim, the posterior angles being prolonged into slender spines reaching to the sixth or seventh thoracic segment, and slightly divergent. Glabella small, broad-ovate, rounded in front and truncate behind, about half the length of the head, greatest width anterior to the middle; surface convex, very prominent behind, some specimens showing faint indications of a pair of short oblique furrows anterior to the middle; near the base on each side a small ovate node separated from the glabella by a distinct furrow; longitudinal furrows moderately deep. Eyes small, very prominent and rounded, situated about one-third the length of the head from the posterior margin; distance from center to center equal to the length of the head forward of the occipital furrow; the surface smooth. Occipital ring narrow, the furrow well marked, becoming less distinct toward the posterior cheek furrows. Cheeks not prominent except anteriorly.

Thorax with twelve segments, highly convex, deeply lobed, lobes nearly equal in the anterior portion; the axial lobe more rapidly tapering posteriorly than the lateral ones, its annulations curved forward in the middle; lateral segments curved a little backward, the extremities obtusely rounded, somewhat abruptly bent a little nearer the axial extremity, causing an angular ridge along each lateral lobe; each segment marked by a strong longitudinal furrow nearer the anterior margin.

Pygidium small, subsemicircular, a little arched forward on the anterior border; axial lobe extending a little more than two-thirds the length of the pygidium, rounded at the extremity and marked by one distinct and one indistinct annulation, as also in the lateral lobes. Surface marked by small scattered pustules, most distinct on the cheeks and segments of the axial lobe.

Length of an ordinary specimen 17 mm. ; greatest width of thorax a little more than 8 mm. ; length of head, 6 mm. ; length of pygidium 2 mm.

This species differs from all others described, in the elongate form of the head and in the proportions of the body.

ILLÆNUS *Dalman*.

ILLÆNUS ARMATUS ?

Plate 32, Figs. 19, 20.

Illænus armatus HALL. 20th Rept. St. Cab. Nat. Hist., p. 320, pl. 22, figs. 1-3. 1867. Rev. Edit., pp. 418, 433. [1870.]

Illænus Barriensis [MURCH.] HALL. Trans. Alb. Inst., vol. iv, p. 227. Abstract, p. 33; May, 1863.

The specimens of ILLÆNUS occurring in this locality are all fragmentary, and so imperfect that no satisfactory identification can be made. The form of the pygidium is like *I. armatus*. The head is more extended in front than in that species from Wisconsin, but this may be due in some degree to the compression which has flattened the specimens. One specimen retaining the movable cheek, with its posterior extension, has been observed, leaving little doubt as to the identity of the species.

CERAURUS *Green*.

CHEIRURUS *Beyrich*.

CERAURUS (CHEIRURUS) NIAGARENSIS.

Plate 32, Fig. 16.

Compare *Cheirurus insignis* BEYRICH. Ub. Bohm. Tril., p. 12, fig. 1.

Compare *Cheirurus insignis* BARRANDE. Syst. Sil. Cent. Bohême, p. 782, pl. 41.

Compare *Cheirurus insignis* CORDA. Prod., p 133, pl. vi, fig. 70.

Ceraurus insignis HALL. Pal. N. Y., vol. ii, pp. 300, 306, pl. 67, figs. 9, 10. 1852.

Ceraurus insignis HALL. 20th Rep. St. Cab. Nat. Hist., p. 335. 1867.

Ceraurus Niagarensis HALL. 20th Rep. St. Cab. Nat. Hist., Rev. Edit., p. 427, pl. 21, figs. 10, 11. [1870.]

Sphærexochus Romingeri ? HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 32, fig. 16. (Erroneous reference.)

Ceraurus bimucronatus ? (MURCHISON) ROEMER. Silur. Fauna Westl. Tenn., S. 80, T. V. fig. 19; not *Cheirurus bimucronatus* MURCHISON. Siluria Foss. 64; fig. 4, pl. 3, fig. 5; and pl. 19, figs. 10, 11.

Compare *Cheirurus pauper* BARRANDE. Syst. Sil. Cent. Bohême, p. 800, pl. 41, fig. 41.

Compare *Cheirurus obtusatus* (CORDA) BARRANDE. Syst. Sil. Cent. Bohême, p. 786, pl. 41, figs. 14-16.

This species, so far as known, is only represented by fragments of the cephalic shields found in New York, Wisconsin, Tennessee and Indiana, and nearly perfect specimens of the pygidia, also found at Waldron, Indiana. With the material now at hand, a more exact and satisfactory comparison can be made with various European species.

The only European species with a single obtuse node at the extremity of the pygidium are *C. insignis* BEYRICH, *C. pauper* BARR., and *C. obtusatus* CORDA; the other allied species have the extremity variously mucronate or emarginate. These species also all agree in the comparatively slender sharp spines on the lateral margins.

The pygidia found at Waldron may be described as follows:

Pygidium longitudinally subelliptical, very slightly convex, axis prominent in front, diminishing very rapidly in size and elevation toward the posterior end, composed of three prominent annulations, and a flat, rounded node extending beyond the margin, with two small circular depressions at the base near the third segment, probably indicating a rudimentary fourth segment. Lateral lobes composed of three pairs of segments, having a very short, deep furrow at the base of each segment; produced into three broad, flat, subtriangular curved spines, notched at the base on the anterior margin, extending outward and curving abruptly backward, concave to the axis. Surface granulose.

Surface of the glabella covered with small crateriform pustules. The fixed cheek is finely granulose, with small, irregular circular depressions.

From the above it will be seen that the separation first made in the revised edition of the 20th Rept. St. Cab., was necessary, and that it constitutes a distinct species.

NOTE ON THE GENUS DALMANITES AND ODONTOCEPHALUS.

CRYPHÆUS *Green.* 1837.
ODONTOCEPHALUS *Conrad.* 1840.
DALMANIA and DALMANITES *Emmrich.* 1845.
ODONTOCHILE *Corda.* 1847.*

The genus DALMANIA or DALMANITES of Emmrich has been generally adopted by European and American authors, overlooking the fact that Green, in 1837, proposed the name CRYPHÆUS, and Conrad, in 1840, proposed the name ODONTOCEPHALUS for forms now included under Emmrich's genus. The typical species of Conrad's genus was the *Asaphus selenurus* of Eaton, described in 1832.

In 1835, Green, in the supplement to his *Monograph of the North American Trilobites*, described the head of a Trilobite under the name of *Calymene odontocephala*,† from the denticulate character of the anterior margin of the buckler or cephalic shield. This species of Green was identified among the collections from the upper limestones of the Helderberg and Schoharie, and in 1840 Mr. Conrad discovered an entire specimen which had been collected at Auburn, N. Y. This specimen proved that the *Asaphus selenurus*, Eaton, of which only the caudal shield had been heretofore known, and *Calymene odontocephala* of Green, described from the head alone, were one and the same species, and he proposed the generic name of ODONTOCEPHALUS, and *Odontocephalus selenurus* as the typical species.‡

The name ODONTOCEPHALUS has, therefore, priority over DALMANIA by five years in time, and while, although naturalists would prefer to retain the use of the name Dalmania or Dalmanites, (the former being also used for a genus of dipterous insects,) it becomes a question whether a just interpretation of the rule of priority would not require the adoption of the name ODONTOCEPHALUS. While aware of the fact that Mr. Conrad had thus described the *Asaphus selenurus* of Eaton, the writer has in former publications adopted the name Dalmania or Dalmanites, without considering the question of dates.

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* The generic name CRYPHÆUS, proposed by Green in 1837, was already preoccupied for a genus of Coleoptera in 1833, and the name ODONTOCHILE had also been given to a genus of Coleopterous insects in 1834.

† Cast No. 36 of Green's series of casts of Trilobites.

‡ Third An. Report Pal. Dept. N. Y. Geol. Survey. 1840.

The distinguishing features of the genus CRYPHÆUS of Green (1837), are, according to its author, the fimbriate caudal shield, of which he remarks: "The second series of ribs, which proceed beyond the costal arches of the Cryphæus, we suppose will distinguish it from every other described genus." He remarks that "a very slight obliteration" of these parts "would give them all the characters of a Calymene" = Phacops.

In considering the question of generic identity, however, it should not be forgotten that the typical forms of the genus DALMANITES, which are similar to the Niagara and lower Helderberg species, have never shown the denticulated anterior border or fimbriated pygidium. The genus was originally characterized as having many annulations in the axis of the pygidium, but farther investigation has included forms with few annulations. The ODONTOCEPHALUS, in its typical form, is characterized by the denticulate border and a pygidium with few annulations in the axis. Similar characteristics mark the other allied species, so far as known.

Whatever may be the real value or importance of these structural modifications, it is interesting to find their manifestation coincident with the change or succession of the geological formations. The lowest forms, geologically, have simple phacopidean heads — (the posterior angles not produced) with pygidia which are acute or subacute posteriorly and have numerous annulations in the axis. In the next phase these forms of the group have the posterior angles of the buckler prolonged into spinform extensions, and the caudal extremity very acute or extended into a more or less elongate spine. A still farther modification occurs in the next horizon where the posterior angles of the buckler are extremely prolonged, the caudal extremity extended into a long spine, and the anterior border of the head produced into a simple or bifurcate, or sometimes tridentate process. In the next geological period, we find the forms of this group having the posterior angles of the buckler either moderately or extremely prolonged, the caudal extremity truncate or emarginate (concave) and produced on each side posteriorly into a short spine (or sometimes with an accessary spine), on each side, and the extremities of the caudal ribs spiniferous. The anterior margin of the buckler is rounded or slightly produced and denticulate, either in the front alone or upon the entire border.

In the next stage the anterior margin of the buckler is rounded and simple, the posterior angles more or less prolonged into spiniform extensions, and the caudal extremity fimbriate with rounded or more or less flattened spiniform processes; of these there are five on each side of the axial extremity, which is likewise produced into a short flattened spine.

These extravagant forms of DALMANITES or ODONTOCEPHALUS, in the last two geological stages, are associated with the staid and almost unvarying PHACOPS which begins and ends its existence in the three latest named geological periods. * * *

For the present I propose to recognize the following species as DALMANITES, until it shall be determined whether the forms possessing the characters of the genus ODONTOCEPHALUS may be properly distinguishable as a separate group.

DALMANITES VIGILANS.

Plate 33, Figs. 1-4.

Dalmanites vigilans HALL. Rep. Prog. Geol. Surv. Wis., p. 57. 1861.
Dalmania vigilans HALL. 20th Rep. St. Cab. Nat. Hist., p. 335, pl. 21, figs. 16-18. Rev. Edit., p. 426.
Dalmania vigilans HALL. Doc. Edit. 28th Rep. St. Mus. Nat. Hist. Explanation of pl. 33, figs. 1-4. 1876.

General form of body broadly ovate, greatest breadth across the posterior part of the cephalic shield.

Head convex, semi-elliptical, breadth about twice as great as the length (exclusive of the frontal projection) ; border extended in front into a triangular, sometimes truncate, process, the base of which is little less than one-half as wide as the width of the anterior portion of the glabella ; in older individuals this projection becomes more obtuse and sometimes rounded ; lateral borders broad, flattened, separated from the cheeks by a distinct groove, produced posteriorly into long, slender parallel spines, which do not extend beyond the general outline, and are continued as far as the extremities of the fifth thoracic segment. Glabella large, depressed-convex, widening in front to twice its width at the posterior margin, divided into lobes by three pairs of transverse furrows exclusive of the occipital furrow, which is distinct and continuous ; the two posterior furrows distinct at the sides, but not extending entirely across the glabella except in a faint depression ; the anterior furrows deep, very distinct, situated a little anterior to the eyes, extending each about one-third across the glabella and giving to the frontal lobe a transversely elliptical outline ; occipital ring narrow, ornamented in the middle by a single, short, sharp spine. Eyes very prominent, short reniform, containing about thirty-five vertical ranges of lenses, the middle ranges having nine each. Palpebral lobe depressed, giving great prominence to the rim of the eye. Cheeks small, prominent on the anterior portion, marked near the posterior border by a deep groove—the continuation of the occipital furrow; margin broad and flat.

Thorax with the axial lobe depressed-convex, widest at the sixth segment, its greatest width more than two-thirds that of the lateral lobe. The articulations curve forward in the middle and at their junction with the lateral lobes, near the extremities they are bent suddenly backward, terminating in a sharp point. Articulations of the lateral lobes traversed by a deep longitudinal furrow extending from the middle lobe to the abrupt curve near their extremities.

Pygidium somewhat elongate-triangular, extended posteriorly into an acute spine; central lobe or axis marked by ten or twelve narrow annulations; the lateral lobes less prominently marked by ten flattened ribs, which are traversed by a deep furrow, and terminate in a narrow border; the two posterior pairs of ribs are directed obliquely backward.

Surface of the head, except the anterior and lateral border, covered with small irregular pustules, the border being finely granulose. The remainder of the body is granulose, with occasionally small pustules on the axial lobe of the thorax.

The Waldron specimens of this species were identified with specimens from Wisconsin, which formed the basis of the original description. The only important differences noticed, are the lesser prolongation of the anterior process; the head is not so regularly semi-elliptical, but is more angular on the posterior side; the pygidium is somewhat more elongate and more acutely terminated. The species was originally described from specimens of the buckler and pygidia. In the recent collections from Waldron, there are several specimens retaining the thorax nearly entire, and from these the description of the species has been completed.

Compared with *D. verrucosus*, the head is proportionally narrower, the postero-lateral spines longer and less diverging; the pygidium is narrower and more elongate, and the surface is not so strongly covered with pustules. It somewhat resembles *D. limulurus* of the Niagara formation of New York, but differs in the proportionally larger glabella, the larger and more prominent eyes, and the extension of the anterior border.

Specimens of this form have proved comparatively rare in the collections thus far made at Waldron.

DALMANITES VERRUCOSUS.

Plate 33, Figs. 5-17; Pl. 34, Figs. 13-15.

Dalmania verrucosa HALL. Trans. Alb. Inst., vol. iv, p. 218. Abstract, p. 24; May, 1863.

General form elongate-ovate, the greatest breadth across the posterior part of the cephalic shield.

Head semicircular, or, including the lateral spines which reach to the base of the fifth thoracic segment, broad crescentiform, the anterior margin produced in front of the glabella, forming a semicircular projecting border about one-seventh as wide as the greatest width of the glabella. Glabella convex, not very prominent, the greatest breadth about equal to the length forward of the occipital furrow. Anterior lobe transversely oval, about twice as wide as the posterior lobe, separated from the rest by a pair of rather deep, obliquely transverse furrows, which extend about four-fifths across the glabella. Posterior and middle furrows short, but deeply marked, not extending to the margins of the glabella. Occipital furrow narrow and shallow, more deeply marked in its continuation in the cheek furrows. Eyes large, prominent, having in their greatest elevation, nine or ten ranges of lenses, and thirty-five ranges in the other direction. Palpebral lobe depressed, giving great prominence to the rim of the eye. Lobes of the cheeks rather prominent: marginal rim broad, the lateral portions having a rounded, undefined ridge near the inner border.

Thorax with the axial lobe depressed-convex, widest at the fourth and fifth segments, its greatest width not exceeding two-thirds that of the lateral lobe; the articulations curve forward in the middle and at their junction with the lateral lobes; articulations of the lateral lobes marked by a deep longitudinal furrow which commences at the juncture of the anterior margin with the axial lobe, and is directed backward, leaving the lower portion of the articulation about one third of the whole width at the middle of the length, and again runs out on the upper margin, at the point where the articulation is bent abruptly backward.

Pygidium broadly triangular, the anterior lateral angles rounded and the lateral borders convex; axial lobe regularly tapering posteriorly, marked by thirteen annulations which gradually decrease in size posteriorly, and terminate in a slender spine about half as long as the caudal plate. The lateral lobe has ten articulations, eight of which are divided by a longitudinal furrow; the last two are simple, and all become obsolete just within the margin.

Surface of the head, except the anterior and lateral borders, covered with small, somewhat pointed pustules, the border having only a finely granulose texture. Occipital and axial rings of the thorax and pygidium each marked with seven small spiniform pustules, the central one the longest; those of the pygidium become closely crowded in the posterior portion; there are sometimes two or more additional smaller pustules on the stronger rings of the thorax.

Length of a medium-sized specimen (exclusive of the caudal spine) 80 mm.; greatest width of the head somewhat more than 50 mm.; length of the head from the occipital ring 15 mm.; greatest width of thorax 48 mm.; width of axial lobe 13 mm.; length of pygidium (exclusive of the spine) 28 mm.; greatest width of pygidium 48 mm. Some of the large cephalic shields have a width of from 80 to 100 mm.

The heads of this species, in a tolerably good state of preservation, are very common; the remainder of the body being mostly found in a fragmentary condition.

DALMANITES BICORNIS.

Plate 33, Fig. 18.

Dalmania bicornis HALL. Doc. Edit. 28th Rept. St. Mus. Nat. Hist. Explanation of pl. 33, fig. 18. 1876.

This species is indicated from the occurrence of an incomplete border of the buckler, which preserves a strong bifurcatory anterior process — a feature sufficiently characteristic to distinguish it from any trilobite of the Niagara formation yet known to us. The form bears much general resemblance to *D. nasutus* of the Lower Helderberg formation, which has a much larger bifurcating anterior process, and in which the anterior lobe of the glabella is projected forward beyond the line of general contour of the cephalic shield.

LICHAS *Dalman.*

LICHAS BREVICEPS.

Plate 34, Figs. 1-7.

Lichas breviceps HALL. Trans. Alb. Inst., vol. iv, p. 222. Abstract, p. 28; May, 1863.

Not *Lichas breviceps* ? HALL. 20th Rep. St. Cab. Nat. Hist., pp. 334, 377, pl. 21, figs. 12-14. Rev. Edit., p. 424.

Head broad and short, somewhat crescentiform, projecting in front and prominent in the middle, the length about one-third as great as the width, posterior angles directed backward in short obtuse spines. Glabella very convex, wider than long, rounded in front, distinctly divided into three lobes, two lateral and one central, the central lobe narrower behind and rapidly expanding in front, the lateral lobes reniform and about as wide as the posterior part of the central or anterior lobe, commencing forward of the eye and reaching to the occipital furrow. Eyes very prominent, reniform, very convex on the visual surface, having the appearacce of the eyes in ILLÆNUS. Anterior border of the head very narrow in front of the glabella, being only a rounded rim. Cheeks flat or slightly concave, with a prominently rounded ridge just beneath the eye. Occipital ring prominent; furrow deep, becoming very faint in its extension into the cheek furrows. Surface of the head marked by fine scabrous pustules.

A portion of the thorax connected with a pygidium preserves the remains of ten articulations, in one of the lateral lobes and on a part of the axial lobe. The axial lobe is wider in the middle than at its junction with the head, and from the seventh articulation gradually tapers to the pygidium. The lateral lobe is a little more than two-thirds as wide as the axial lobe in its greatest width; the articulations are somewhat abruptly turned backward toward their extremities, which are closely arranged and in contact, except the last one, between which and the first segment of the pygidium is a narrow free space.

The separated pygidia present the following characters: General form semi-elliptical, a little rounded on the anterior border; axial lobe broad and strong, very prominent in the anterior part, rapidly narrowing and becoming low in the middle and again widening posteriorly; its width at the anterior margin being about one-third as great as the whole width of the tail; a single anterior annulation. Lateral lobe with three segments on each side, and each marked by a broad, shallow, longitudinal furrow; at the posterior side of the two anterior ones, the margin of the shield is slightly indented, below this it is entire, with a regularly curved outline; the two anterior segments are curved a little backward and their extremities free, while the third one is curved first outward and then downward, uniting with the depressed axial lobe. The enfolding of the crust on the lower side extends upward about three-fifths of the length of the tail, and is strongly but distantly lamellose-striate.

Exterior surface marked by pustules of moderate size, and a few short hollow spines.

It resembles *L.* (*Platynotus*) *Trentonensis* as recognized in the blue shales of the Hudson river group of Cincinnati, in the prominent eyes; but the head is much shorter in proportion to its width, and the tail is broader and more nearly straight on the anterior margin.

Lichas Boltoni (*Bigsby*) var. occidentalis.

Plate 34, Figs. 8-11.

Lichas Boltoni var. *occidentalis* Hall. Trans. Alb. Inst., vol. iv, p. 223. Abstract, p. 29; May, 1863.

For citations, see Pal. N. Y., vol. ii, p. 311. 1852.

This form is known almost entirely from the pygidia, most of the specimens being in an imperfect condition. The middle lobe of the pygidium is short and the articulations are more prolonged than in the usual forms of *L. Boltoni* in the Niagara shales of New York. This character, however, is subject to some variation, even among collections from the same locality, as may be seen by comparing the figure on plate 69 with 1g on plate 70 of vol. ii, Pal. N. Y.

A specimen of the right cheek indicates that the head was longer and more curved on the posterior margin.

In some of the New York specimens, the anterior border in front of the glabella is produced into a broad subnasute extension, and a single fragment, of what appears to be a similar but more extreme anterior prolongation of the head, has been found at Waldron (figure 12 of plate 34). Should this be proved to belong to the form represented in figures 8, 9 and 10, the difference between the New York and western specimens would be still more marked. The individuals reached a large size, as is shown by a fragment of one of the thoracic segments, having a width of nearly 120 mm.

LICHAS —— *sp.?*

Plate 34, Fig. 12.

The fragment figured is apparently the frontal extension of the border of the glabella of a species of Lichas, corresponding to what is shown in figure 1a of plate 70, vol. ii, Pal. N. Y. It is probable that this belongs to the form of which the pygidia are represented in figures 8, 9 and 10, of the same plate.

LICHAS EMARGINATUS *n. sp.*

Lichas breviceps? HALL. 20th Rep. St. Cab. Nat. Hist., p. 334, pl. 21, figs. 12-14. 1867. Rev. Edit., p. 424. [1870.]

A comparison of this form with *L. breviceps* shows that the lateral lobes of the glabella are larger, and the eye tubercle smaller. The axial lobe of the pygidium is more prominent and longer, marked by four annulations in the anterior portion, and is gradually narrowed posteriorly, having a distinct conical form, with no expansion into the posterior border as in *L. breviceps*. The lateral lobes have the articulations more prolonged and bent more directly backward. The pygidium is also emarginate behind, while in *L. breviceps* from Waldron it is continuous.

It becomes necessary, therefore, to propose a name for the Wisconsin specimens which have been referred to *L. breviceps?*.

This species may be compared with *L. scabra* of Beyrich, and *L. avis* of Barrande, but the lateral articulations of the pygidium are much shorter in this species.

INDEX

TO THE

FAUNA OF THE NIAGARA GROUP.

20

NOTICE OF SOME REMARKABLE CRINOIDAL FORMS

FROM THE LOWER HELDERBERG GROUP.

By JAMES HALL.

In addition to several aberrant forms of Crinoidea, for which genera have been constituted, the species here noticed furnish some information as to the extreme variations which these organisms can assume in their mode of life, and in the special modifications of parts of their organism. The genera EDRIOCRINUS, ANCYROCRINUS and LICHENOCRINUS, depart in their habits, and in some degree in their structure, from the ordinary forms of the group, but with the exception of ANCYROCRINUS, they bear slight relation to the species of the present paper.

The specimens from the Tentaculite limestone in Schoharie, N. Y., were purchased with the Gebhard collection in 1872, and have remained unpublished in the hope of arriving at a more satisfactory determination of the nature of this remarkable form. During the past summer, Prof. James M. Safford, of Nashville, Tennessee, kindly placed at my disposal numerous specimens of an identical nature from the same horizon in Tennessee, and on this material, together with the New York specimens in the State Museum, the generic characters with the following descriptions of the species are based.

CAMAROCRINUS *nov. gen.*

Body large, externally lobed, chambered within, varying from transversely or longitudinally oblate-spheroidal to subspherical, and frequently assuming an unsymmetrical form from the unequal development of the lobes corresponding to the internal chambers. The cavity of the body or dome is divided into two or more large compartments, with usually several smaller accessory chambers, by vertical and horizontal partitions which are extensions of the substance of the inner walls of the dome.

The basal portion occupies a subcircular area, which is placed in a central position with regard to the disposition of the lobes of the body, and is surrounded by an elevated projection or extension of the walls. In structure this area is composed of spreading, radiciform, bifurcating rays, connected by irregular polygonal plates. The basal rays are composed of joints similar to those of an ordinary crinoidal column, and vary in number from five to twelve or more, and are arranged symmetrically with respect to two axes at right angles; they bifurcate at the third or fourth segment from their origin, and enclose ambulacral openings which penetrate into the interior cavities of the body.

The external wall of the dome is composed of two distinct layers, of which the infolding and extension of the inner one forms the partitions dividing the chambers. No traces of free arms have been observed. Column cylindrical, smooth near the body; the segments regular. The interior canal is five-lobed, and is divided and continued through the basal rays and their ramifications; not opening into any interior cavity of the body, so far as observed.

This remarkable crinoidal body is so totally unlike any previously described form, within my knowledge, that its true characters and relations are not at once evident. There is no doubt as to its crinoidal nature, but there is no apparent analogy of its parts with ordinary crinoids. Some of its characters would indicate that it is a curiously modified and enlarged summit or dome; that the visceral cavity is a small internal chamber immediately over the column-attachment; and that the lobes are an abnormal development of the interbrachial or interradial spaces. But the more probable theory in regard to this fossil, points to a functional similarity with a crinoidal root, as in ANCYROCRINUS from the upper Helderberg and Hamilton groups, in which there is a bulbous growth at one extremity of the column, supposed to act as a float or anchor to the body and arms. Viewing it in this respect, it may be regarded as a large chambered bulb, with an attached column, on the distal extremity of which was a calyx, having characters unknown at the present time. In this aspect, it must have been a free floating organism, similar in its habits to the recent *Medusæ* and *Comatulæ*. The lack of definition and symmetry which these crinoidal bodies assume would be an argument in support of this view, and find an explanation in their consequent secondary functional importance, and separation from the governing center or centers.

CAMAROCRINUS STELLATUS *n. sp.*

Plate 35, figs. 1-8.

Body oblate-spheroidal, convex above, flattened or somewhat concave below, with from three to twelve low, rounded lobes on the basal margin.

The base is composed of spreading radiciform, bifurcating branches, connected by a stellate network of finer ramifications, forming the plates of the base; the whole being surrounded by an irregular projected margin, and occupying an area having a diameter equal to from one-half to two-thirds the transverse diameter of the body. The basal branches, of which there are usually about eight, bifurcate at the third segment from their origin, and surround large ambulacral openings into the interior cavities of the body. The section represented in fig. 5, pl. 35, shows some evidences of a conical cavity above the center of the base, and a large horizontal septum, extending parallel to the base and at a distance above it, equal to the height of the internal conical chamber; but this does not appear to be a constant character.

The body is divided into four or more large chambers, or compartments, by radiating partitions from a central vertical axis. Near the summit, at the base and along the sides, there are frequently several accessory chambers formed by a division and divergence of the primary septa.

The external wall of the lateral and upper portions is composed of two layers of large and small stellate plates, connected by numerous processes. Each star is marked by a central rounded node, and the rays vary in number from three to ten. Column smooth, round near its attachment.

The largest specimen of this species observed, has a transverse diameter of 110 mm. with a vertical diameter of nearly 60 mm. The basal branches of the same specimen occupy an area having a diameter of 50 mm., or nearly one-half the transverse diameter of the body. In a smaller specimen whose transverse diameter is 55 mm. the basal area measures 28 mm., or nearly the same proportions as in the larger specimen.

This species is distinguished from *C. Saffordi* by its more depressed form, comparatively larger basal area, more numerous ambulacra, and in the stellate structure of the external walls. In some of its features it more nearly resembles *C. Clarkii*, but the unsymmetrical form of that species, the numerous unequal internal chambers with correspondingly numerous ambulacra, are distinctive.

The external aspect of the specimens is similar to that of a Favosite or Sponge; and it is is only under favorable conditions of weathering that the true stellate structure of the external walls is exhibited.

Formation and locality. In the Tentaculite limestone of the Lower Helderberg group, at Schoharie, N. Y.

CAMAROCRINUS SAFFORDI n. sp.

Plate 36, figs. 1—6; Plate 37, figs. 1, 2.

Body spherical to oblate-spheroidal, vertically or transversely compressed and externally lobed; presenting from three to five large lobes, corresponding to the internal chambers. There are usually five lobes, but often very unequally developed, giving an unsymmetrical form to the body.

Basal area small, well defined; limited by an extension of the walls, and occupying a space having a diameter of about one-third the transverse diameter of the dome. Basal rays strong, their subdivisions enclosing five distinct ambulacral openings into the internal chambers, and laterally connected by numerous small polygonal plates similar to those composing the walls of the body.

The dome is ordinarily divided, by vertical partitions, into five large unequal chambers, which are rarely of a uniform size, and often show great inequality. In some specimens one or more of the chambers are partially or completely atrophied from the enormous development of adjacent chambers, producing forms similar to fig. 3, pl. 36, and figs. 1, 2, pl. 37.

Internal and external walls of the dome composed of small polygonal plates, united by minutely undulating or serrated suture-lines. The external plates are well defined by the depressed suture-lines and often show a small node or central tubercle. As in the other forms here described, the walls readily separate into an inner and outer layer, and the interspaces have a porous or spongy structure.

The specimens present such a great range in size and form that the dimensions are not apparently of specific importance. The largest example observed, which is represented in section in fig. 2, pl. 37, has a greatest transverse diameter of about 145 mm. and shows five unequal internal chambers. The transverse diameters of specimens of ordinary size vary from 80 to to 110 mm.

It is not at once evident as to what constitutes the important specific differences of these fossils. The specimens referred to *C. stellatus* show a somewhat more depressed and symmetrical form, the basal area is comparatively larger, with more numerous ambulacra, and the ornamentation of the exterior walls of the dome is conspicuously different from *C. Saffordi*. In contrast with *C. Clarkii*, the species here described has a more regular form, with fewer internal chambers and corresponding ambulacra, and the basal area is considerably smaller.

The projecting margin around the basal area is broken and imperfect in all the specimens examined, and its original extent is not known; but whatever variation there may be in the form of the body, this area is well defined and distinctly limited, having a subcircular or unequally pentagonal outline. The substance of the dome is usually silicified, and this change has obscured the minute structure of the walls, which is preserved in but few of the specimens.

Fig. 1, pl. 36, represents the bases of two small columns besides the large central one, suggesting the idea that this hydrocyst furnished a float or support to a colony of individuals. In fig. 5, there is a cicatrice such as would be produced by the separation of a similar accessory column. The external resemblance of the specimens of this species to a Favosite is even more marked than in *C. stellatus*, and is well represented in fig. 4.

Formation and locality. In limestone referred to the Lower Helderberg group, Hardin county, Tennessee.

CAMAROCRINUS CLARKII *n. sp.*

Plate, 36, figs. 7, 8; Plate 37, fig. 3.

Body of an irregular ovoid form, marked by numerous unequal lobes corresponding to the internal chambers; base flattened.

Basal area large and well defined, having a diameter of somewhat less than one-half the transverse diameter of the dome. Rays numerous, connected by small polygonal plates; bifurcating near the periphery of the basal area and surrounding small ambulacra leading into the internal cavities.

The interior of the hydrocyst is divided by vertical, horizontal, and oblique partitions, into numerous unequal chambers, which are shown on the exterior as rounded lobes. Each of these chambers has an ambulacral opening in the basal area.

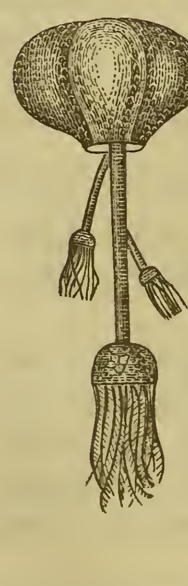
Walls composed of very small polygonal plates varying in diameter from .5 to one mm.; surface smooth, without special ornamentation.

The specimen described shows, on the exterior, eleven lobes, which present great variations in comparative volume. Its greatest vertical diameter is 40 mm., and its transverse diameters are 46 and 55 mm., respectively. The basal area is subcircular, and measures about 23 mm.

This form is distinguished from *C. Saffordi* with which it is associated, in its more irregular form, larger base, and more numerous ambulacra. In the comparative size of the basal area it more nearly corresponds to *C. stellatus*, but its form and the structure of the walls are very different. The specimen forming the basis of the description possesses features which are apparently of specific importance as above indicated, while showing the variation and want of a constant definition, which characterize these bodies.

The great inequality exhibited in the lobes may, in other specimens, produce a general form very unlike those described. The form of the body, and the size and disposition of the lobes seems to be the most inconstant feature of the three species here described.

Formation and locality. In the Lower Helderberg, limestone, Hardin county, Tennessee.



EXPLANATION OF PLATES.

EXPLANATION OF PLATE I.

AGARICUS (LEPIOTA) PUSILLOMYCES *Peck.*

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Fig. 1. Two plants of ordinary size.
Fig. 2. Vertical section of a pileus.
Fig. 3. Spores × 400.

TREMELLA MYCETOPHILA *Peck.*

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Fig. 4. Three plants of ordinary size growing on *Agaricus dryophilus.*

MONOTOSPORA BISEPTATA *Peck.*

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Fig. 5. A block of wood bearing a patch of plants.
Fig. 6. A plant bearing an immature spore × 400.
Fig. 7. A plant bearing a mature spore × 400.
Fig. 8. Detached spores × 400.

CLAVARIA GRACILLIMA *Peck.*

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Fig. 9. Two plants of ordinary size.

CLAVARIA PULCHRA *Peck.*

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Fig. 10. Two plants of ordinary size.

HELOTIUM PILEATUM *Peck.*

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Fig. 11. Piece of an herb stem bearing three plants of ordinary size.
Fig. 12. A plant magnified.
Fig. 13. An ascus containing spores × 400.
Fig. 14. Spores × 400.

LENTINUS UMBILICATUS *Peck.*

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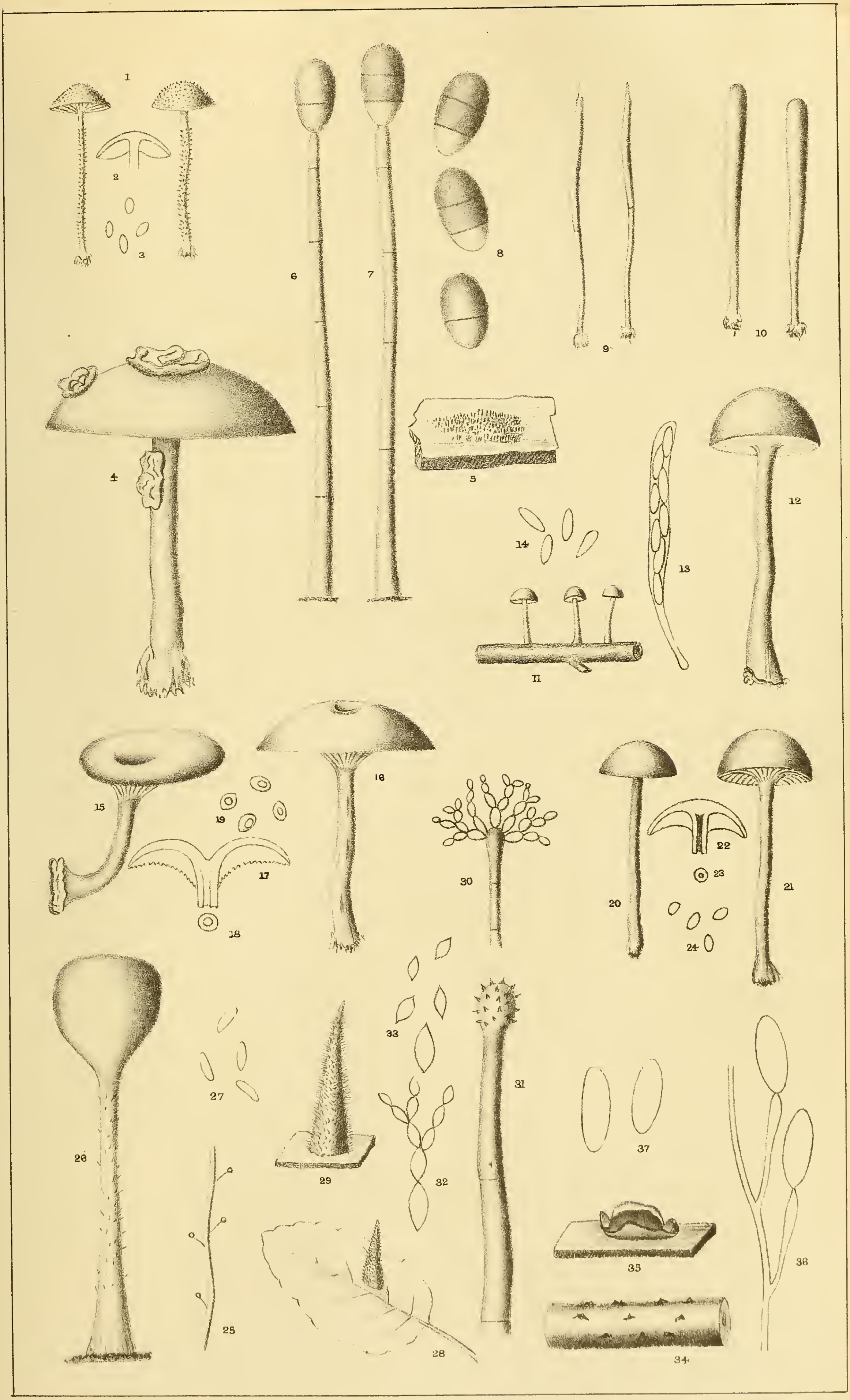
Fig. 15. A plant of ordinary size with the stem eccentric.
Fig. 16. A plant of ordinary size with the stem central.
Fig. 17. Vertical section of a pileus.
Fig. 18. Transverse section of a stem.
Fig. 19. Spores × 400.



Lith. of Weed Parsons & Co. Albany N.Y.

PLATE I — (*Continued*).

HYGROPHORUS PARVULUS *Peck.*

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Fig. 20. A plant of ordinary size.
Fig. 21. A larger plant, showing the lamellæ.
Fig. 22. Vertical section of a pileus.
Fig. 23. Transverse section of a stem.
Fig. 24. Spores × 400.

STILBUM CANDIDUM *Peck.*

Page 61.

Fig. 25. Piece of a stem bearing four plants of ordinary size.
Fig. 26. A plant magnified.
Fig. 27. Spores × 400.

HAPLOGRAPHIUM APICULATUM *Peck.*

Page 62.

Fig. 28. A leaf with its fungus-bearing gall.
Fig. 29. The gall and its hairy coating of fungi slightly magnified.
Fig. 30. Upper part of a plant bearing strings of spores, magnified.
Fig. 31. Upper part of a plant deprived of its spores, × 400.
Fig. 32. A branched string of spores × 400.
Fig. 33. Separate spores × 400.

DISCELLA DISCOIDEA *C. & P.*

Page 58.

Fig. 34. Piece of a branch bearing the fungus.
Fig. 35. A pustule and its matrix magnified.
Fig. 36. A fertile filament bearing spores × 400.
Fig. 37. Spores × 400.

PLATE II.

Erysiphella aggregata *Peck.*

Page 63.

Fig. 1. An alder catkin coated by the fungus.
Fig. 2. A conceptacle and its mycelium magnified.
Fig. 3. A sporangium containing spores × 400.

Microsphæra abbreviata *Peck.*

Page 64.

Fig. 4. Part of the circumference of a conceptacle and two appendages × 400
Fig. 5. A sporangium containing spores × 400.

Venturia Kalmiæ *Peck.*

Page 82.

Fig. 6. A leaf bearing the fungus.
Fig. 7. A perithecium magnified.
Fig. 8. An ascus containing spores × 400.
Fig. 9. Spores × 400.

Valsa mucronata *Peck.*

Page 74.

Fig. 10. Piece of a branch bearing the fungus.
Fig. 11. A single cluster of the fungus magnified.
Fig. 12. An ascus containing spores × 400.
Fig. 13. Spores × 400.

* Sphæria amphicornis *Ellis.*

Page 78.

Fig. 14. Several perithecia attached to the matrix.
Fig. 15. A perithecium magnified.
Fig. 16. An ascus containing spores × 400.
Fig. 17. Spores × 400.

Sphæria mirabilis *Peck.*

Page 80.

Fig. 18. Part of a leaf bearing the fungus.
Fig. 19. A perithecium magnified.
Fig. 20. An ascus containing spores × 400.
Fig. 21. Spores × 400.

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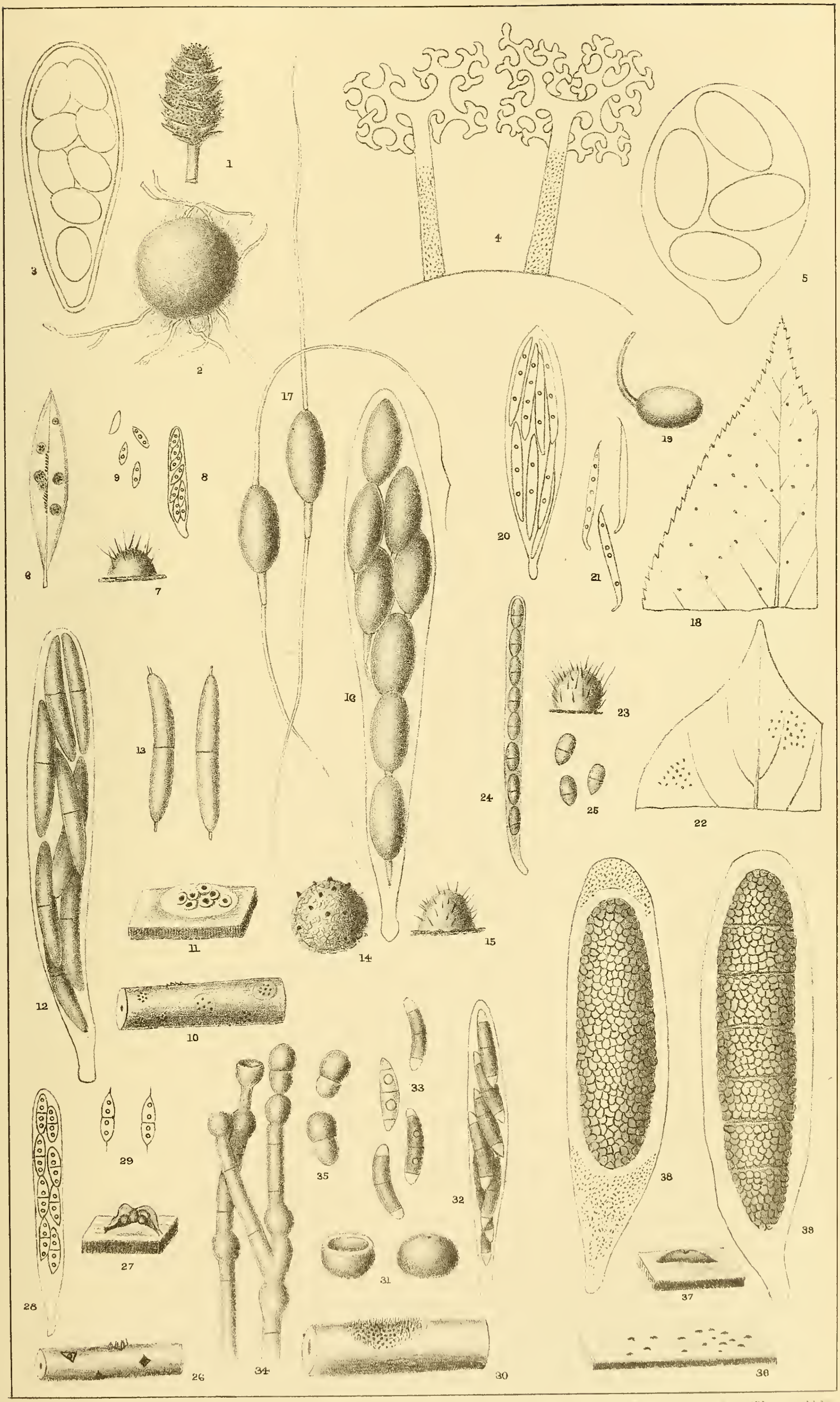
* This name antedates *Sphæria eximia* as noted in the Thirty-first State Museum Report, page 60.



Lith of Weed Parsons & Co Albany NY

PLATE II — (*Continued*).

VENTURIA CLINTONII *Peck.*

Page 82.

Fig. 22. Part of a leaf bearing the fungus.
Fig. 23. A perithecium magnified.
Fig. 24. An ascus containing spores × 400.
Fig. 25. Spores × 400.

VALSA OXYSPORA *Peck.*

Page 73.

Fig. 26. Piece of a branch bearing the fungus.
Fig. 27. A pustule with its matrix magnified.
Fig. 28. An ascus containing spores × 400.
Fig. 29, Spores × 400.

SPHÆRIA PHÆOSTROMOIDES *Peck.*

Page 77.

Fig. 30. Piece of a branch bearing the fungus.
Fig. 31. Two perithecia magnified, one of them collapsed.
Fig. 32. An ascus containing spores × 400.
Fig. 33. Spores × 400.
Fig. 34. Flocci of the subiculum × 400, one bearing a spore at the apex.
Fig. 35. Spores or conidia of the subiculum × 400.

SPHÆRIA MONOSPERMA *Peck.*

Page 79.

Fig. 36. Piece of wood bearing the fungus.
Fig. 37. A perithecium with its matrix magnified.
Fig. 38. An ascus containing an immature spore × 400.
Fig. 39. An ascus containing a mature spore × 400.

PLATE III.

Receptaculites subturbinatus *Hall.*

Page 103.

Fig. 1. Lateral view of a specimen enlarged to two diameters.

Fig. 2. A further enlargement of the surface, showing the form of the cells.

Fig. 3. An enlarged summit view of another specimen.

Astylospongia præmorsa *Goldfuss.*

Page 103.

Figs. 4, 5. Lateral and summit views of a specimen of medium size.

Fig. 6. View of the upper side of a more deeply lobed specimen.

Figs. 7, 8. Upper and lateral views of a very perfectly formed specimen, enlarged two diameters.

Figs. 9, 11. Vertical sections of two specimens showing structure, enlarged to two diameters. The dark spots in the center are filled with pyritous matter, and are not cavities.

Fig. 10. Horizontal section of another specimen, enlarged two diameters.

Fig. 14. A crushed and imperfect specimen, showing the radiating fibrous-like character of the substance (enlarged).

Astylospongia præmorsa *var.* nuxmoschata *n. var.*

Page 104.

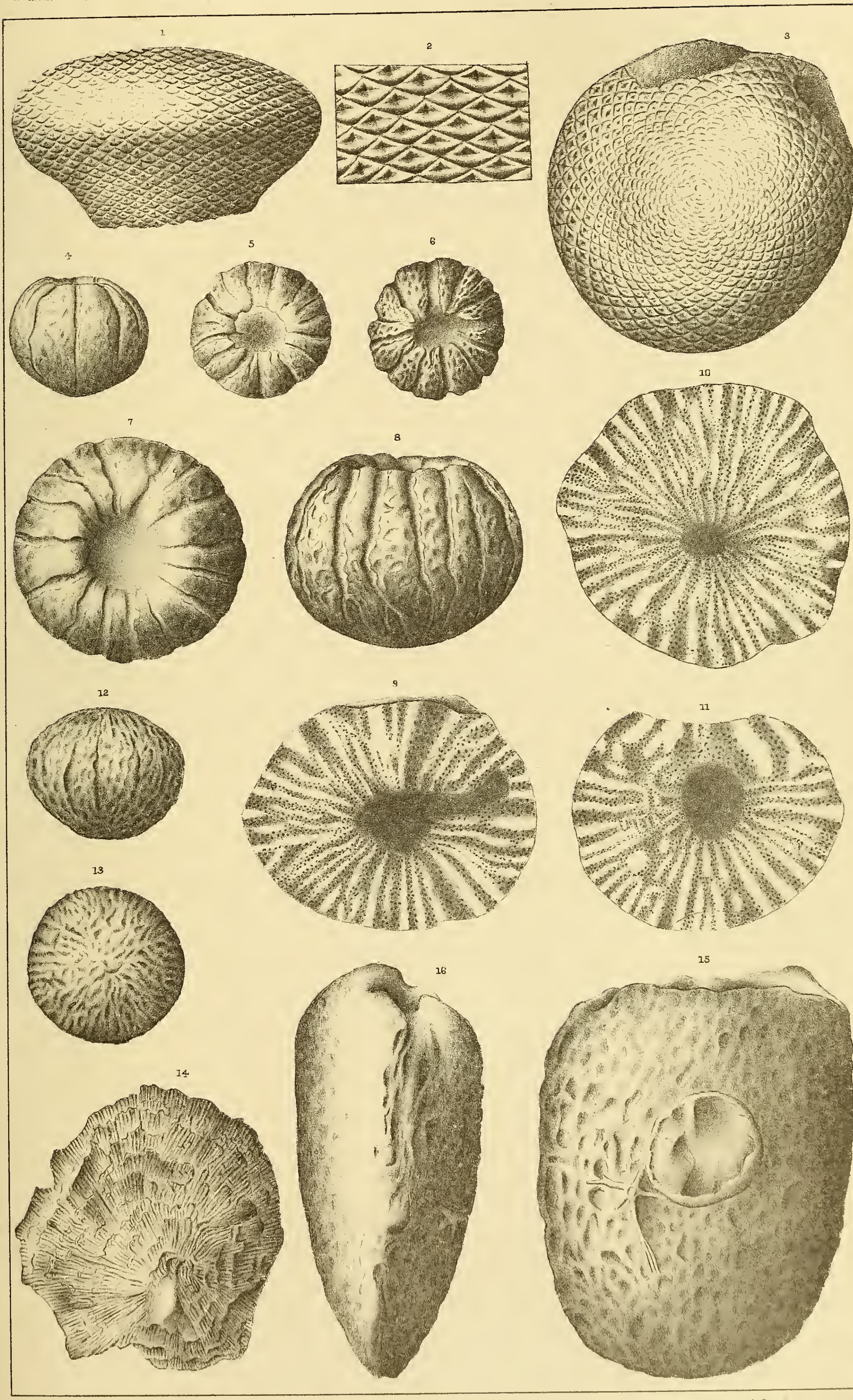
Figs. 12, 13. Lateral and summit views of a specimen, showing the difference in the form and lobation of the surface from typical *A. præmorsa.*

Astylospongia (Palæomanon) bursa *Hall.*

Page 105.

Figs. 15, 16. Lateral and profile views of a crushed specimen, showing the characters of the species.

(PETROSPONGIA.)



G. B. Simpson del.

Ph. A. lith.

PLATE IV.

FAVOSITES SPINGERUS *Hall.*

Page 108.

Figs. 1, 2. Upper and lateral views of a specimen of the usual character.

Fig. 3. Vertical section of a similar specimen, showing the divergence of the cells and the distant entire diaphragms.

Fig. 4. Vertical section of a specimen with larger cells.

Fig. 5. An enlarged oblique view of a portion of the surface, showing the irregular cells and the spiniform projection at the angles.

FAVOSITES FORBESI *var.* OCCIDENTALIS *n. var.*

Page 108.

Fig. 6. An irregularly hemispherical specimen, showing small cells with a few of somewhat larger size.

Figs. 7, 8. Turbinate forms with large irregular cells, the lower part covered by the epitheca.

Fig. 9. The upper side of a large irregular specimen.

Fig. 10. Lateral view of a large broadly turbinate specimen, having the lower part covered by the epitheca and showing in the upper part an irregular distribution of large and small angular cells.

Fig. 11. A vertical section of a specimen similar to fig. 8, showing the closely arranged diaphragms.

Fig. 12. An enlarged transverse section, showing the thick vertical walls.

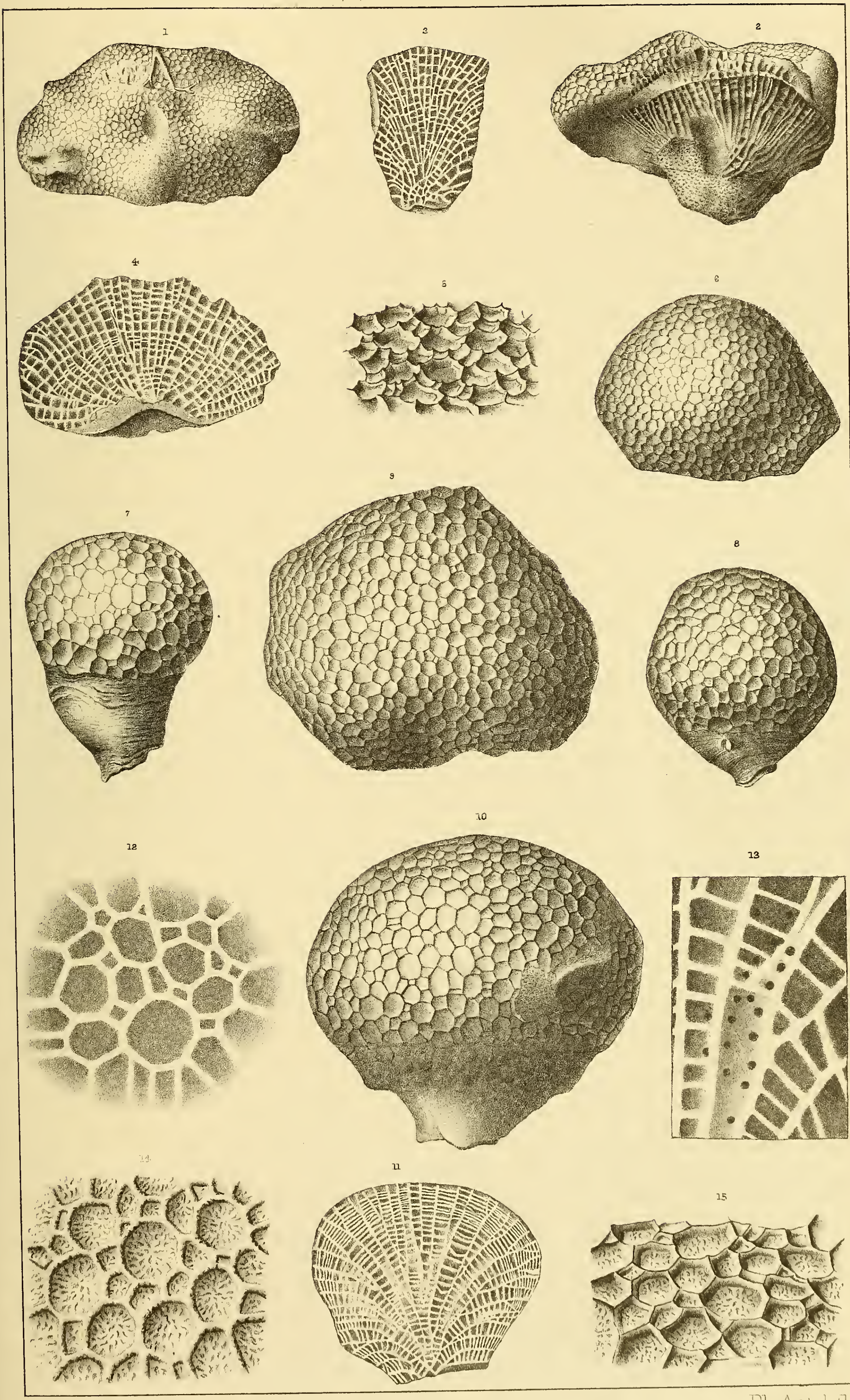
Fig. 13. Enlarged vertical section showing the thick walls and large mural pores.

Fig. 14. The natural surface of a well-preserved specimen, showing the granulations upon the diaphragms.

Fig. 15. An oblique view of the same. In the figure the vertical walls are not sufficiently elevated above the diaphragms.

NIAGARA GROUP.

(CORALS.)



G. B. Simpson, del. Ph Ast lith

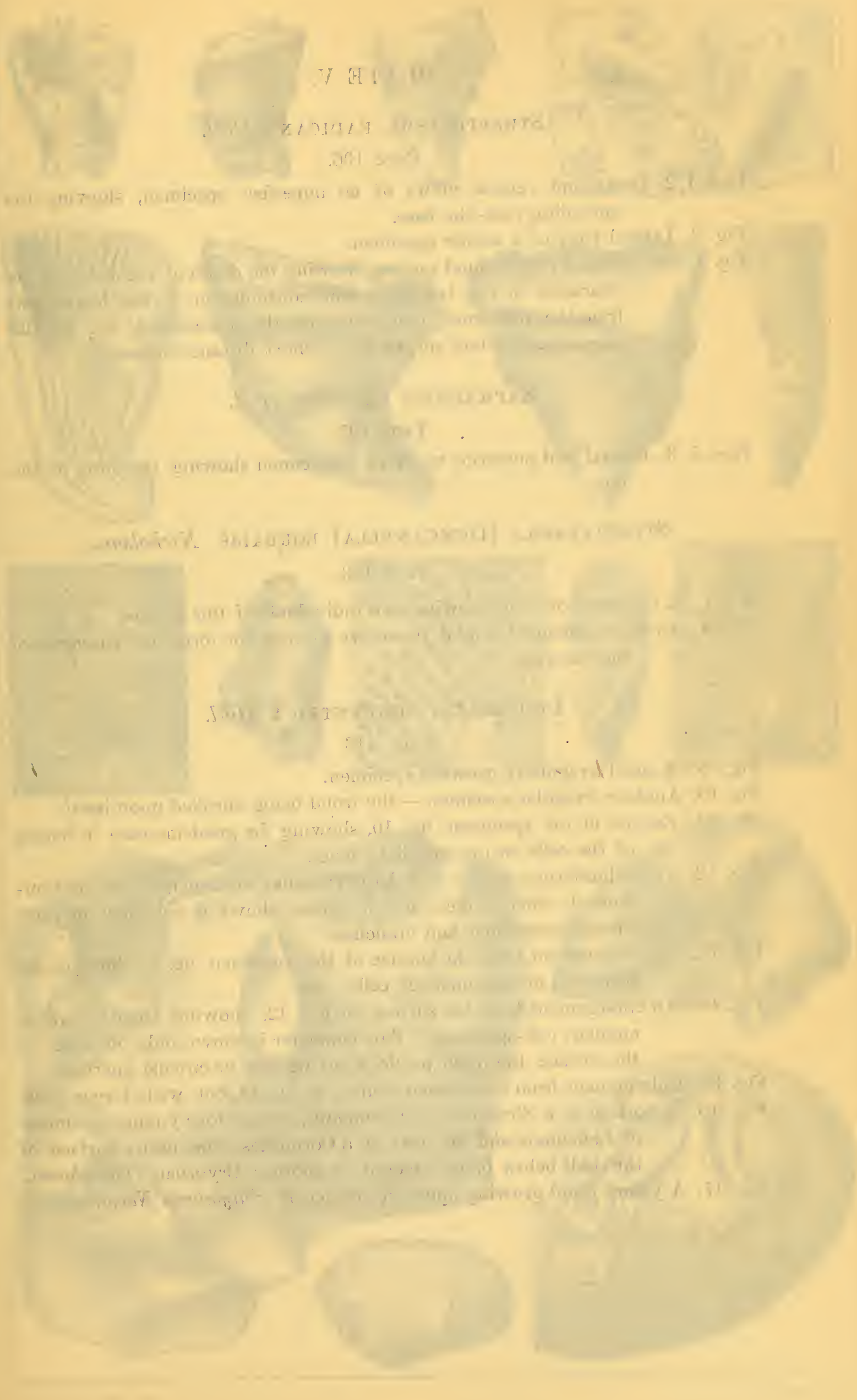


PLATE V.

Streptelasma radicans *Hall.*

Page 106.

Figs. 1, 2. Dorsal and ventral views of an imperfect specimen, showing the spreading root-like base.

Fig. 3. Lateral view of a similar specimen.

Fig. 4. An enlarged longitudinal section, showing the depth of the cup and the character of the lamellæ. The continuation of the lower part from the horizontal line is incorrectly represented, the lamellæ becoming obsolete and solid at a short distance below.

Zaphrentis celator *Hall.*

Page 107.

Figs. 5, 6. Lateral and posterior views of a specimen showing the form of the cup.

Streptelasma (Duncanella) borealis *Nicholson.*

Page 106.

Fig. 7. A fragment of rock showing two individuals of this species.

Fig. 8. An enlargement of one of the above to show the form and character of the exterior.

Lichenalia concentrica *Hall.*

Page 116.

Fig. 9. A small irregularly growing specimen.

Fig. 10. Another irregular specimen — the frond being enrolled upon itself.

Fig. 11. Section of the specimen fig. 10, showing the great increase in length of the cells on the enrolled portion.

Fig. 12. The celluliferous surface of a large irregular specimen which has encrusted other bodies, and in places shows a tendency to form tubular extensions and branches.

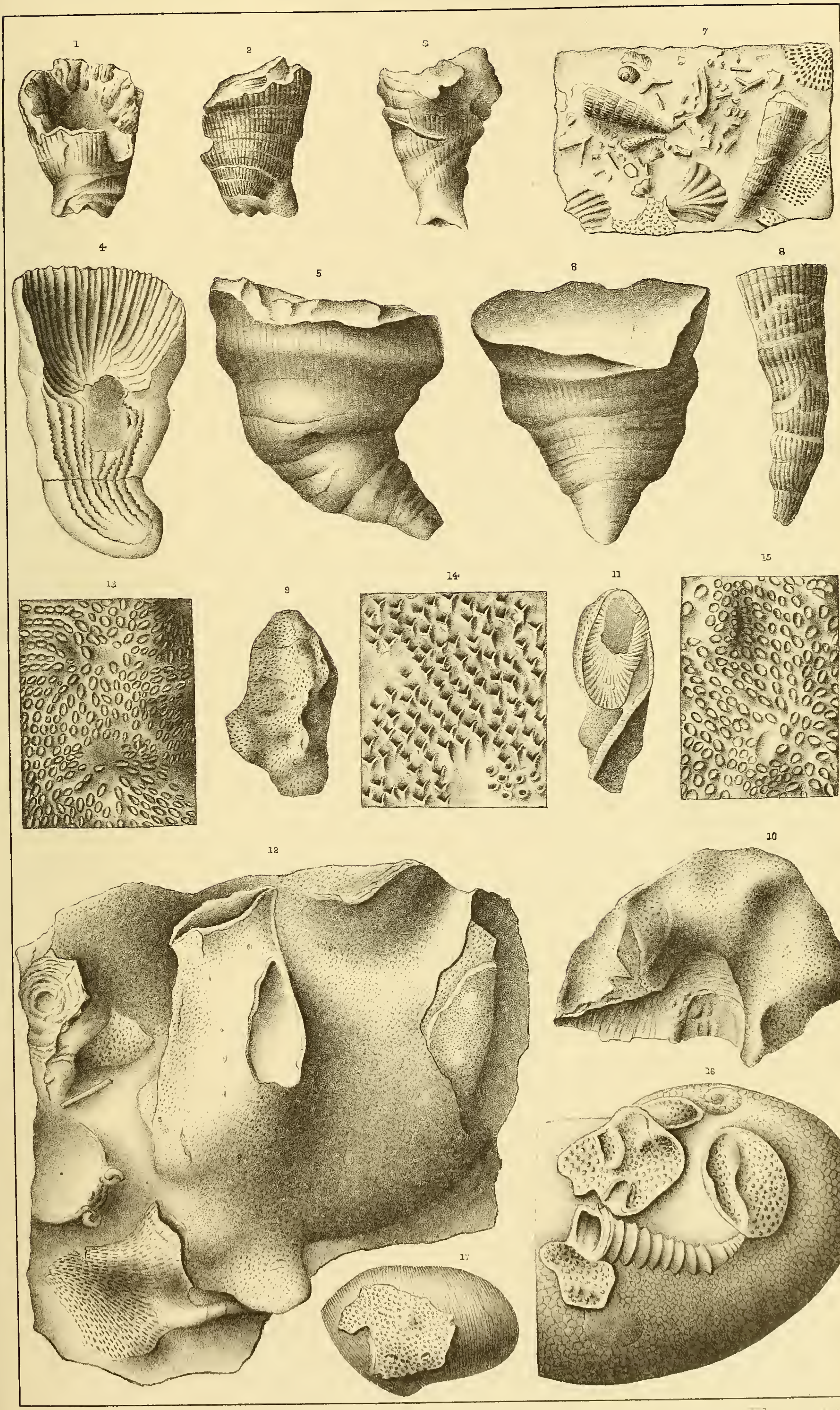
Fig. 13. An enlargement from the surface of the specimen fig. 9, showing the form and arrangement of cells.

Fig. 14. An enlargement from the surface of fig. 12, showing angular (subtriangular) cell-apertures. This character is shown only on a part of the surface, the other portions having oval or circular apertures.

Fig. 15. Enlargement from a specimen similar to fig. 13, but with larger cells.

Fig. 16. A portion of a *Strophostylus cyclostomus*, bearing four young specimens of Lichenalia and the base of a Cornulites; the entire surface of the shell below being covered by another Bryozoan (*Paleschara*).

Fig. 17. A young frond growing upon the surface of *Platyostoma Niagarense.*



G. B. Simpson del. Ph. Ast lith.

PLATE VI.

[illegible] *Hall.*

Page [illegible]

Figs. 1, 2. The upper and lower [illegible] specimen: the lower showing [illegible] character.

Fig. 3. The [illegible] showing the [illegible]

Fig. 5. A fragment [illegible] of [illegible] specimen of [illegible] attached to [illegible]

Fig. 6. [illegible] surface of [illegible]

Fig. 7. [illegible] showing the [illegible]

Fig. 8. The lower [illegible] has been [illegible] the [illegible] upward [illegible]

[illegible] (Page [illegible])

Fig. 1. [illegible] specimen [illegible] The [illegible] on the [illegible]

Fig. 2. A small [illegible] upon the [illegible] surface [illegible]

Fig. 3. An [illegible] of [illegible] where [illegible] the regular [illegible] species.

PLATE VI.

Lichenalia concentrica *Hall.*

Page 116.

Figs. 1, 2. The upper and lower surfaces of a young specimen, the latter showing a small cicatrice of attachment.

Fig. 4. The under surface of a specimen, showing the epitheca in its irregular growth, and its strong concentric markings.

Fig. 7. A fragment of Fenestella, having two young specimens of Lichenalia attached to the surface.

Fig. 8. The lower surface of a small fragment with scarcely any remaining epitheca, and so translucent that the structure is visible through the substance, showing the elongated cell-bases.

Fig. 9. The lower surface of a specimen corresponding to fig. 3, showing the concentric markings of the epitheca.

Fig. 10. The lower surface of a small specimen where the epitheca has been worn away or only partially developed, showing along the base, the radiating grooves formed by the cells before curving upward toward the surface.

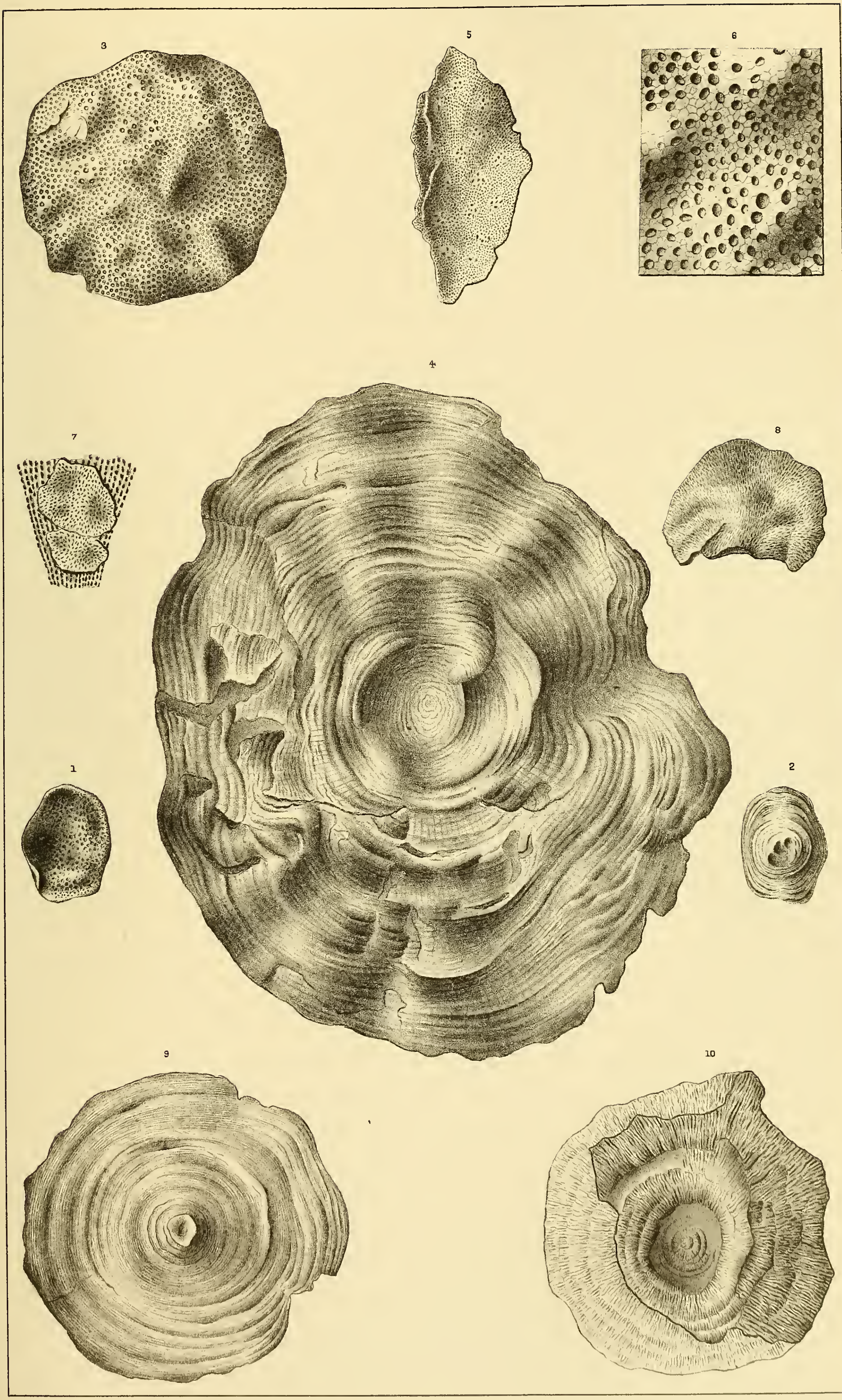
Lichenalia concentrica *var.* maculata *n. var.*

Page 117.

Fig. 3. The upper or celluliferous surface of a regularly growing specimen of medium size, showing tubercles with maculæ of larger cells. The cells are represented much larger than they really are on the specimen. (See fig. 5.)

Fig. 5. A small irregular specimen, with unusually distinct maculæ upon the celluliferous surface.

Fig. 6. An enlargement from a part of the surface of specimen fig. 3, where it has been worn or macerated, showing the angular intercellular spaces.



G. B. Simpson, del Ph. Ast lith

PLATE VII.

LICHENALIA CONCENTRICA *var.* PARVULA *Hall.*

Page 117.

Fig. 1. A fragment of this form of Lichenalia which has grown upon the upper surface of a Strophostylus.

Fig. 2. An enlargement of a portion of the above, showing the cells to be much smaller and more distinctly circular than in the ordinary form of *L. concentrica.*

LICHENALIA CONCENTRICA *Hall.*

Page 116.

Fig. 3. An enlargement of a young Lichenalia, showing it as it has grown attached to the surface of an Atrypa.

Figs. 4, 5, 7, 8. Enlargements from the surfaces of Lichenaliæ as presented in different individuals. Figures 4 and 5 are respectively three and four diameters of the young specimens attached to Fenestella. (See pl. 12, fig. 3.)

Fig. 6. An enlargement to about four diameters of a group of two young Lichenaliæ and a young Favosites, attached to the shell of Strophostylus.

Figs. 9, 10. Enlargements from the lower surfaces of different individuals, showing the variable conditions of the epitheca. In fig. 9 the cell-partitions are shown through the texture ; and fig. 10 presents a fibrous condition, from the removal of the epithecal covering leaving the projecting cell-walls.

Fig. 11. An enlarged transverse section of a specimen similar to fig. 4 of plate 6, showing the depth of the cells and the thickness of the epitheca in old individuals.

The variations in expression, in the many forms of this species, the size, proportion and arrangement of the cellules upon the surface, and the aspects produced by weathering or maceration are so great as often to induce a reference to distinct species. It does not, however, seem possible to convey in a satisfactory manner, the characters as they appear to the eye and under a lens.

SAGENELLA ELEGANS *Hall.*

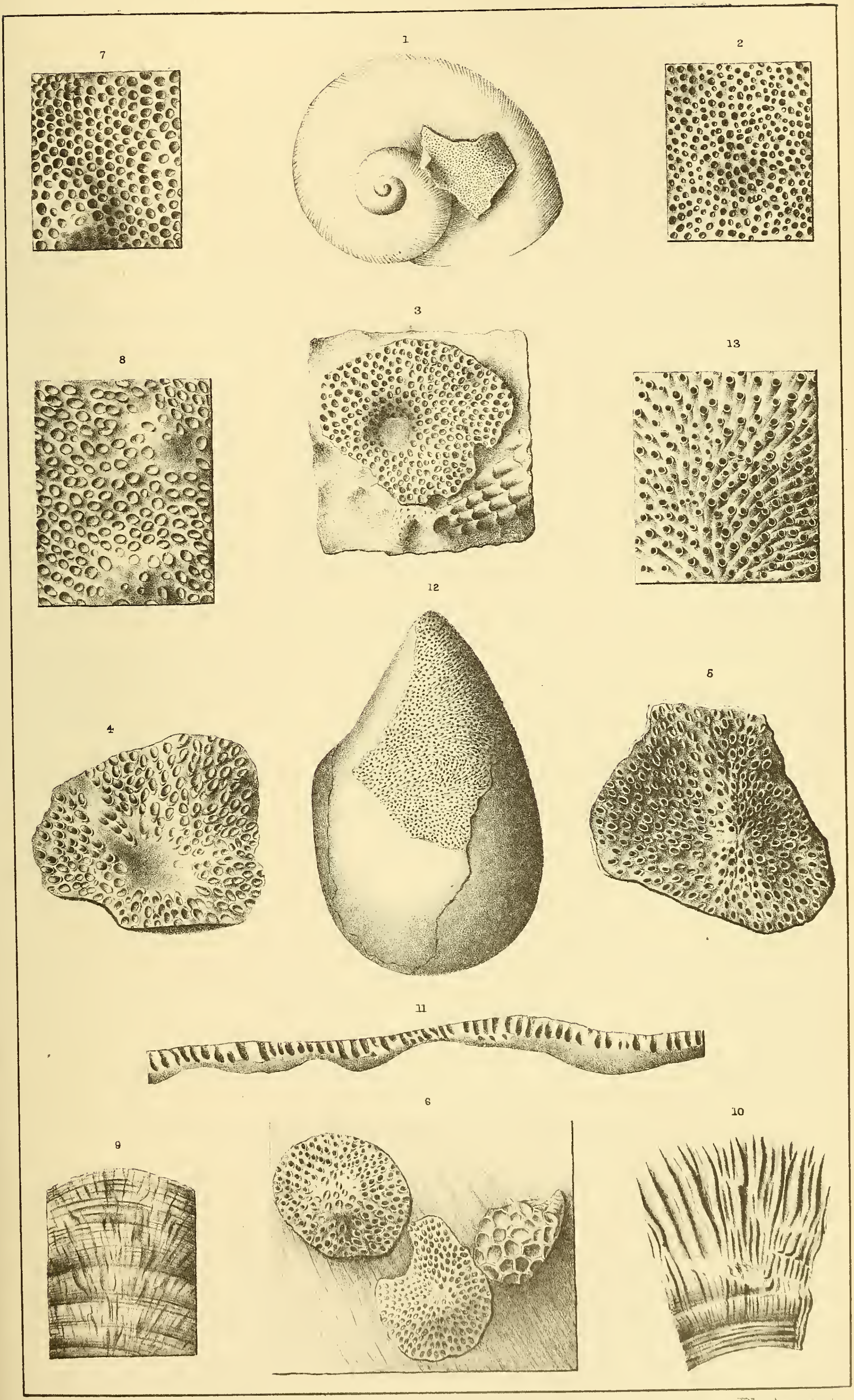
Page 118.

Fig. 12. The right valve of *Ambonychia acutirostra*, showing the encrusting membraneous bryozoan upon its surface.

Fig. 13. An enlargement of a portion of the same specimen to show the tubular cells and their apertures.

NIAGARA GROUP.

(BRYOZOA.)



G. B. Simpson del.

Ph. Ast lith

PLATE VIII.

Ceramopora labecula *Hall.*

Page 119.

Fig. 1. A small colony of the bryozoan, attached to the surface of a Fenestella. showing distinct rounded tubular cells : enlarged to six diameters. In the figure, the cells are a little too distinctly individualized.

Fig. 2. A fragment of Fenestella upon which are two separate colonies of the species, enlarged to the same degree as in the preceding figure.

Fig. 3. Another and larger separate colony enlarged to the same degree. This and the colony in fig. 2 show the ordinary forms of cell pertaining to the species.

Ceramopora confluens *Hall.*

Page 119.

Fig. 4. The bryozoan entirely encrusting a specimen of *Platyostoma Niagarense.*

Fig. 5. An enlargement to show the character of the cells and the centers of radiation forming tubercles. The cells radiate a little more distinctly from these centers than is apparent in the figure.

Ceramopora agellus *Hall.*

Page 120.

Fig. 6. A colony attached to the surface of *Strophostylus cyclostomus.* The cells are largest at the initial point near the lower end, and gradually decrease toward the margin, where they are exceedingly minute. Enlarged to four diameters.

Paleschara offula *Hall.*

Page 120.

Fig. 7. A fragment (natural size), encrusting some foreign substance.

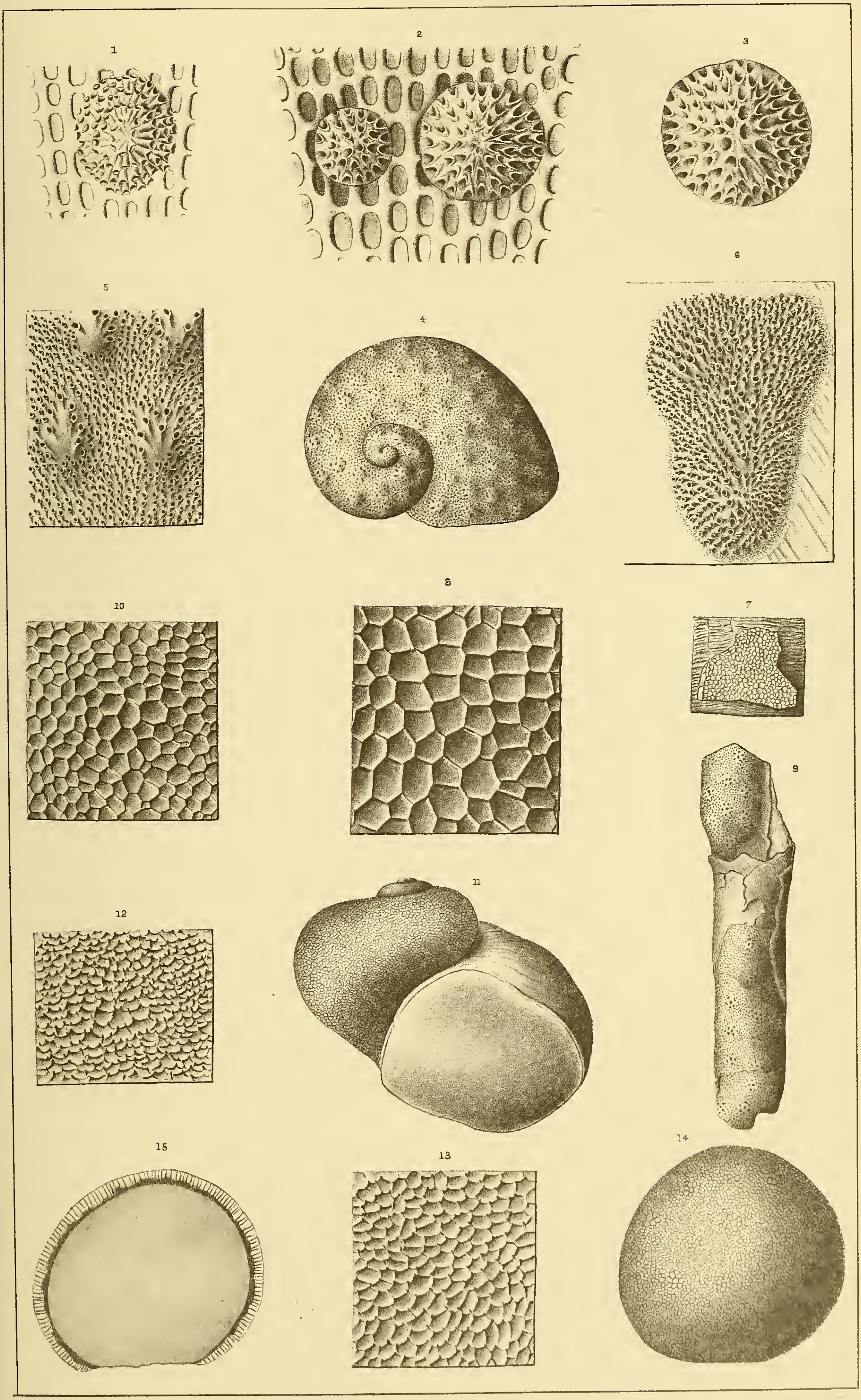
Fig. 8. An enlargement of a portion of the surface to six diameters, showing the character of the cells.

Paleschara maculata *Hall.*

Page 121.

Fig. 9. A specimen (natural size), encrusting some foreign cylindrical body.

Fig. 10. An enlargement of the surface to the same degree as fig. 8, and presenting also, near the center of the figure, one of the maculæ of larger cells.



G. B. Simpson, del.

PLATE VIII—(*Continued*).

Fig. 11. A specimen of Platyostoma having the surface covered by the substance of the bryozoan.

Fig. 12. An oblique lateral view of a portion of the surface, showing the asperities at the angles of the cells. Enlarged to six diameters.

Fig. 13. An enlarged view of the same, looking directly upon the cell-apertures.

PALESCHARA ? (CHÆTETES ?) SPHÆRION *Hall.*

Page 121.

Fig. 14. View of one side of the colony, enlarged to two diameters, showing the arrangement of the cells.

Fig. 15. A section through the center of the specimen, enlarged to the same degree as fig. 14. The dark line at the base of the cells represents the solid substance of the cell floor, the inner space being filled with inorganic calcareous clay.

PLATE IX.

Favosites spinigerus *Hall.*

Page 108.

Fig. 1. The upper surface of a specimen, the cells of which are smaller than those of the specimen represented on plate 4, and without the processes at the angles of the cells.

Fig. 2. An enlargement to four diameters of a portion of the surface.

Callopora exsul *Hall.*

Page 115.

Fig. 3. The upper side of a specimen (natural size).

Fig. 4. An enlargement of the cell-apertures. The original of this figure is a specimen of Callopora incrusting and partially covering a Ceramopora, and the form of the cell-apertures represents the latter genus while the denticulate margins are of Callopora.

Aulopora precius *Hall.*

Page 107.

Fig. 5. A colony attached to the surface of *Meristina nitida.*

Fig. 6. Enlargement from the preceding specimen, showing the form and character of the cells.

Chætetes consimilis *Hall.*

Page 110.

Figs. 7, 8. A specimen, natural size, and an enlargement to five diameters, from the lower bifurcation, where the tubes have grown so as to leave the cell-walls exposed.

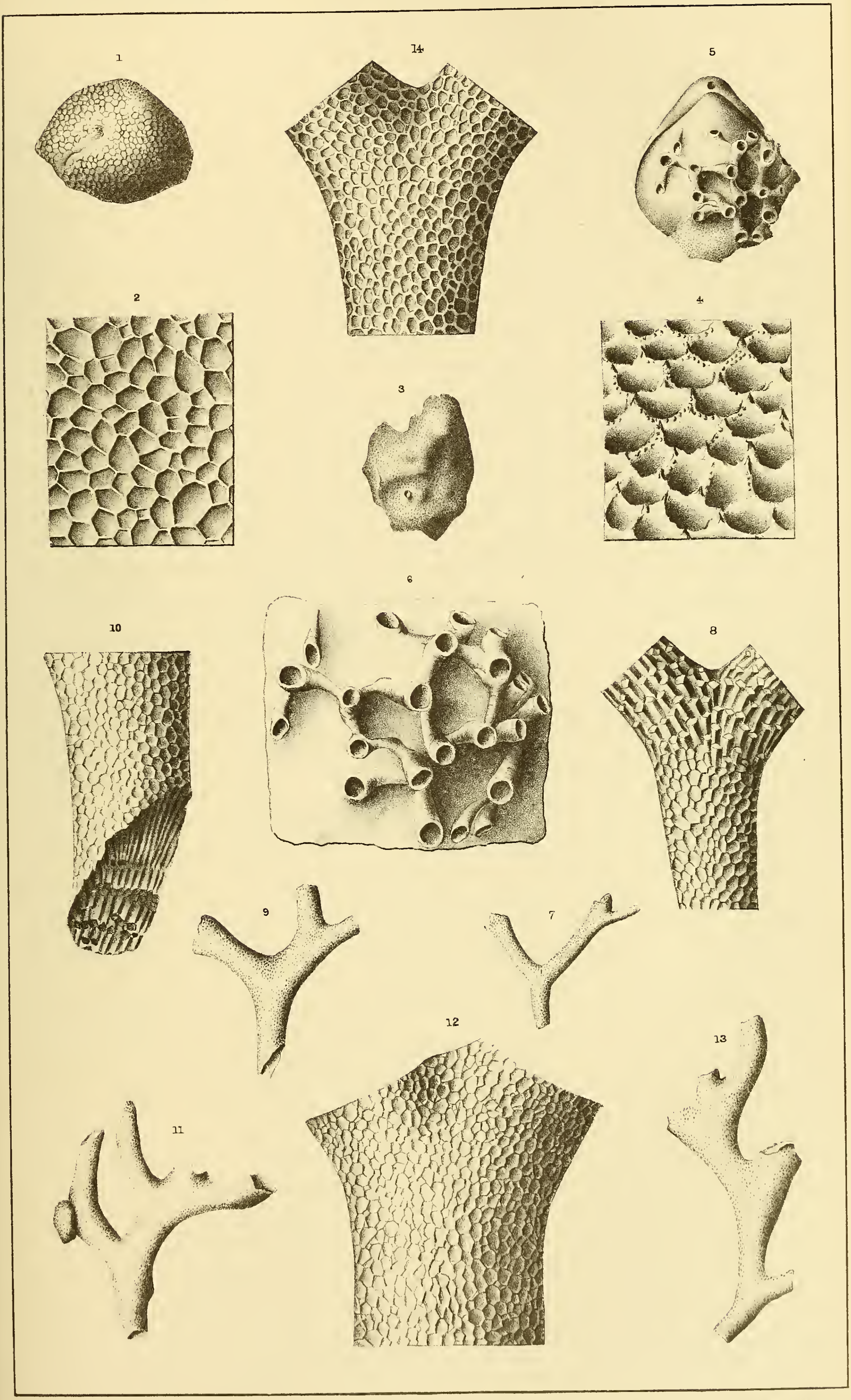
Figs. 9, 10. A specimen, natural size, and an enlargement from the lower end, showing the solid stem with columnar structure, and angular cell-apertures.

Figs. 11, 12. Another individual, and an enlargement from the lower bifurcation, showing the young cells in the angles of the larger ones.

Figs. 13, 14. Another individual and an enlargement of the same, where the cell-walls are flattened on the surface, as from wearing. All the enlargements are to five diameters.

NIAGARA GROUP.

(BRYOZOA & CORALS.)



J. B. Simpson, del.

PLATE X.

Callopora singularis *Hall.*

Page 115.

Figs. 1, 2. A specimen, natural size, and an enlargement, showing the arrangement of the cells. The interstices of the intercellular spaces as represented are too small and indistinct.

Trematopora infrequens *Hall.*

Page 111.

Fig. 3. A fragment of shale, with a group of stems of which one specimen is of this species. Natural size.

Fig. 4. Enlargement of a bifurcation from the individual on the right hand side of the specimen fig. 3.

Trematopora osculum *Hall.*

Page 110.

Figs. 5, 6. A specimen, natural size, and enlarged, showing cells of smaller size than the preceding species.

Figs. 7, 8. A specimen, natural size, and enlarged, showing the cell-apertures more crowded and more exsert than in the last.

Figs. 11, 12. A specimen which appears to have been tubular, with scattered pores. The enlargement, fig. 12, does not fully represent the object.

Fig. 13. A specimen, natural size.

Fig. 14. The same enlarged.

Trematopora subimbricata *Hall.*

Trans. Alb. Inst., vol. X.

Figs. 9, 10. A specimen showing arrangement of the cells opening obliquely upward, and the upper margin not elevated.

Trematopora varia *Hall.*

Page 111.

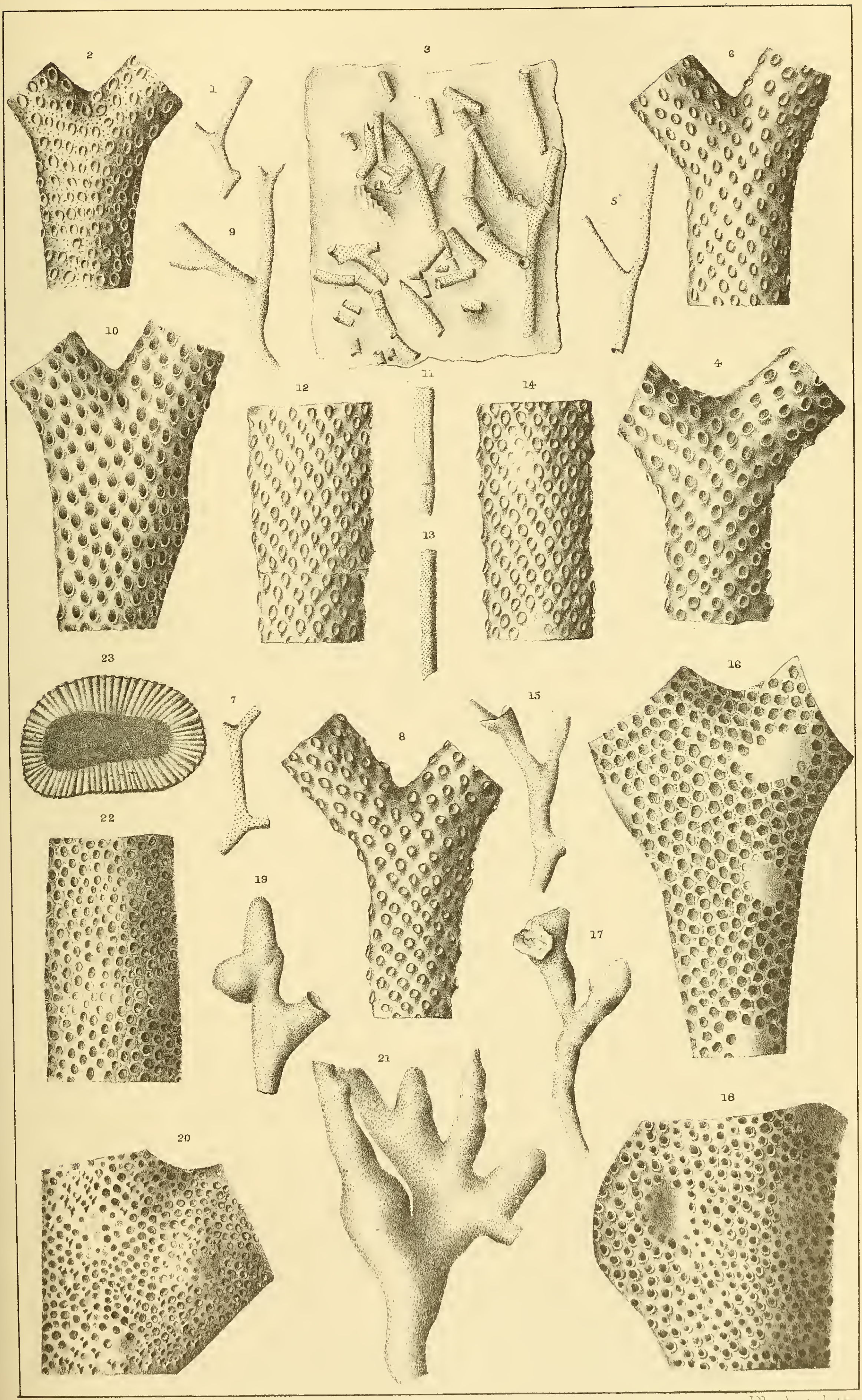
Figs. 15. 16. A specimen, natural size and enlarged. The cell-apertures appear to have been worn or dissolved away, giving the appearance of double cell-walls. Enlargement eight diameters.

Figs. 17, 18. Another individual showing the apertures reduced in size by the contracted margins. Enlargement about six diameters.

Figs. 19, 20. A specimen in which the cells are irregular in size, some of them with elevated margins and others without.

Figs. 21, 22. A thickened branching form, with the branches flattened above, and showing other variations in the form and size of cells. This and the preceding enlargement are four diameters each.

Fig. 23. Tranverse section of the lower part of the specimen fig. 21, showing a hollow tube, and the mode of growth of the cells.



Ph. Ast, lith.

PLATE XL.

[illegible]

[illegible]

Fig. 1, 2, 3 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Fig. 15, 16 [illegible]

PLATE XI.

Trematopora echinata *Hall.*

Page 112.

Figs. 1, 2. A small branch, natural size, and an enlargement of the bifurcation, showing the character of the cells.

Fig. 3. An enlargement from another individual where the cells are not so elongate as in the preceding one. This one and fig. 2 are enlarged eight diameters.

Fig. 4. An enlargement to twelve diameters from a specimen preserving, in great perfection, the spines at the cell-angles.

Fig. 5. A still further enlargement of the walls of a cell.

Trematopora granulifera *Hall.*

Page 112.

Fig. 6. An enlargement of a bifurcating branch, to two diameters.

Fig. 7. A still further enlargement from the above specimen, to show the arrangement of cells and the granulations on the intercellular spaces.

Trematopora minuta *Hall.*

Page 113.

Fig. 8. An enlargement to about twelve diameters, of a small branch of this species, showing the arrangement of cells.

Trematopora variolata *Hall.*

Page 113.

Fig. 9. A branch of the species, natural size.

Fig. 10. An enlargement from a part of the same, showing the scattered pores.

Trematopora spiculata *n. sp.*

Page. 114.

Fig. 11. A specimen of the natural size, showing the mode of growth.

Fig 12. An enlargement from the central portion of the specimen, showing the character of the surface and the minute spinules at the angles of the cells.

Stictopora similis *Hall.*

Page 122.

Figs. 13, 14. A small bifurcating fragment with oval cellules, natural size and enlarged.

Figs. 15, 16. Similar views of another individual of greater width, showing more crowded cellules.

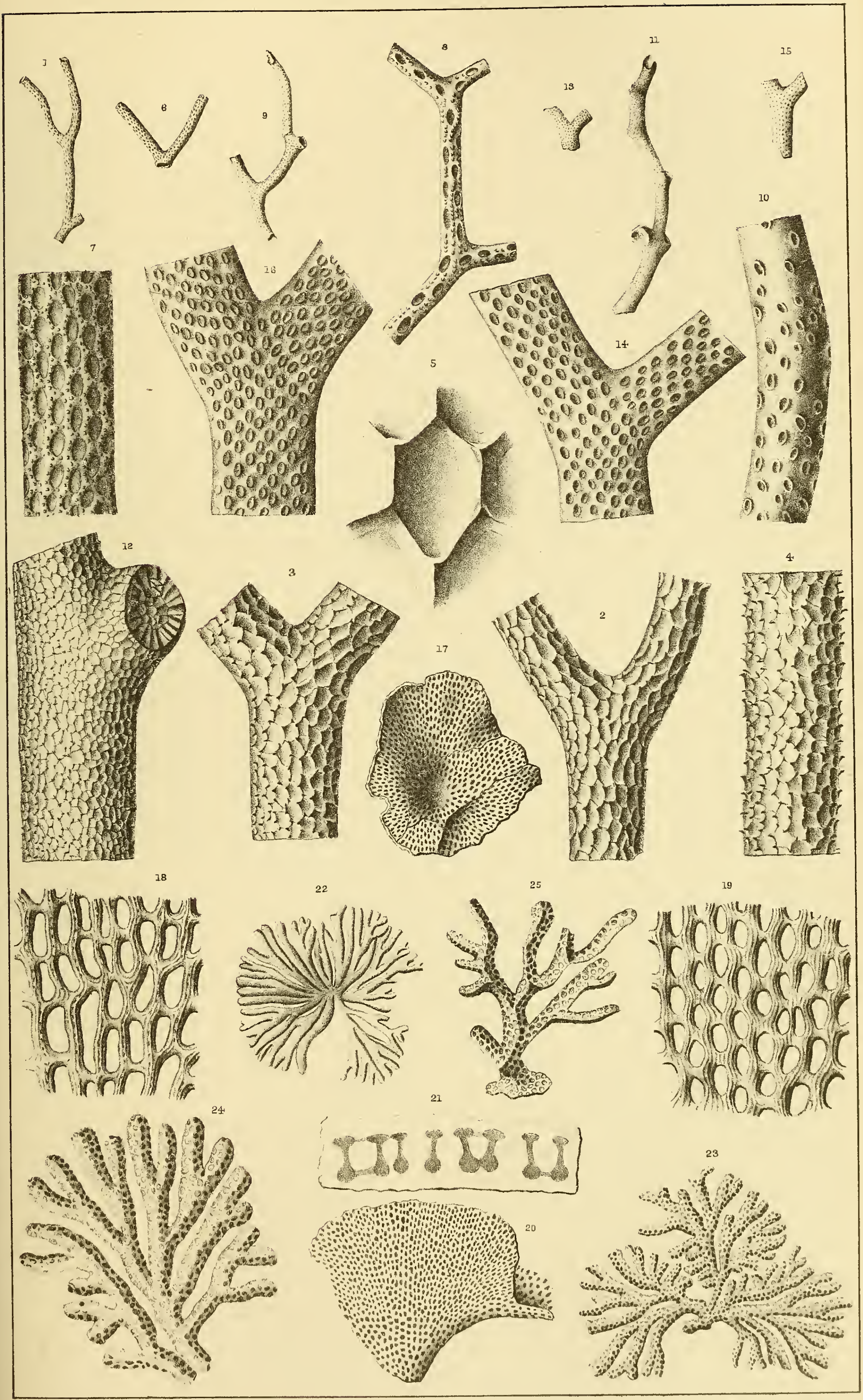

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PLATE XI — (*Continued*).

Fenestella ambigua *n. sp.*

Page 123.

Fig. 17. The inner surface of a frond, natural size.

Figs. 18, 19. Enlarged views of the opposite faces of the above specimen, showing a slight difference in the character of the striation of the two sides of the frond.

Fig. 20. The exterior surface of a flattened frond, showing a portion of the interior surface at the right hand side.

Fig. 21. An enlargement from the edge of the specimen fig. 20, showing a section. The rays of the inner and outer layers of the frond are connected by the vertical extensions, and the rays of the same layer connected by the transverse or horizontal dissepiments.

Thamniscus Niagarensis *Hall.*

Page 126.

Fig. 22. The non-poriferous face of a frond, natural size, showing the mode of growth and absence of transverse dissepiments.

Fig. 23. An enlargement of the poriferous face of a frond, to two diameters.

Fig. 24. A still farther enlargement of the right hand third of the frond fig. 23, to show the angular crest of the branches and the disposition of the pores upon its surface.

Fig. 25. An enlargement, to three diameters, of another fragment, showing the base of attachment, the angular crest of the branches and the extensions of the pores over the root-like base.

PLATE XII.

Fenestella parvulipora *Hall.*

Page 123.

Fig. 1. The non-poriferous surface of a fragment of a frond, natural size.

Fig. 2. An enlargement of a portion of the same to show the character of the surface and mode of reticulation.

Fig. 3. A similar fragment, having young specimens of Lichenalia and Ceramopora growing upon its surface (see plate 7, figs. 4 and 5, and plate 8, figs. 1 and 2).

Fig. 4. An enlargement from a portion of the opposite or celluliferous face of the frond fig. 3.

Fig. 5. A still farther enlargement of this surface, to show more distinctly the arrangement of pores and the line of nodes on the median crest.

Fig. 6. An enlargement of the non-celluliferous face of the same frond, fig. 3, showing the absence of striation upon the surface.

Fig. 7. A portion of a very large frond, natural size, showing the general aspect of the species.

Fig. 8. An enlargement of the surface of the specimen fig. 7, showing the existence of very fine striæ.

Fig. 9. The interior of a frond, retaining the cup-shaped form. The surface here presented is non-celluliferous.

Fenestella acmea *Hall.*

Page 124.

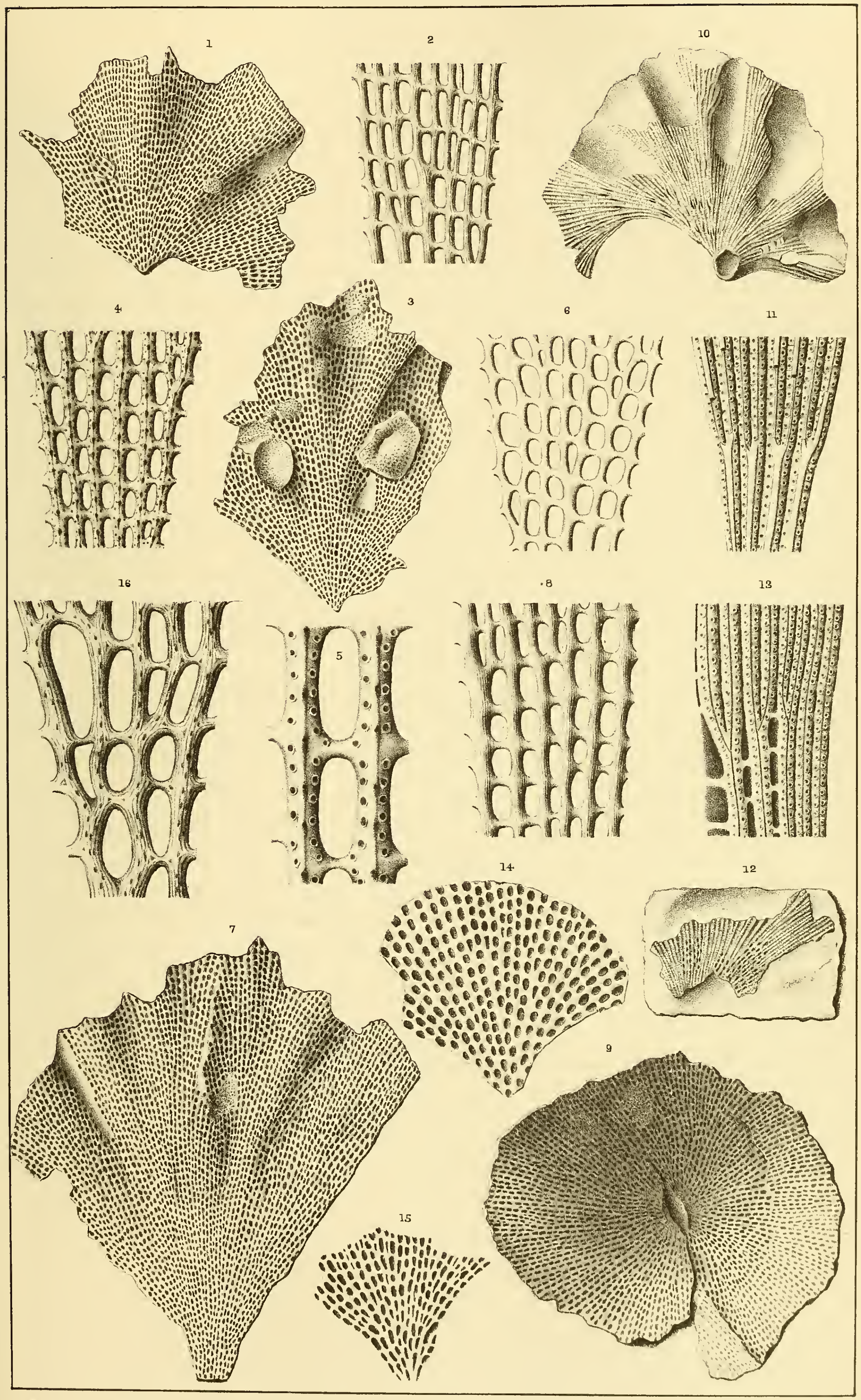
Fig. 10. The outer surface of a funnel-shaped frond, presenting the celluliferous side.

Fig. 11. An enlargement of a part to show the arrangement of the branches, the form of the cells and the median ridge, with its flattened spreading crest, which is seen on some of the rays in the upper part of the figure, and on all below the bifurcation, while it is broken away in places, revealing the narrow slit thus left, which passes into the cavity of the ray below.

Fig. 12. Another fragment of the same species.

Fig. 13. An enlargement from a part of the preceding specimen, presenting wider fenestrules, and having the median crest entirely removed, showing only the narrow slit passing into the cavity of the branch. The connecting fenestrules are obscured over a part of this figure, as in fig. 11.

Fig. 14. An enlargement, to two diameters, of a part of a frond.



G. B. Simpson, del.
Ph. Ast, lith.

PLATE XII — (*Continued*).

FENESTELLA PUNCTOSTRIATA *Hall*

Page 125.

Fig. 15. A fragment of a frond of this species.

Fig. 16. An enlargement of a portion of the same, showing the peculiar striation and pitting of the non-celluliferous surface.

PLATE XIII.

Macrostylocrinus striatus *Hall.*

Page 129.

Fig. 1. Lateral view of a small individual which shows the striations of the surface very perfectly.

Figs. 2, 3. The posterior and basal views of a larger specimen. The striations of the surface are not represented in the figure.

Fig. 4. An enlargement of the basal plate and one ray, showing the character of the surface striæ.

Macrostylocrinus fasciatus *Hall.*

Page 130.

Figs. 5, 6. Lateral and basal views of a specimen, enlarged two diameters.

Glyptaster occidentalis *Hall.*

Page 133.

Figs. 7, 8. Basal and lateral views of a small, very perfectly preserved individual, enlarged to two diameters.

Fig. 9. Two of the rays with the interradial area still farther enlarged to show the character of the surface-markings.

Fig. 10. The anterior side of a larger specimen, from which the basal plates have been removed, and the ridges not developed on the subradials.

Fig. 11. The posterior side of the same specimen as fig. 10.

Saccocrinus Christyi *Hall.*

Page 127.

Fig. 12. An enlargement to two diameters of the anal side of a small specimen, showing a small number of anal plates.

Fig. 13. Antero-lateral view of a larger specimen, on which the surface-striæ are very perfectly preserved.

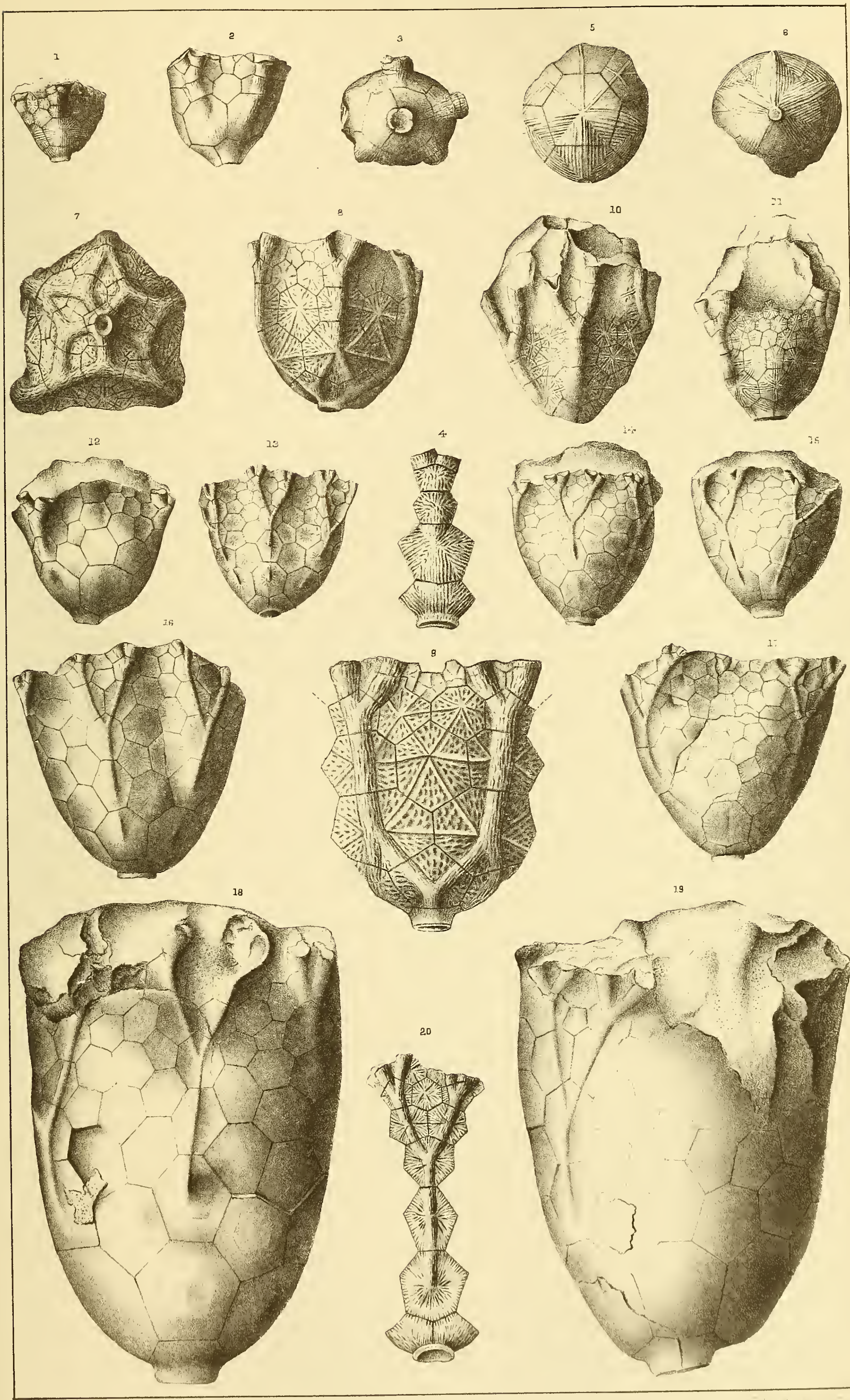
Figs. 14, 15. The right and left sides of another individual.

Fig. 16. Anterior side of a larger specimen.

Fig. 17. The posterior side showing a larger number of plates than in fig. 12.

Figs. 18, 19. The anterior and anal sides of a large specimen, which is slightly imperfect and somewhat obscured by attached bryozoans.

Fig. 20. An enlarged ray from specimen fig. 13, to show the character of surface-striæ.



G. B. Simpson, del.

PLATE XIV.

Glyptaster inornatus *Hall.*

Page 134.

Fig. 1. The anal area of a specimen which preserves the entire calyx.
Fig. 2. The anterior side of the same.
Fig. 3. A basal view of the same specimen.
Fig. 4. A basal view of the specimen fig. 6.
Fig. 5. A lateral view of the lower part of a calyx, on which the surface ornamentation is only partially developed.
Fig. 6. Lateral view of the specimen fig. 4, showing a grade of development of the surface ornamentation intermediate between specimens figs. 1 and 5.

Glyptocrinus Carleyi *Hall.*

Page 132.

Figs. 7, 8. Right and left lateral views of a nearly entire body, showing the general features of the species to the second bifurcation of the arms.
Fig. 9. A basal view of the preceding specimen.
Fig. 10. An enlargement of the central portion of fig. 8, to show more distinctly the surface characters.

Melocrinus obconicus *Hall.*

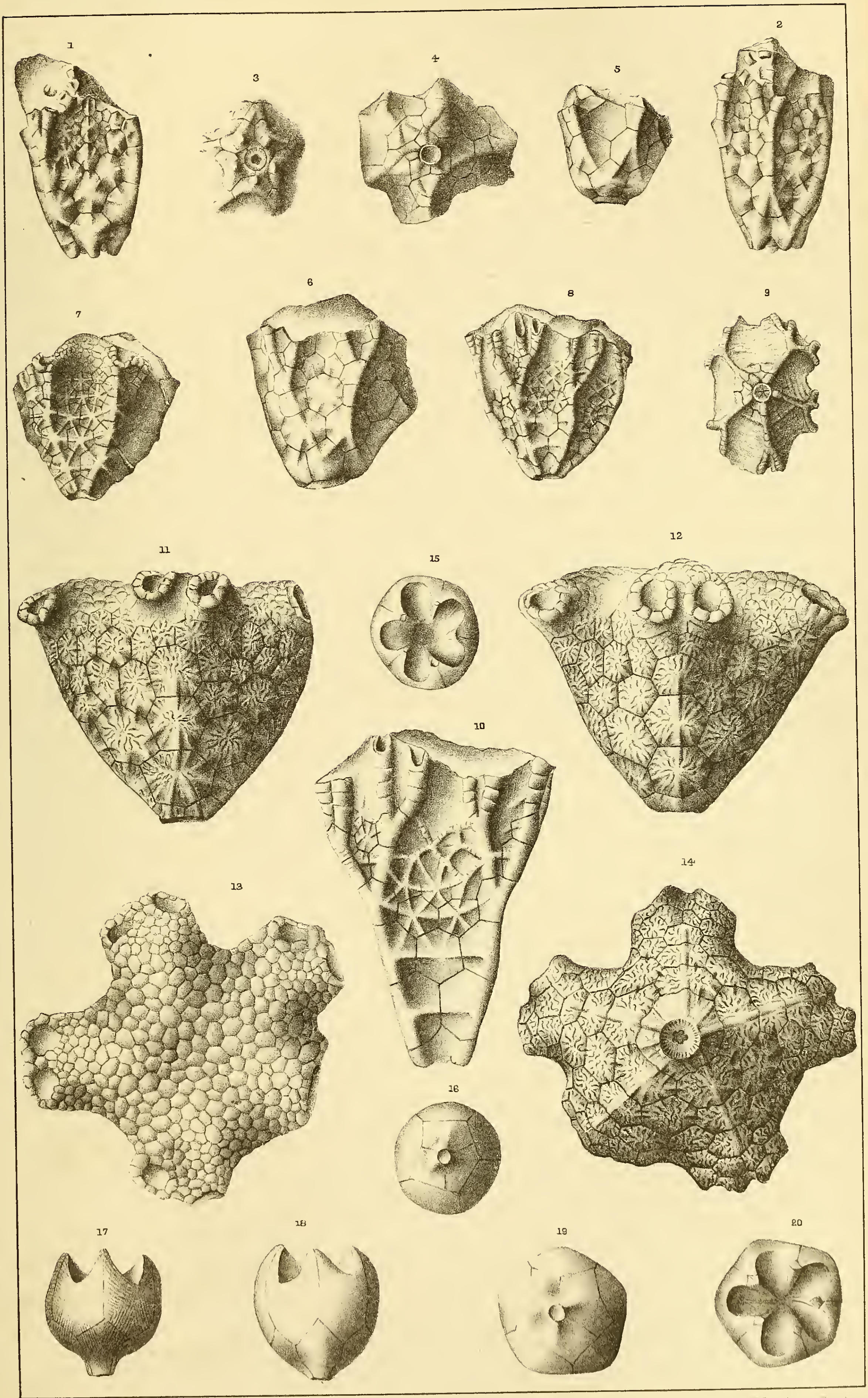
Page 138.

Figs. 11, 12. Lateral and anterior views of a specimen, enlarged to two diameters, showing the form of plates and character of surface.
Fig. 13. The summit correspondingly enlarged, showing the plates of the dome.
Fig. 14. Basal view enlarged, as the preceding figures.

Stephanocrinus gemmiformis *Hall.*

Page 146.

Figs. 15–17. Summit, basal and lateral views, enlarged to three diameters, showing the form and character of the body. The plates of the third range are shown upon the summits of the divisions of the calyx. Fig. 17 shows the characters of the surface-markings.
Figs. 18–20. Lateral, basal and summit views of a larger specimen, somewhat different in form, with the third range of plates of larger size. Enlarged to three diameters.



G. B. Simpson, del.

Ph. Ast. lith.

PLATE XV.

Lecanocrinus pusillus *Hall.*

Page 136.

Figs. 1, 5. Anterior and posterior views of a calyx preserving the first and second anal plates; enlarged to two diameters.

Figs. 3, 4. Similar views of another specimen, natural size, where the two anal plates of the preceding specimen are represented by one only.

Fig. 2. The lower side of the last specimen, showing the size of the basal plates.

Fig. 6. An enlargement of a first radial plate, to show the surface-markings.

Cyathocrinus nucleus *Hall.*

Page 136.

Figs. 7, 8. Lateral and anterior sides of the specimen, enlarged to four diameters, showing its form and character.

Fig. 9. Basal view of the same, enlarged to four diameters showing the lobation of the body at the base of the arms.

Cyathocrinus Polyxo *Hall.*

Page 135.

Figs. 10, 11. Lateral and basal views of a small specimen showing the basal plates with a small perforation in the middle.

Fig. 12. Anterior view of a larger specimen, showing the usual character of the species.

Figs. 13, 14. Posterior and basal views of a large individual, showing the very large second anal plates, and large opening through the basals. In this specimen the angular character of the plates, as observed in younger specimens, is greatly subdued.

Figs. 15, 16. Posterior and basal views of a specimen, showing features similar to the last.

Fig. 17. Posterior side of a specimen, showing a part of a third anal plate.

Rhodocrinus (Lyriocrinus) Melissa *Hall.*

Page 139.

Fig. 18. The summit of a large individual preserving the plates of the dome and also showing evidence of a subcentral proboscis.

Fig. 19. Basal view of a large imperfect specimen, showing flattened nodes on the subradial plates.

Figs. 20, 21. Basal and lateral views of a very symmetrical specimen, presenting the general form and features of the species to the arm-bases.

Fig. 22. Basal view of a specimen of ordinary size, showing a thickened, depressed, pentagonal ring around the column cicatrice, and incipient or developed nodes on the first radial plates. The surface of the plates is beautifully striated.

(CRINOIDEA.)

Plate 15.

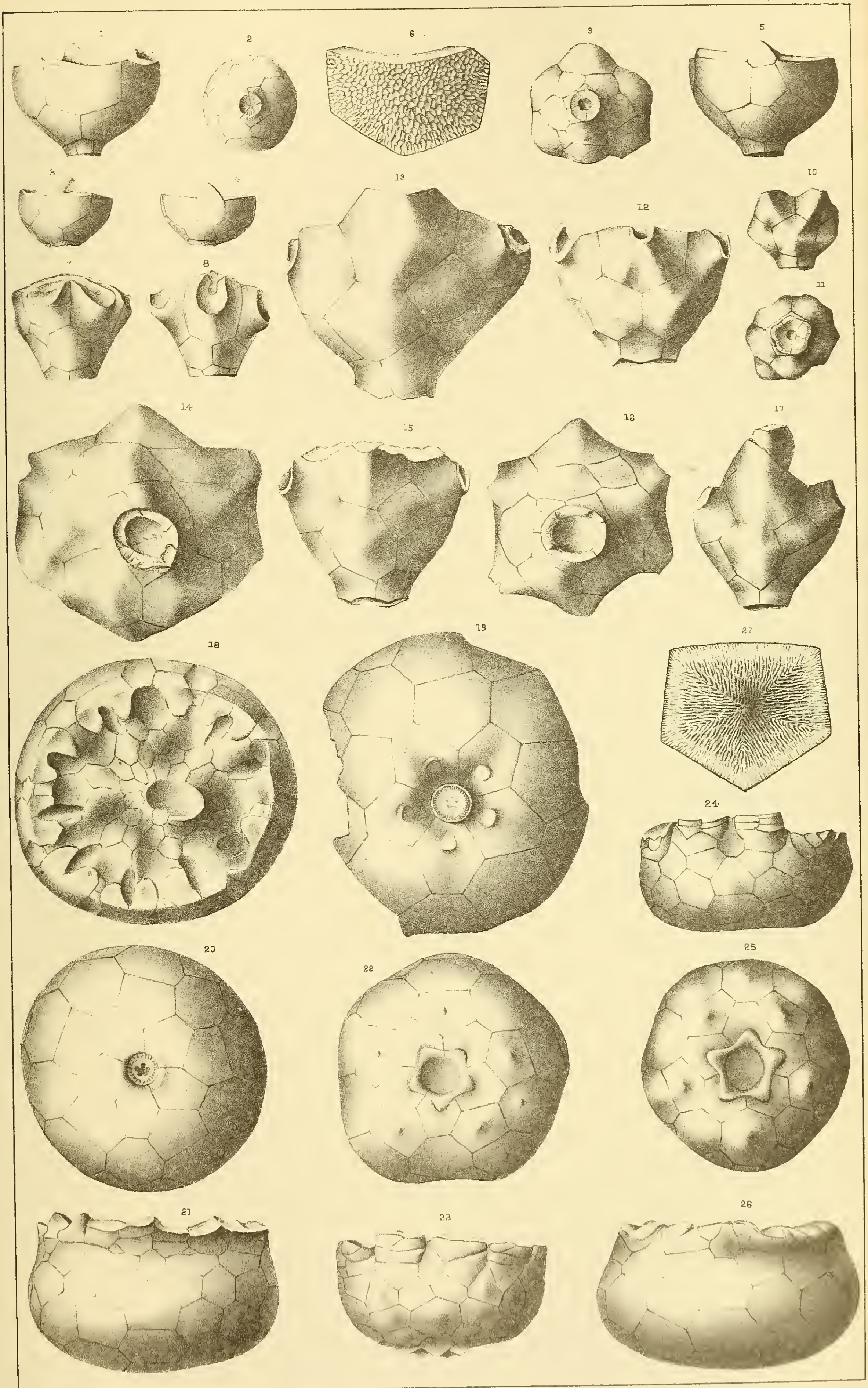


PLATE XV — (*Continued*).

Fig. 23. Lateral view of a similar individual, enlarged to two diameters, showing a projecting pentalobate base with nodose radial and interradial plates.

Fig. 24. Lateral view of the specimen fig. 22, showing arm-bases with arm-plates attached.

Fig. 25. Basal view, enlarged, of the specimen fig. 23, showing the nodes on the first radial plates.

Fig. 26. Lateral view of the specimen fig. 18.

Fig. 27. An enlargement of a first radial plate of specimen fig. 22, showing the character of the surface-striæ.

PLATE XVI.

EUCALYPTOCRINUS CÆLATUS *Hall.*

Page 142.

Fig. 1. A young individual enlarged to three diameters. The divisions of the arm-plates are incorrectly represented.

Fig. 2. A larger individual preserving the arms in place, but the divisions of the arm-plates are not fully shown in the figure.

Fig. 3. Lateral view of the calyx of a full-grown individual, of the prevailing form.

Fig. 4. Basal view of the same.

Fig. 5. A lateral view of a specimen showing the calyx and the solid interbrachial plates of one side.

Fig. 6. The opposite side of the same specimen, which is broken so as to reveal the visceral cavity, above which are the interior dome plates, covering the canal leading to the exterior. These anchylosed plates are embraced and supported by the inner edges of the interbrachial plates, as shown in the figure.

Fig. 7. The summit of the same specimen, showing the interbrachial plates, and the accessory plates, surrounding the orifice at the summit. The upper side of the figure, where the exterior is broken away, shows distinctly the bases of two interbrachial plates, and the projecting angles of the interior dome plates.

Fig. 8. The upper margin and interior of a calyx, showing the plates and cicatrices for the attachment of the arms and interbrachial plates.

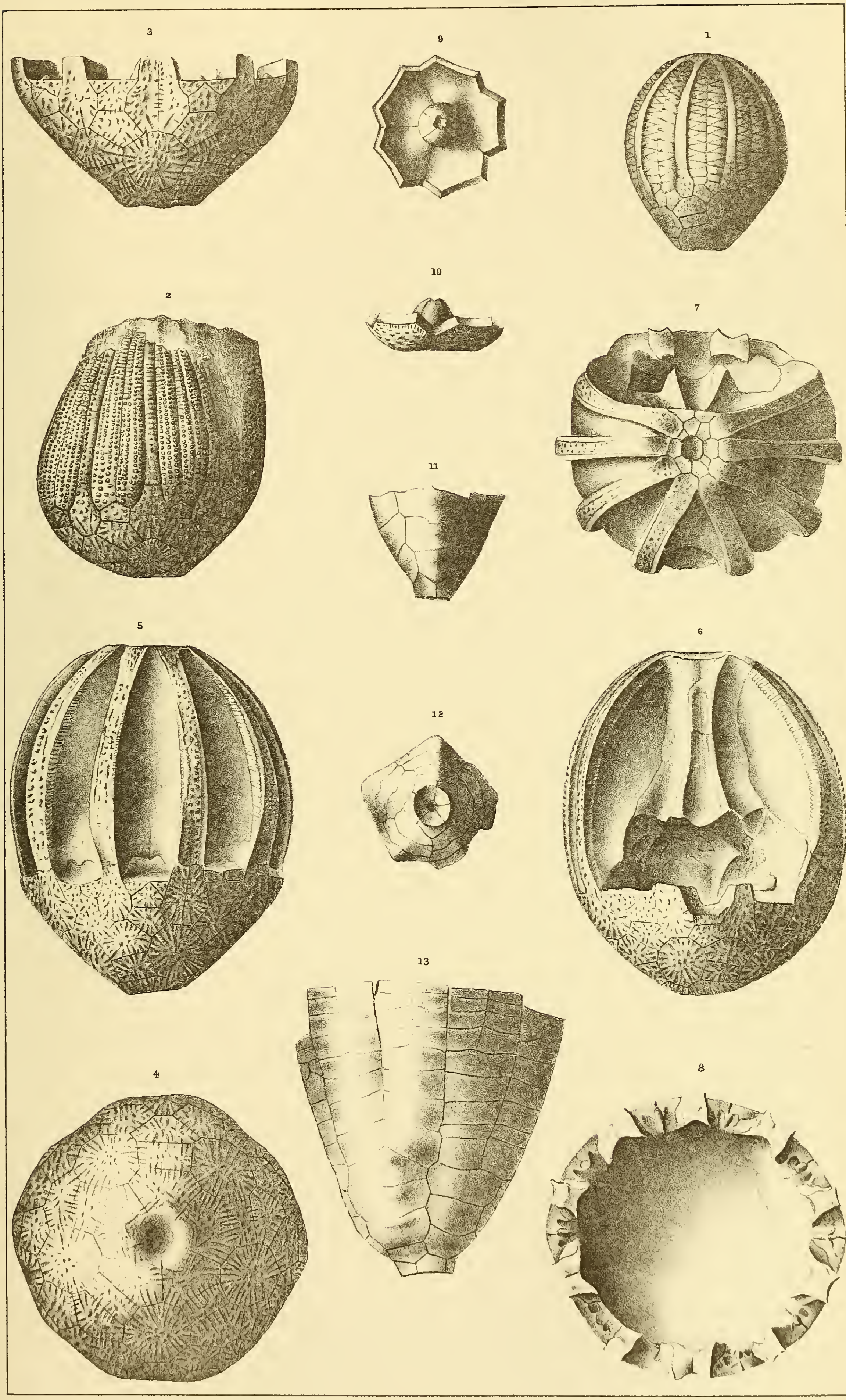
Figs. 9, 10. Interior and lateral views of the basal and subradial plates of the species, showing the division of the basal plates, as seen on the inner side, and their great development in the interior of the calyx.
These are rarely distinguishable within the column cavity, and probably never on the exterior surface.

ICHTHYOCRINUS SUBANGULARIS *Hall.*

Page 137.

Figs. 11, 12. Lateral and basal views of a fragment, showing subradial and radial plates with a decided pentangular outline.

Fig. 13. Lateral view of a larger fragment, showing the rays to near the third division on two of the series, and a less decided subangularity of the body in the lower parts than the preceding specimen.



G.B. Simpson del. Th. Ast lith.

PLATE XVII.

EUCALYPTOCRINUS CRASSUS *Hall.*

Page 141.

Fig. 1. A young individual, natural size, showing the immature character of the arms.

Fig. 2. An enlargement, to three diameters, of another young specimen, showing the immature character of the arms. The plates of the body have the same features as in the more advanced stages of growth.

Fig. 3. A young specimen retaining the interbrachial plates, but without the arms, the impression of the tentaculæ being retained on the sides of these plates.

Fig. 4. A young specimen similar to the preceding, referred to this species, but of a more globular form and spreading calyx.

Fig. 5. A young individual retaining the arms in place, and having the column and roots entire.

This is the only specimen yet found, retaining all the parts complete, among many hundreds of imperfect individuals which have been collected at the locality.

Fig. 6. Lateral view of an extremely elongated calyx.

Fig. 7. Lateral view of a more spreading form, retaining parts of the arms in place.

Fig. 8. Lateral view of a more elliptical specimen, preserving the interbrachial plates without the arms.

Fig. 9. A fragment of a column from the upper and middle portions, belonging apparently to a medium-sized specimen of this species. Two colonies of Favosites have commenced their growth upon it.

Fig. 10. The lower part of an interbrachial plate, showing the impression of the tentaculæ and the arm-plates.

Fig. 11. An enlargement of a part of an arm, showing the tentaculæ and edges of the arm-plates.

EUCALYPTOCRINUS OVALIS *Troost.*

Page 143.

Fig. 12. Lateral view of a very perfect specimen, possessing the form and general characters of the species ascribed to it by Dr. Troost. The arms of this species appear more mature than the young referred to *E. crassus*. except in the specimen figure 5.

Fig. 13. An enlargement of the summit of the specimen fig. 12. showing the arrangement of the plates at the summit with the oral plates.

NIAGARA GROUP.

(CRINOIDEA.)

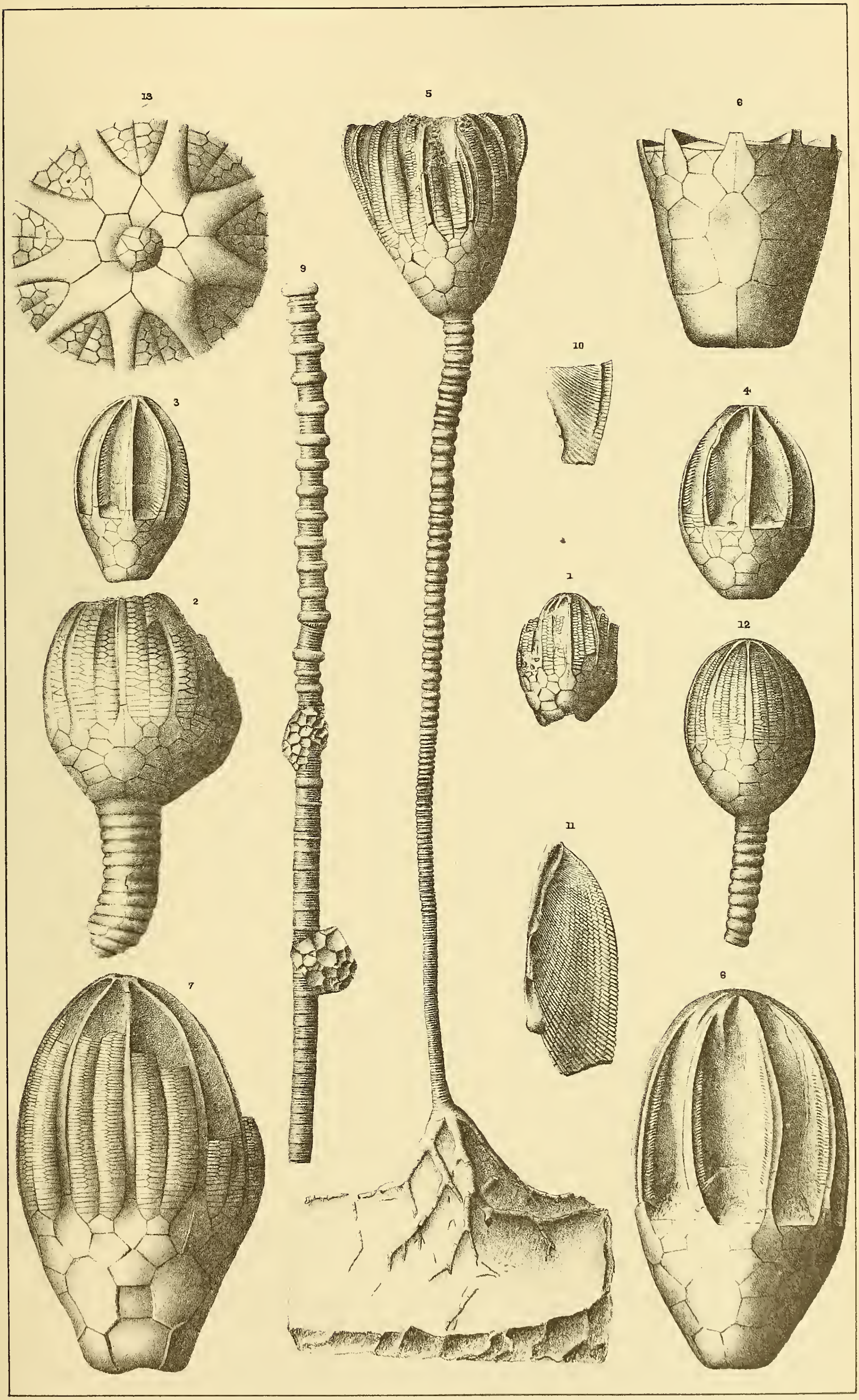


PLATE XVIII.

EUCALYPTOCRINUS CRASSUS *Hall.*

Page 141.

Fig. 1. Lateral view of a large calyx, which is constricted below the middle.

Fig. 2. Lateral view of specimen without the constriction, with regularly sloping sides. This specimen preserves some of the lower plates of the arms.

Fig. 3. Basal view of the specimen fig. 1, showing the arrangement of plates and the deep cavity for the reception of the column, with the basal plates in the bottom.

Fig. 4. Lateral view of a large specimen, preserving the interbrachial plates, the spaces between which are filled with limestone.

Fig. 5. The summit of the specimen fig. 4, showing lanceolate depressions in the upper ends of the interbrachials apparently for the insertion of accessory plates.

Fig. 6. Lateral view of a smaller specimen, which is more pointed at the upper end, but otherwise retaining the characters of this species.

Fig. 7. The summit of the preceding specimen, showing but two intercalated plates around the aperture.

Fig. 8. An enlargement from the summit of another individual, showing four intercalated plates.

Fig. 9. An enlargement of the bases of a pair of arms, and of the adjacen plates, from fig. 7, Plate 17, to show their arrangement.

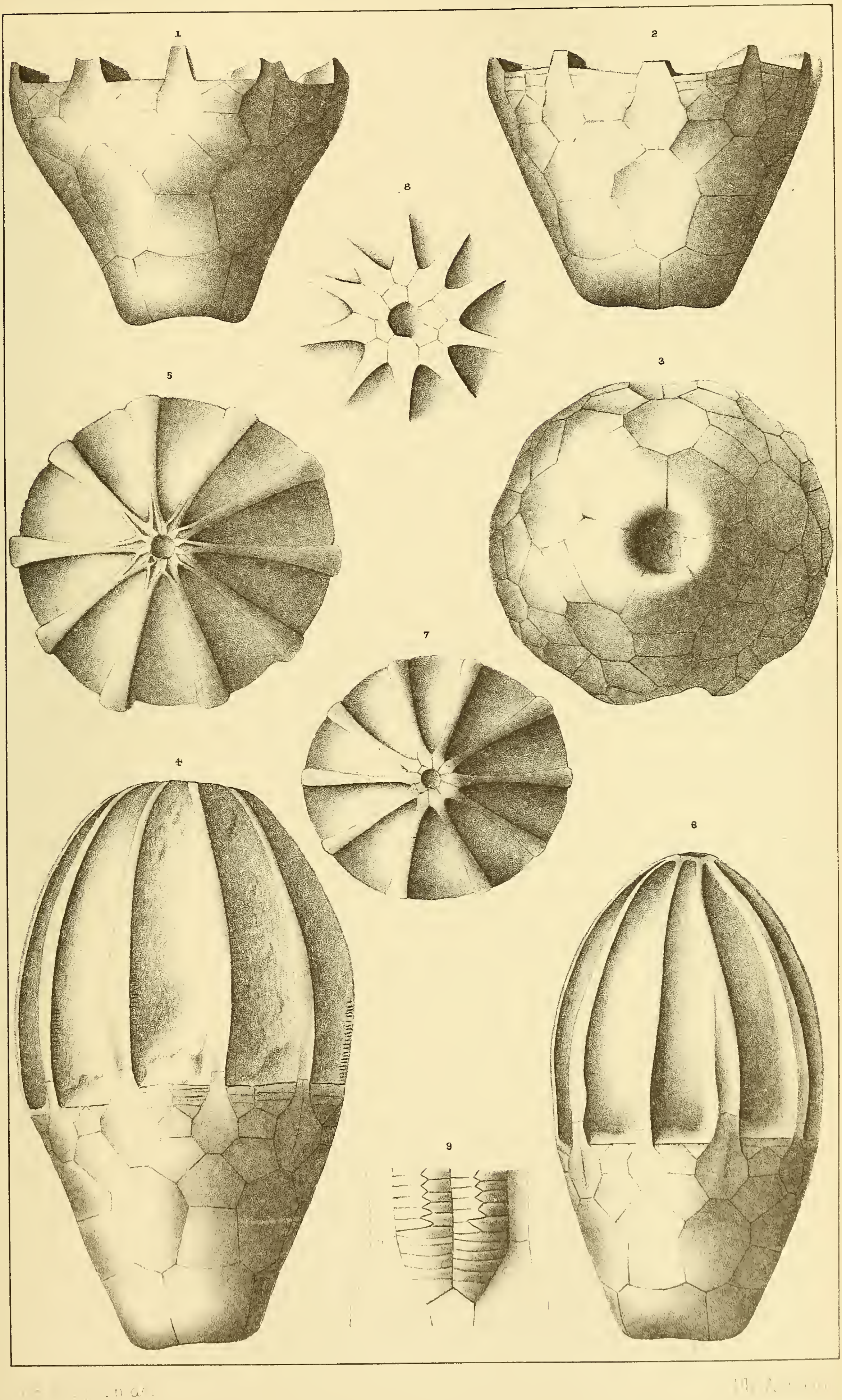

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PLATE XIX.

[illegible]

Page [illegible]

Fig. 1. [illegible]

Fig. 2. [illegible]

[illegible]

[illegible]

Fig. 1. [illegible]

Fig. 2. [illegible]

[illegible]

Page [illegible]

Fig. 1. [illegible]

Fig. 2. [illegible]

Fig. 3. Lateral view of the [illegible]

PLATE XIX.

Eucalyptocrinus cælatus *Hall.*

Page 142.

Fig. 1. The interior of the dome of a large imperfect specimen, showing the supraradial plates of adjacent rays, with the double interradial plate between them in the lower central part of the figure; also the arm-openings (the rhomboidal depressions) and the plates forming the lower part or sides of the dome. Above this is the dome covering the aperture which, in the lower part, is composed of four anchylosed plates, as farther shown in fig. 3. These are surmounted by a fluted hollow column, which reaches to the summit of the interbrachial plates. In this specimen it is broken off above. On the outer parts of the figure on either side may be seen the interbrachial plates, with the sutures dividing them from the inner parts.

Fig. 3. The lower concave surface of the anchylosed plates, which form the base of the dome over the visceral cavity of *Eucalyptocrinus cælatus.*

Eucalyptocrinus crassus *Hall.*

Page 141.

Fig 2. The upper rim of a flattened calyx of this species, showing the cicatrices for the attachment of the arms and interbrachial places.

Figs. 4, 5. The outer and inner surfaces of a lower dome plate of this species, showing it to be of much greater length than the corresponding part of *Eucalyptocrinus cælatus.*

Roots of Eucalyptocrinus.

Page 144.

Figs. 6, 7. Upper and lateral views of a group of roots, which have grown upon the exterior of a calyx of *Eucalyptocrinus cælatus.*

Fig. 8. The upper side of a larger root with base of column, which has grown upon the surface of the calcareous mud of the sea bottom.

Calceocrinus stigmatus *Hall.*

Page 147.

Fig. 9. Dorsal view of the body of a specimen enlarged to two diameters.

Fig. 10. Ventral side enlarged to two diameters, showing the scars for the attachment of the lateral and dorsal arms, and for the ventral plates.

Fig. 11. Lateral view of the same, enlarged.

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(CRINOIDEA.)

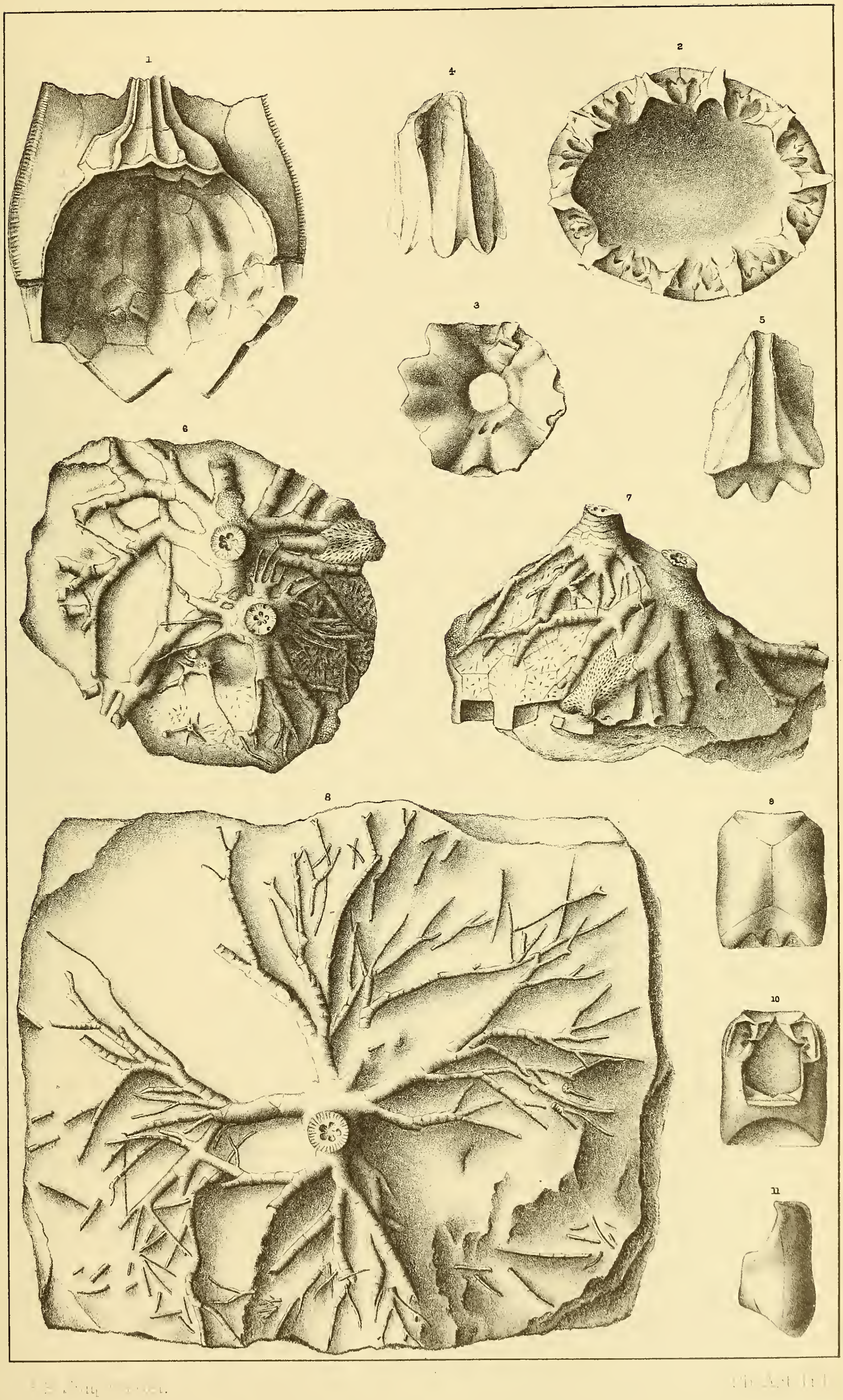


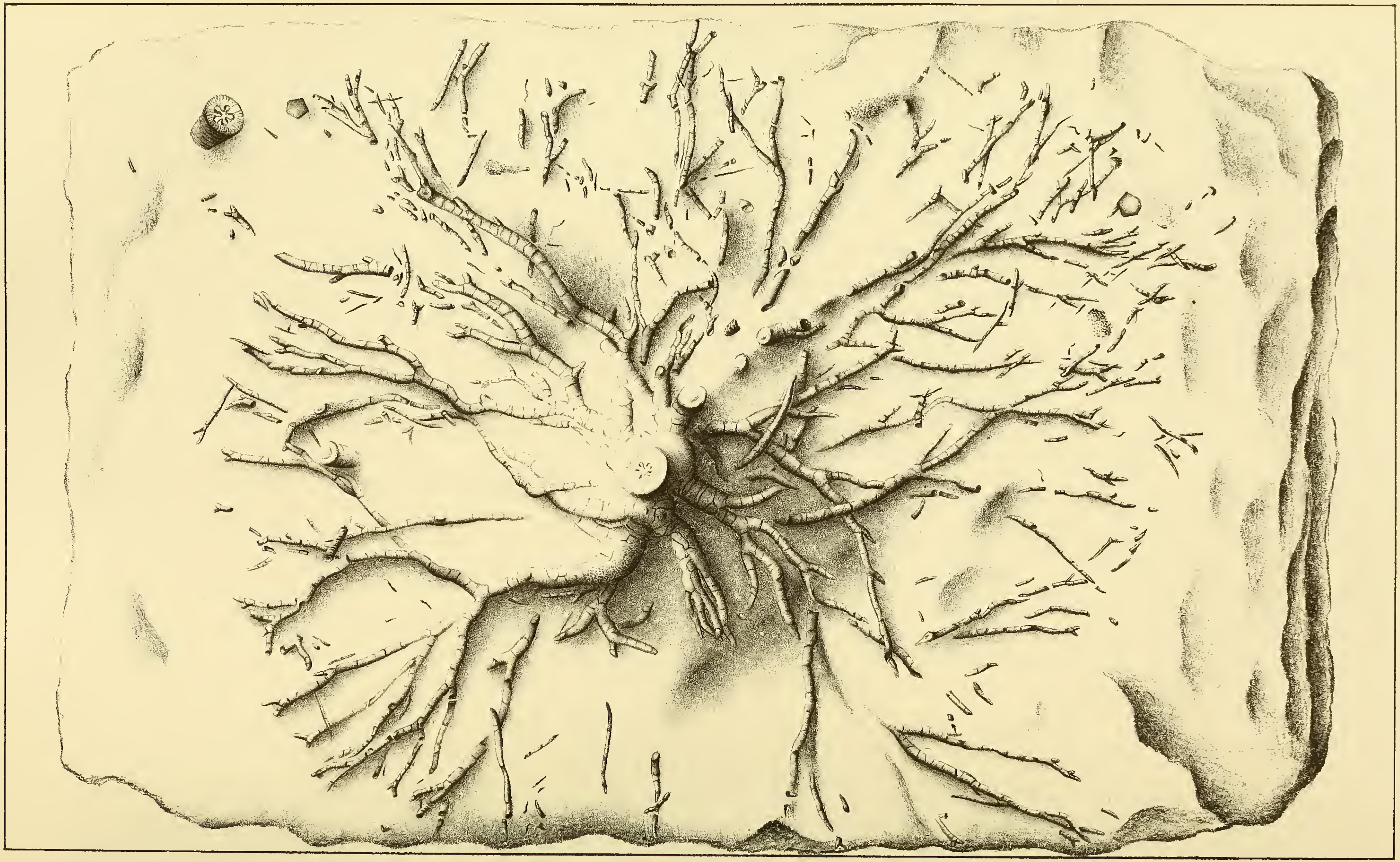
PLATE XX.

Roots of EUCALYPTOCRINUS.

Page 144.

The specimen, which preserves the base of the column, shows the ramification of the rootlets through the calcareous shale, and was evidently imbedded during its growth upon the ocean bed.

Specimens sometimes occur with rootlets much more extended, and becoming quite filiform, but seldom traceable to their entire extent.



Phil Ast del. et lith.

PLATE XXI.

[illegible]

Figs. 1-8. The upper valve and [illegible] [illegible] [illegible]
[illegible]

[illegible]

Fig. 1. A specimen which [illegible] [illegible]
Fig. 2. The upper valve of a specimen [illegible] of the [illegible]
Nanaimo. Owing to the presence of the [illegible]
growth, the shell has [illegible]
Fig. 3. Lateral view of the same, [illegible]
Fig. 4. The [illegible] of the species [illegible]
species of [illegible].
Fig. 5. [illegible] of Nanaimo [illegible] a ventral [illegible]
[illegible] direction.

[illegible]

Fig. 6. [illegible] Specimen which is [illegible] the [illegible], but shows the general features of the species.
Fig. [illegible] view of [illegible] the [illegible]
[illegible]
[illegible] arrangement of [illegible]

[illegible]

Figs. 13, 14. Ventral and dorsal views of a small specimen.
Fig. 15. Ventral view of a large individual.
Fig. 16. Lateral view of a similar specimen.
Fig. 17. [illegible] of a [illegible] of the [illegible]
of the [illegible].
Fig. 18. An enlargement of the interior of a dorsal valve showing the muscular impressions, vascular and [illegible] and [illegible] area.
Cardinal area of the specimen, fig. 11.

PLATE XXI.

Pholidops ovalis *Hall.*

Page 149.

Figs. 1, 2. The upper valve and profile view (greatly enlarged) of a specimen retaining both valves.

Crania Siluriana *Hall.*

Page 148.

Fig. 3. A specimen which retains both valves, attached to the surface of Spirifera.

Fig. 4. The upper valve of a specimen attached to the surface of *Platyostoma Niagarense.* Owing to the contour of the surface on which it has grown, the shell has become elongated and constricted on one side.

Fig. 5. A lateral view of the same, showing the elevation.

Fig. 6. The calyx of *Eucalyptocrinus crassus* with four ventral valves of the species attached.

Fig. 7. A specimen of *Rhynchonella Stricklandi* with a ventral valve of the species attached.

Crania setifera *Hall.*

Page 148.

Fig. 8. A specimen which is imperfect around the margin, but shows the general features of the species.

Fig. 9. A lateral view of the same, restored on the edge, showing the elevation of the valve and the position of the apex.

Fig. 10. An enlargement of the surface to show the setiform spines.

Orthis elegantula *Dalman.*

Page 150.

Figs. 11, 12. Ventral and dorsal views of a small specimen.

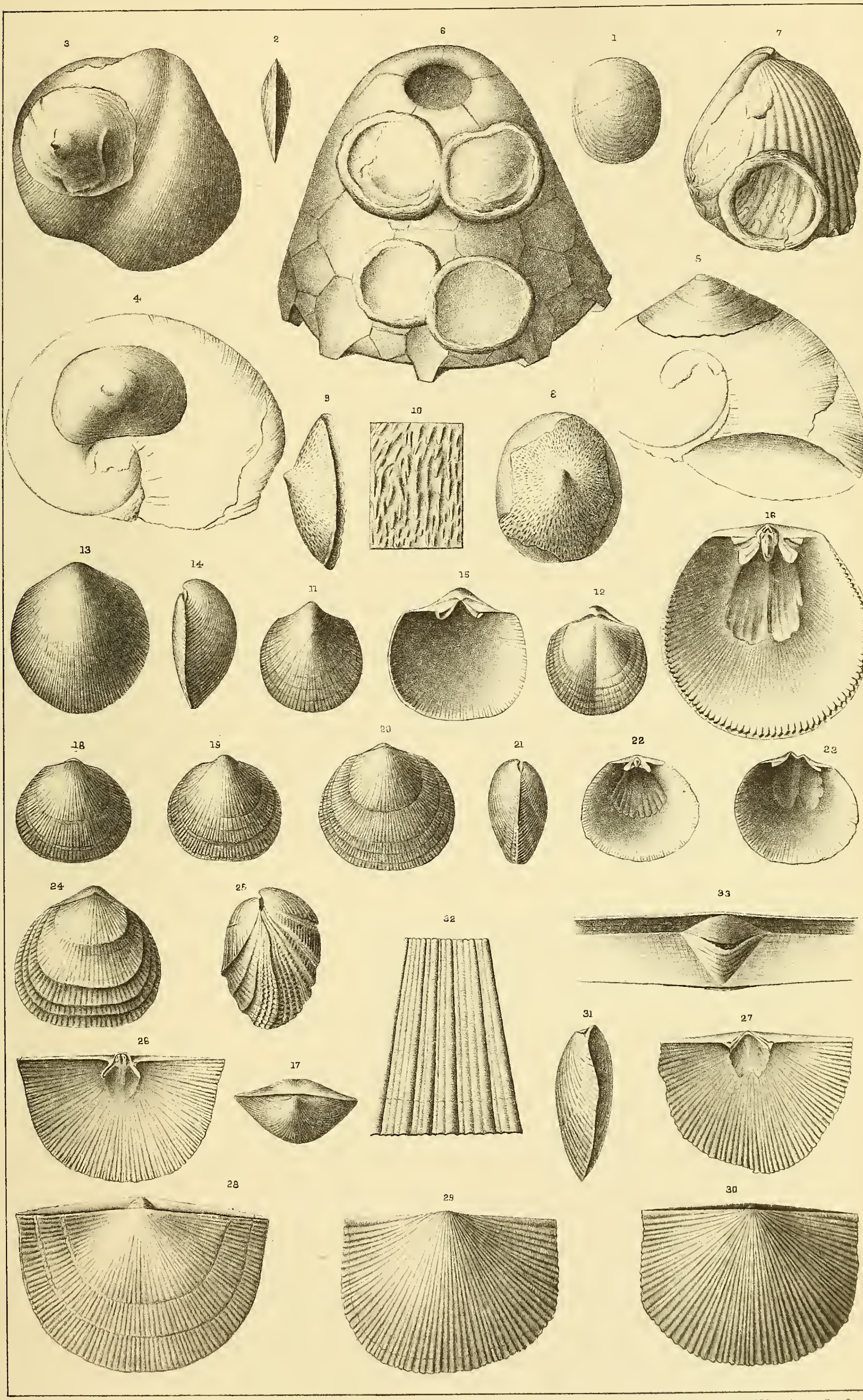
Fig. 13. Ventral view of a large individual.

Fig. 14. Lateral view of a similar specimen.

Fig. 15. Interior of a large ventral valve, showing the cardinal area, teeth and wide foramen.

Fig. 16. An enlargement to two diameters of the interior of a dorsal valve, showing the muscular imprints, cardinal and crural processes, and external cardinal area.

Fig. 17. Cardinal view of the specimen fig. 14.



G. B. Simpson, del.
Ph. Ast lith

PLATE XXI — (*Continued*).

Orthis hybrida *Sowerby*.

Page 149.

Fig. 18. Dorsal view of a specimen of the usual form and size.

Fig. 19. Ventral view of the same.

Fig. 20. Dorsal view of an unusually large specimen.

Fig. 21. Lateral view of the specimen figures 18 and 19, showing the relative convexity of the valves.

Fig. 22. The interior of a dorsal valve, showing the muscular impression, cardinal process, etc.

Fig. 23. The interior of a ventral valve, showing muscular imprints, teeth, etc. The shell is slightly distorted and imperfect on the cardinal margin.

Figs. 24, 25. Dorsal and lateral views of a small rotund specimen, showing strong varices of growth; enlarged to two diameters.

Streptorhynchus subplana (*Conrad*).

Page 151.

Fig. 26. The interior of a dorsal valve, showing the cardinal process, etc.

Fig. 27. An imperfect ventral valve, showing muscular imprints, teeth and cardinal area.

Fig. 28. Dorsal view of a symmetrical specimen of the larger size.

Figs. 29, 30. Ventral and dorsal views of a specimen of the usual size of the species as it occurs at Waldron.

Fig. 31. Ventral view of the same, showing the convexity of the valves.

Fig. 32. An enlargement of the surface, showing the fine concentric striæ.

Fig. 33. An enlargement of the central part of the cardinal area of the united valves, showing the closed deltidium, the striæ, etc.

PLATE XXII.

Strophonella semifasciata *Hall.*

Page 154.

Fig. 1. An imperfect dorsal valve.

Fig. 2. A more nearly entire specimen of the same valve, which presents the usual fasciculate characters of surface-striæ.

Fig. 3. Cardinal view of a specimen, retaining both valves in place and showing strong deltidial coverings.

Strophomena rhomboidalis (*Wilckens*).

Page 150.

Fig. 4. The interior of a ventral valve, showing the muscular imprint.

Fig. 5. The dorsal view of a specimen, having both valves in connection.

Fig. 6. The ventral valve of the same.

Fig. 7. A lateral view of another specimen, with a ventral valve of *Crania Siluriana* attached.

Fig. 8. The upper part of a ventral valve of a large specimen, which preserves both valves, the cardinal line being shown near the lateral angles.

Fig. 9. The interior of a dorsal valve, showing muscular imprints, cardinal process, etc.

Fig. 10. An enlargement of the middle portion of the cardinal area of a specimen, with both valves in place, showing the back of the cardinal process of the dorsal valve filling the deltidial opening of the ventral valve. The central groove marks the division of the cardinal process.

Chonetes Nova-Scotica *Hall.*

Page 155.

Fig. 11. A ventral valve showing the spines and the larger median striæ; enlarged to two diameters.

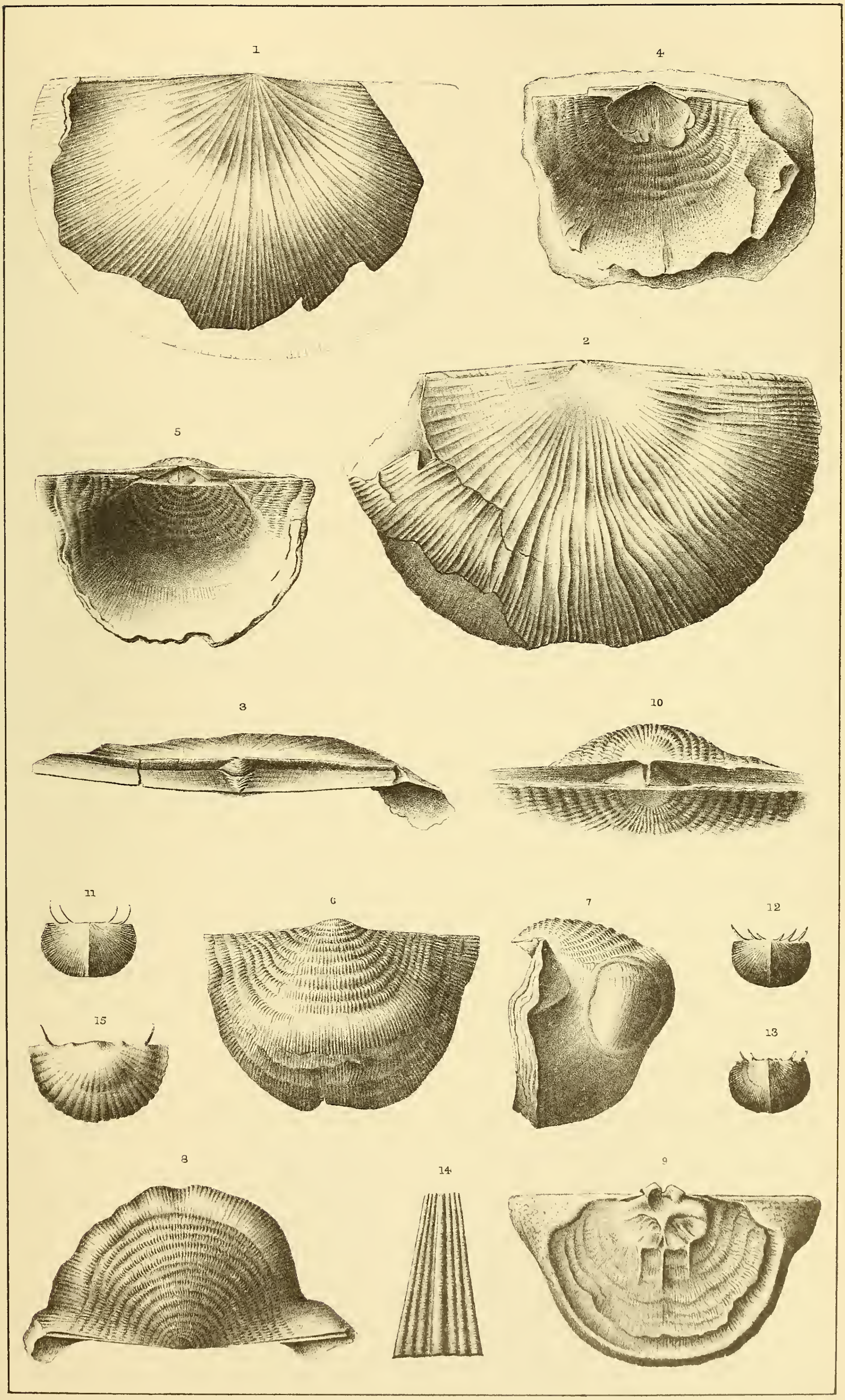
Figs. 12, 13. Two other ventral valves, natural size, showing the cardinal spines. The central part of these three figures is incorrectly represented as angular, instead of simply by a stronger median ray.

Fig. 14. An enlargement from the middle of a specimen to show the stronger central ray and fine concentric striæ.

Chonetes undulata *n. sp.*

Page 155.

Fig. 15. An enlargement to four diameters of an individual possessing the usual characters.



G. B. Simpson, del. Ph. Ast. lith.

PLATE [illegible] II.

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Fig. 1. [illegible]

Fig. 2. [illegible]

Fig. 3. [illegible]

Fig. 4. [illegible]

Fig. 5. [illegible]

Fig. 6. [illegible]

[illegible]

Fig. 7. [illegible]

Fig. 8. [illegible]

[illegible]

Fig. 9. [illegible]

Fig. 10. [illegible]

[illegible]

Fig. 11. An enlarged vertical view, showing the [illegible]

Fig. 12. A single valve showing the form of the shell.

Fig. 13. An enlargement of the surface showing the arrangement of the [illegible]

PLATE XXIII.

Strophodonta striata *Hall.*

Page 152.

Fig. 1. A ventral valve showing the general form and the surface characters.

Fig. 2. The dorsal side of the same.

Fig. 3. A profile view, showing the relative convexity and the bending of the valves at the cardinal angles.

Fig. 4. The interior of a dorsal valve, showing the cardinal process, and crenulate margins.

Fig. 5. The interior of a ventral valve, showing the muscular imprint, the cardinal area and the crenulations on the hinge.

Fig. 6. An enlargement of the cardinal process of the dorsal valve, showing the grooving of the posterior face.

Strophonella semifasciata *Hall.*

Page 154.

Fig. 7. The ventral side of a large, nearly entire specimen.

Fig. 8. The interior of an imperfect dorsal valve, referred with doubt to this species, showing a minute cardinal process and crenulated hinge line.

Strophodonta profunda *Hall.*

Page 151.

Fig. 9. The interior of a ventral valve, showing the muscular imprint and cardinal area, with the hinge crenulations extending less than half its length.

Fig. 10. The exterior of an imperfect valve partially restored, showing the character of the striæ.

Streptorhynchus tenuis *Hall.*

Page 150.

Fig. 11. An imperfect ventral valve, showing the rounded hinge extremity and the character of the surface-striæ.

Fig. 12. A dorsal valve showing the form of the shell.

Fig. 13. An enlargement of the surface, showing the alternations of the radiating striæ and the finer concentric crenulating lines.

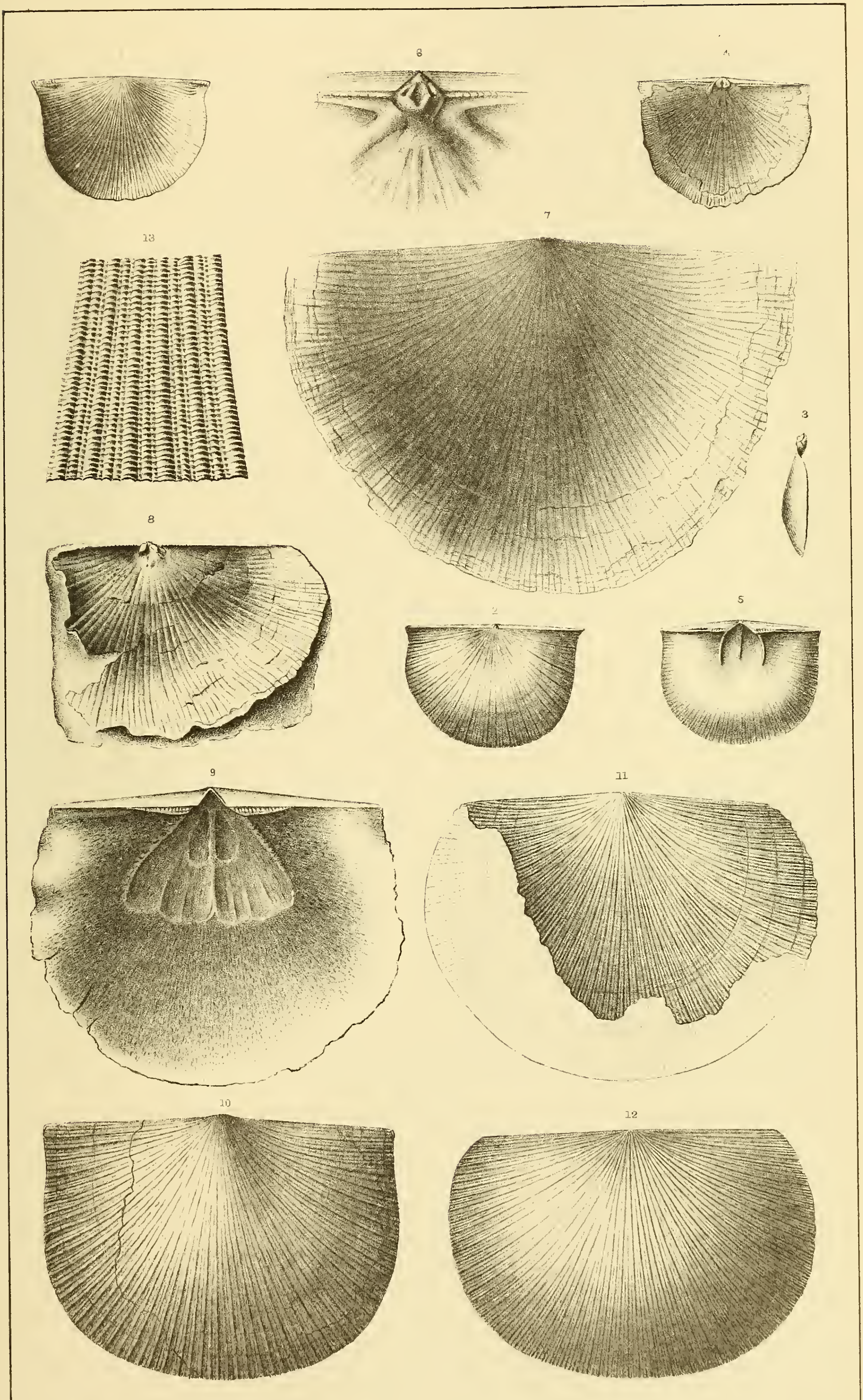

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PLATE XXIV.

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PLATE XXIV.

SPIRIFERA CRISPA (*Hisinger*) *var.* SIMPLEX *n. var.*

Page 157.

Figs. 1–5. Dorsal, ventral, front, lateral and cardinal views of a specimen of this variety, enlarged to two diameters.

SPIRIFERA CRISPA (*Hisinger*).

Page 157.

Fig. 6. Dorsal view of a specimen of the size and form usually obtained at this locality.

Fig. 7. Ventral view of a wider form.

Figs. 8–12. Dorsal, ventral, front, cardinal and lateral views of a larger specimen showing the characters of the species, as it occurs at Waldron.

Fig. 19. The interior of a ventral valve, enlarged to two diameters.

SPIRIFERA EUDORA *Hall.*

Page 156.

Figs. 13–16. Dorsal, cardinal, front and lateral views of a specimen, presenting the features of the species from the Waldron locality.

Fig. 17. A ventral valve, having the surface-striæ strongly marked.

Fig. 18. Interior of a ventral valve, showing the cardinal area, the foramen and teeth.

SPIRIFERA RADIATA *Sowerby.*

Page 157.

Fig. 20. Dorsal view of a specimen of medium size.

Fig. 21. Dorsal view of a nearly full-grown specimen.

Figs. 22–26. Dorsal, ventral, cardinal, lateral and front views of a large well-formed specimen, of the usual characters of the species as recognized at this locality.

Fig. 27. Profile view of the specimen fig. 21, for comparison with fig. 25.

Fig. 28. The interior of a ventral valve.

Fig. 29. The interior of the cardinal portion of a dorsal valve.

Fig. 30. An enlargement of the surface-striæ. Figs. 17, 19, 22, 28, 29 and 30 are copied from Pal. N. Y., Vol. IV, Pt. II: *Revision of the Brachiopoda* (unpublished).

NIAGARA GROUP.

(BRACHIOPODA.)

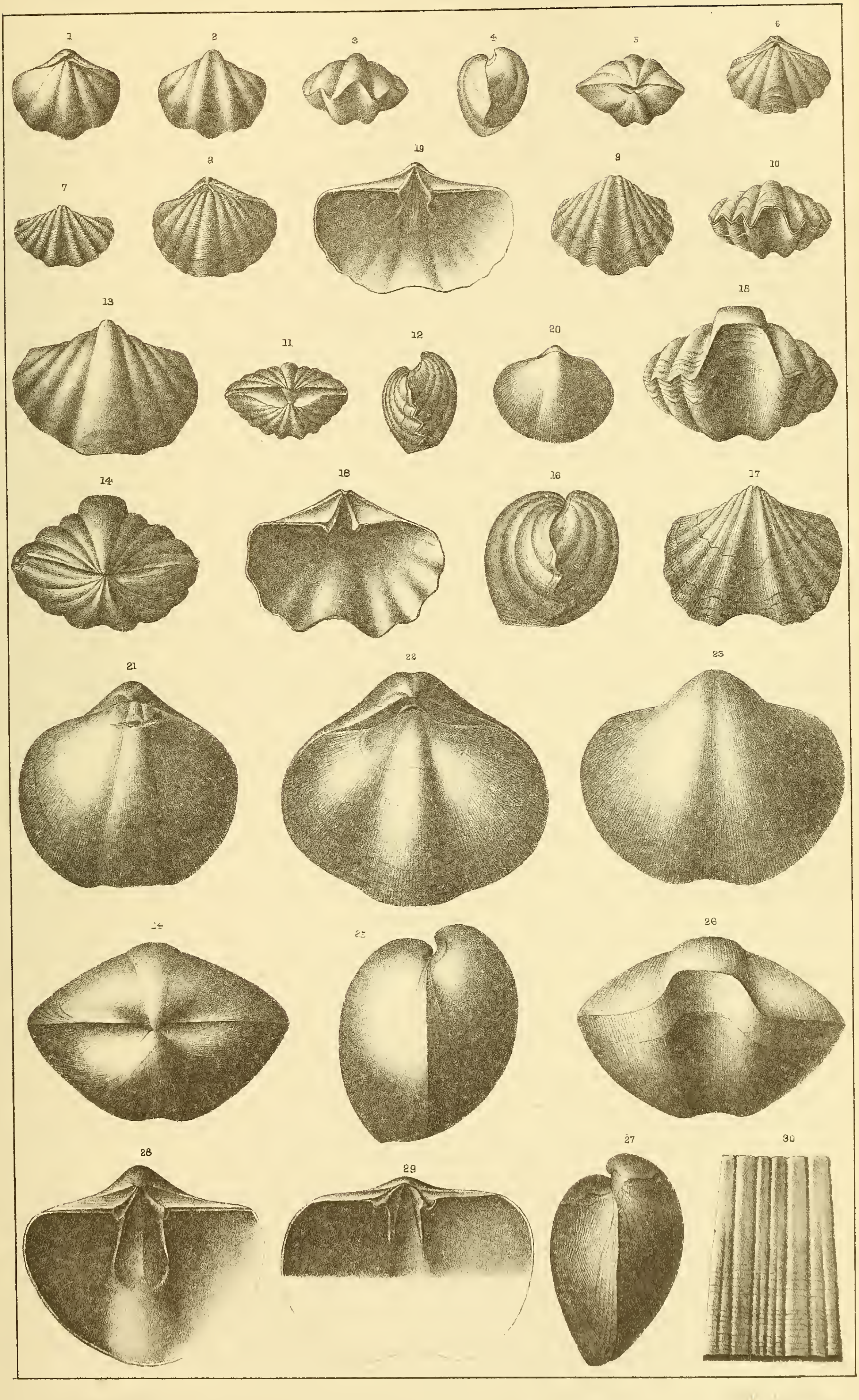

PLATE XV[illegible].

[illegible] Hall.

Page 1[illegible]0.

Fig. 1. Dorsal view of a small specimen of a rounded form.

Fig. 2. Ventral view of a [illegible] specimen which is emarginate in front.

Fig. 3. Dorsal view of a large, broadly ovate form which is emarginate in front and shows [illegible] on the beak.

Fig. 4. Ventral view of a large [illegible] specimen which is [illegible] emarginate in front.

Fig. 5. Lateral view of the specimen fig. 2, showing the convexity of the valves.

Fig. 6. Dorsal view of a narrow, elongate ovate form, with a [illegible] in front.

Fig. 7. Dorsal view of a [illegible], rounded form, which is not emarginate.

Figs. 3, 5 and 7 are copied from Pal. N. Y., Vol. IV, Pl. [illegible]. [illegible] the Brachiopoda [illegible]

[illegible] Hall.

Page 1[illegible].

Fig. 8. Dorsal view of a young specimen which has not begun to develop the [illegible] or sinus, and a [illegible] the [illegible] edge [illegible] specimen.

Figs. 9, 10. [illegible] views of [illegible] specimens.

Fig. 11. Dorsal view of a specimen [illegible] than fig. 10.

Fig. 12. Lateral view of the specimen fig. 9.

[illegible] Hall.

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Figs. 13-17. Dorsal views of specimens varying in size and form, and exhibiting some of the phases which mark the species in its advanced stages of growth.

Fig. 18. Profile of the specimen fig. 17, showing the convexity of the valves.

Fig. 19. Ventral view of a specimen showing the [illegible] depression.

Fig. 20. Front view of the specimen fig. 19 [illegible] showing the depth of the depression.

Fig. 21. [illegible] view of a small [illegible] form [illegible] specimen.

[illegible] Hall.

Page 1[illegible].

Figs. 22-25. [illegible] views of dorsal and ventral valves of [illegible] specimens, [illegible] of the [illegible]

PLATE XXV.

Meristina nitida *Hall.*

Page 160.

Fig. 1. Dorsal view of a small specimen of a rounded form.

Fig. 2. Ventral view of a rhomboidal specimen which is emarginate in front.

Fig. 3. Dorsal view of a large, broadly ovate form, which is emarginate in front and shows the foramen in the beak.

Fig. 4. Ventral view of a large rhomboid-ovate specimen, which is strongly emarginate in front.

Fig. 5. Lateral view of the specimen fig. 3, showing the convexity of the valves.

Fig. 6. Dorsal view of a narrow, elongate-ovate form, with a slight emargination in front.

Fig. 7. Dorsal view of a narrow, rhomboidal form, which is not emarginate.

Figs. 3, 5, 6 and 7 are copied from Pal., N. Y., Vol. IV, Pt. II: *Revision of the Brachiopoda*, (unpublished).

Meristina Maria *Hall.*

Page 159.

Fig. 8. Dorsal view of a young specimen which has not begun to develop the mesial elevation or sinus, and is proportionally broader than the mature, full-grown specimens.

Figs. 9, 10. Dorsal and front views of a large mature specimen.

Fig. 11. Front view of a specimen with the mesial fold much less strongly marked than fig. 10.

Fig. 12. Lateral view of the specimen fig. 9.

Retzia evax *Hall.*

Page 160.

Figs. 13–17. Dorsal views of specimens varying in size and form, and exhibiting some of the phases which mark the species in its advanced stages of growth.

Fig. 18. Profile of the specimen fig. 14, showing the convexity of the valves.

Fig. 19. Ventral view of a specimen showing the mesial depression.

Fig. 20. Front view of the specimen figs. 14 and 18, showing the depth of the depression.

Fig. 21. Ventral view of a small, elongate form, showing finer plications — apparently a mature specimen.

Nucleospira pisiformis *Hall.*

Page 160.

Figs. 22–25. Dorsal, ventral, lateral and cardinal views of a ventricose specimen, having much the appearance of *N. ventricosa* of the Lower Helderberg group.

NIAGARA GROUP.

(BRACHIOPODA.)

G. B. Simpson del. Ph. Ast lith

PLATE XXV.— (*Continued*).

Figs. 26, 27. Dorsal and lateral views of a less ventricose specimen, with surface almost entirely covered by fine setæ.

Fig. 28. Dorsal view of a specimen with more prominent beak.

RHYNCHOTRETA CUNEATA (*Dalman*) *var.* AMERICANA *n. var.*

Page 167.

Fig. 29. Dorsal valve of a small specimen of the usual form.

Fig. 30. Dorsal view of a more elongate form.

Figs. 31, 32. Dorsal and ventral views of a very broad specimen, having strong, slightly rounded plications.

Fig. 33. Ventral view of a large specimen, differing somewhat in form from the preceding.

Fig. 34. Lateral view of the specimen figs. 31 and 32.

Fig. 35. Dorsal valve of an extremely elongate form, with narrow plications.

Figs. 36, 37. Front views of the specimens fig. 33 and fig. 31, showing the elevation of the front.

Fig. 38. Dorsal view of a young shell before the development of the elevation of the front and depression of the sides has commenced.

CŒLOSPIRA DISPARILIS *Hall.*

Page 162.

Figs. 39–41. Dorsal, ventral and lateral views of a specimen, enlarged to two diameters, showing the usual characters of the species.

Fig. 42. An enlargement of a ventral valve of a specimen of more elongate form and extended beak.

Fig. 43. An enlargement of the dorsal side of a broader specimen. The apex of the dorsal valve is represented a little too convex.

ATRYPA RETICULARIS (*Linn.*).

Page 162.

Figs. 44, 45. Dorsal and ventral views of a specimen showing strong lamellæ fringing the concentric lines of growth.

Fig. 46. Ventral view of a larger and more ventricose specimen, with finer concentric markings.

Fig. 47. Lateral view of the same, showing the convexity of the valves.

PLATE XXVI.

RHYNCHONELLA NEGLECTA *Hall.*

Page 162.

Figs. 1, 2. Dorsal and front views of a specimen of the usual size.

Figs. 3–6. Dorsal, ventral, lateral and front views of a larger specimen.

RHYNCHONELLA ACINUS *Hall.*

Page 163.

Fig. 7. The dorsal side of a specimen of regularly ovate form, enlarged to four diameters.

Figs. 8–11. Dorsal, front, ventral and lateral views of a somewhat larger specimen, similarly enlarged, showing the usual features of the species.

RHYNCHONELLA INDIANENSIS *Hall.*

Page 163.

Fig. 12. Dorsal view of a small specimen.

Figs. 13, 14. Dorsal and ventral views of a larger specimen, having three plications elevated on the dorsal fold.

Figs. 15, 16. Corresponding views of a specimen with four plications elevated on the dorsal fold.

Figs. 17, 18. The dorsal and ventral sides of a smaller specimen, having four plications on the fold.

Fig. 19. Lateral view of the specimen fig. 15.

Fig. 20. Lateral view of the specimen fig. 17.

Figs. 21, 22. Front views of the specimens figs. 15 and 17.

RHYNCHONELLA WHITII *Hall.*

Page 164.

Figs. 23–26. Dorsal, ventral, front and lateral views of a characteristic specimen of this species, having but two plications elevated in the center.

Figs. 27–29. Dorsal, ventral and front views of a specimen with one of the median plications divided, making three elevated on the mesial fold.

Figs. 30–33. Front, lateral, dorsal and ventral views of a specimen, showing four elevated plications on the mesial fold.

RHYNCHONELLA STRICKLANDI (*Sowerby*).

Page 165.

Figs. 34, 35. Dorsal and ventral views of a specimen of the more finely plicated variety.

Fig. 36. Dorsal view of a specimen with coarser plications.

Fig. 37. Lateral view of the specimen fig. 34.

Fig. 38. Front view of the preceding, showing the narrower form of the mesial elevation.

NIAGARA GROUP.

(BRACHIOPODA.)

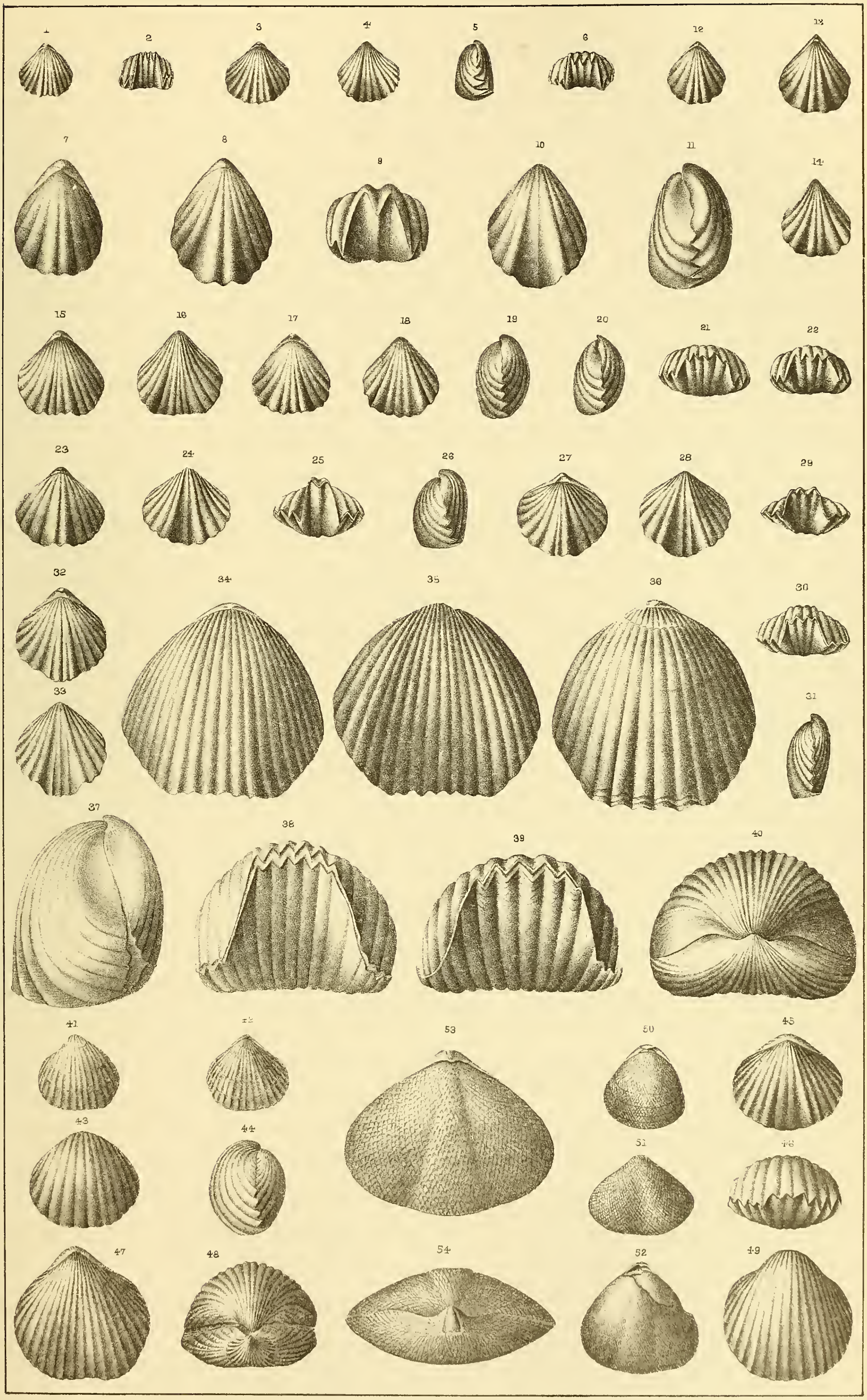


PLATE XXVI — (*Continued*).

Fig. 39. Front view of the specimen fig. 36, showing a broader elevation than the last figure.

Fig. 40. Cardinal view of the more finely plicated variety.

ANASTROPHIA INTERNASCENS *n. sp.*

Page 168.

Figs. 41, 42. Ventral and dorsal views of a small specimen, more finely plicated than usual.

Figs. 43–46. Ventral, lateral, dorsal and front views of a specimen of medium size, having coarse plications.

Figs. 47–49. Dorsal, cardinal and ventral views of a specimen of the usual character.

EICHWALDIA RETICULATA *Hall.*

Page 169.

Fig. 50. Dorsal valve of a narrow, elongate form, with a scarcely distinguishable mesial fold.

Fig. 51. Ventral side of a larger and more transverse specimen, showing a distinct mesial depression.

Fig. 52. A large imperfect specimen, intermediate in form between the two preceding, and with more distinctly defined mesial fold.

Figs. 53, 54. Dorsal and cardinal views of a specimen similar to fig. 51, enlarged, showing the surface characters, and (on the latter figure) the denuded space on the beak of the ventral valve, corresponding to the foramen in other genera.

These figures are copied from the *Twentieth Report on the State Cabinet of Natural History*, page 275, and from *Pal. N. Y.*, Vol. IV, Part II (unpublished).

PLATE XXVII.

AMPHICŒLIA LEIDYI *Hall.*

Page 171.

Fig. 1. An imperfect left valve.

Fig. 2. An imperfect right valve, which presents some difference in the form and position of the beak; probably indicating a distinct species.

MODIOLOPSIS PERLATUS *Hall.*

Page 172.

Fig. 3. A right valve characteristic of the species.

Fig. 4. Cardinal view of the same, showing the convexity of the valve.

MODIOLOPSIS SUBALATUS *Hall.*

Page 173.

Fig. 5. The left valve of a form closely resembling the *M. subalatus* of New York, but of larger dimensions.

Fig. 6. A right valve, having a proportionally greater length—in this feature more nearly approaching the New York specimens.

PTERINEA BRISA *Hall.*

Page 173.

Fig. 7. The exterior of a small, imperfect left valve, with well-preserved surface characters.

Fig. 8. The interior of a large imperfect left valve.

Fig. 9. An internal cast of a small left valve.

MYTILARCA SIGILLA *Hall.*

Page 174.

Fig. 10. A small right valve of a specimen of this species.

AMBONYCHIA ACUTIROSTRA *Hall.*

Page 171.

See plate 7, fig. 12, under description of *Sagenella elegans.*

ORTHOCERAS SIMULATOR *Hall.*

Page 179.

Fig. 11. A fragment of the septate portion of a specimen, showing its general form and character.

Fig. 12. A smaller fragment, similar to the last, but apparently retaining the exterior shell over a portion of the tube.

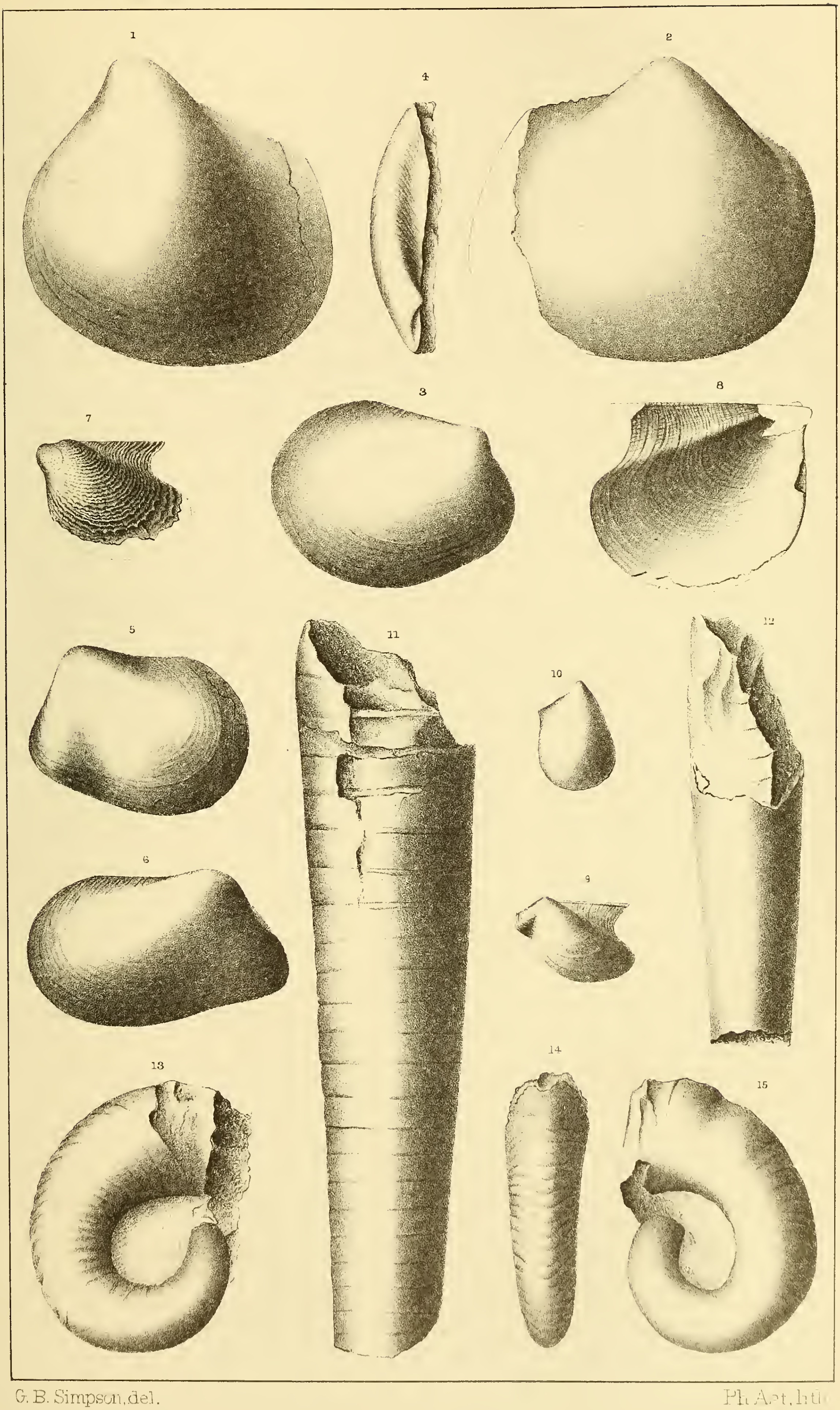
TROCHOCERAS WALDRONENSE *Hall.*

Page 179.

Fig. 13. Lateral view of a specimen preserving one volution, and showing the annulations, but no septa.

Fig. 14. Ventral view of the same, showing the compressed condition of the specimen, and the sinus in the annulations on the ventral side.

Fig. 15. Lateral view of a specimen preserving about the same extent of the tube, with the annulations less distinct, and showing no septa.



G. B. Simpson, del. Ph. Ast, lith.

PLATE XXVIII.

PLATYOSTOMA NIAGARENSE *Hall.*

Page 175.

Fig. 1. A small specimen, showing strong revolving striæ and with a slight depression on the upper surface of the last volution.

Figs. 2–4. Basal, summit and lateral views of a specimen similarly striated, which is sulcated above and below, with two distinct folds on the lower surface of the volution.

Figs. 5–7. Three views of a larger, loosely coiled specimen, with a distinct sulcation above and below the middle of the volution.

Figs. 8, 9. Two views of a more ventricose specimen with regularly convex volutions.

Figs. 10, 11. The summit and ventral view of a large loosely coiled specimen. the outer volution being free.

Fig. 12. The spire of a large ventricose specimen, with closely coiled volutions.

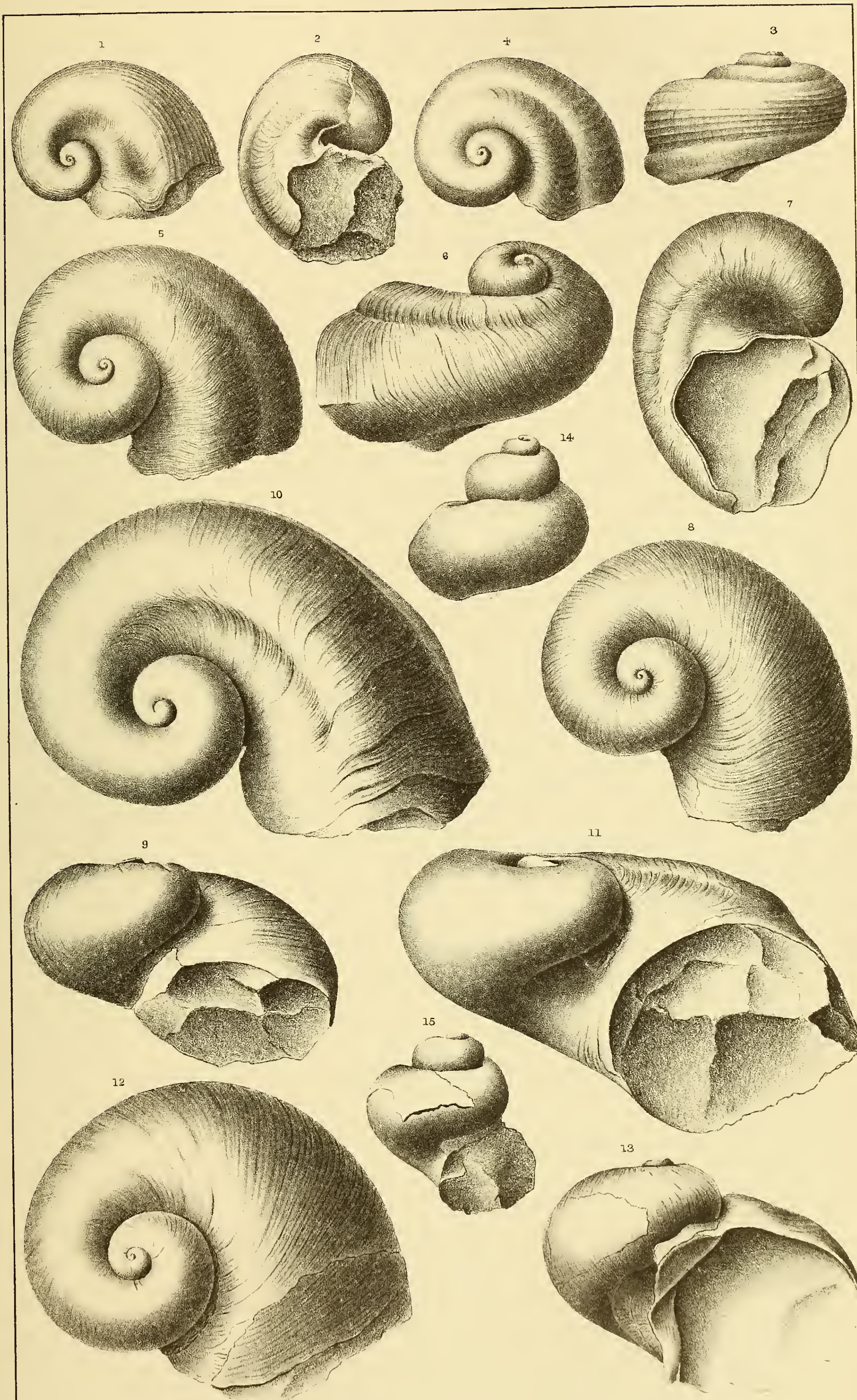
PLATYOSTOMA NIAGARENSE?

Fig. 13. A specimen with its aperture showing a twisted inner lip of the peristome. This feature is produced by the folds on the inner part of the volution and is not a true columella.

PLATYOSTOMA PLEBIUM *Hall.*

Page 175.

Figs. 14, 15. The opposite sides of a specimen, showing the height of the spire and form of the volution and aperture.



G. B. Simpson del.
Ph. Ast lith.

PLATE XXIX.

Platyostoma Niagarense *Hall.*

Page 175.

Figs. 1–4. Four views of a specimen of medium size, where the inner lip of the peristome unites with the surface of the preceding volution, with the spire rising but little above the level of the outer part of the shell.

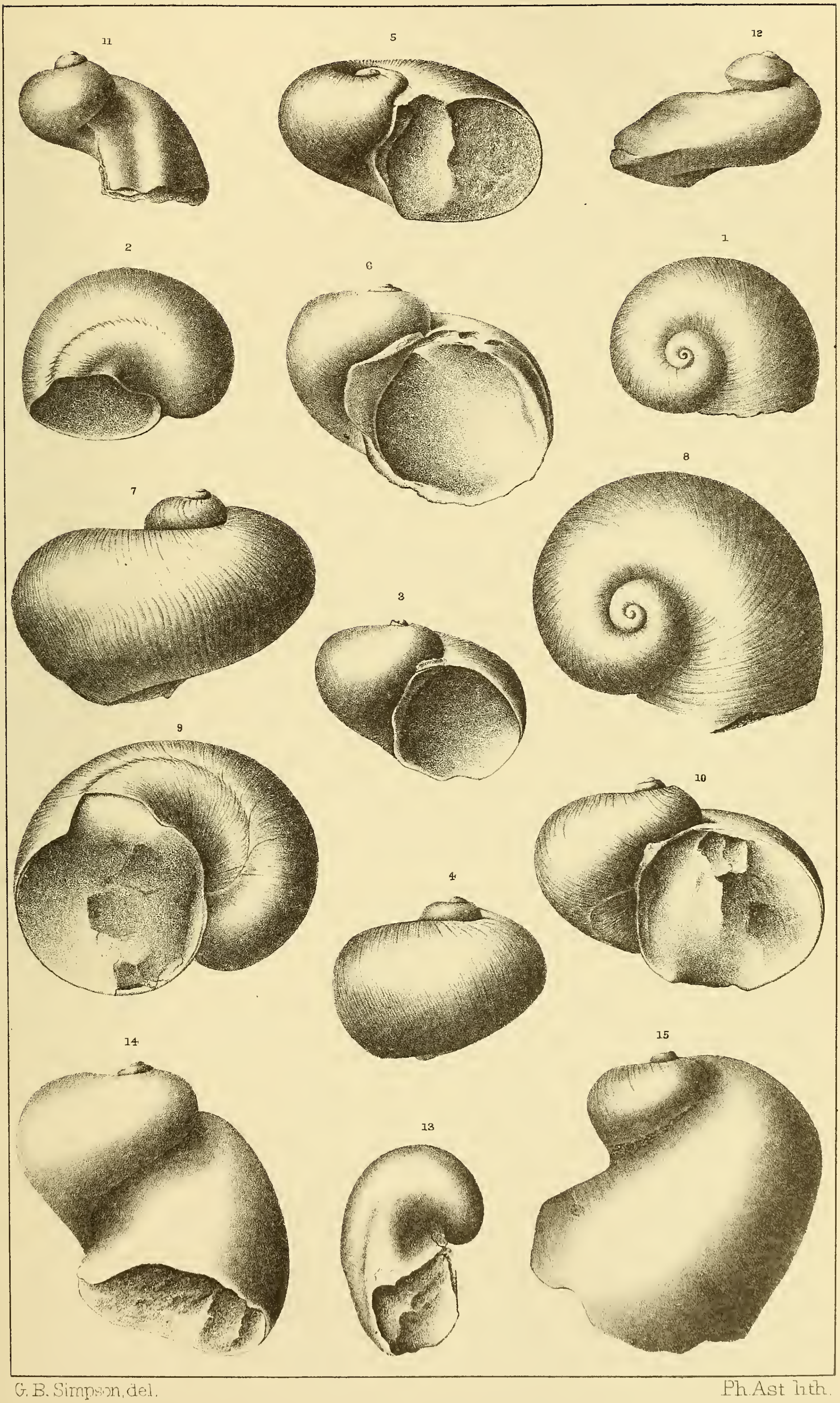
Fig. 5. The aperture of a specimen having the spire flat or slightly depressed, and the peristome spreading upon, and conforming to, the shape of the preceding volution.

Fig. 6. The aperture of a larger specimen, with more rounded volutions and elevated spire, but having the peristome overlapping the preceding volution.

Figs. 7–10. Four views of a specimen with moderately elevated spire, subdepressed volutions and slightly united peristome. In consequence of some accident during the early stages of growth, the inner part of the lower lip has become contracted, forming a deep and abrupt break in the margin, which has probably increased with the age of the shell; as shown in fig. 9.

Figs. 11–13. Front, dorsal and basal views of a slender, depressed specimen, with loosely coiled volutions, which become disunited and deflected.

Figs. 14, 15. The opposite sides of a large ventricose specimen, with rapidly increasing volutions — the last one becoming disunited and deflected, presenting a very peculiar character, and wide contrast with other forms.



G. B. Simpson, del. Ph. Ast lith.

PLATE XXX.

Strophostylus cyclostomus *Hall.*

Page 176.

Fig. 1. The back of a small specimen, showing the rotundity of the volutions and an unusually high spire.

Fig. 2. An oblique front view of a larger characteristic specimen, showing the obliquity of the aperture.

Figs. 3, 4. Summit and lateral views of a specimen of usual form and size.

Fig. 5. The aperture of a more elevated specimen, showing the character of the inner lip and columella.

Fig. 6. Dorsal view of a specimen with very rotund volutions.

Fig 7. The aperture of a more erect and elevated form, showing some slight differences from fig. 5.

Figs. 8-10. Dorsal, basal, and oblique front views of a large, perfect specimen, showing the direction of the striæ, the aperture, etc.

Figs. 11, 12. Front and oblique lateral views of a specimen showing the form of the aperture, inner lip, and twisting of the columella.

Fig. 13. An enlargement of the surface-striæ of a full-grown specimen, showing the transverse striæ of growth, and the finer revolving lines.

Strophostylus cyclostomus *var.* disjunctus *n. var.*

Page 177.

Figs. 14, 15. The opposite sides of a specimen referred with doubt to this species. The outer volution has become free, so that its generic characters are obliterated; but the surface-striæ and the upper volutions are precisely the same as *S. cyclostomus.*

Cyrtolites sinuosus *Hall.*

Page 178.

Figs. 16–18. Lateral, front and dorsal views of a specimen enlarged to three diameters.

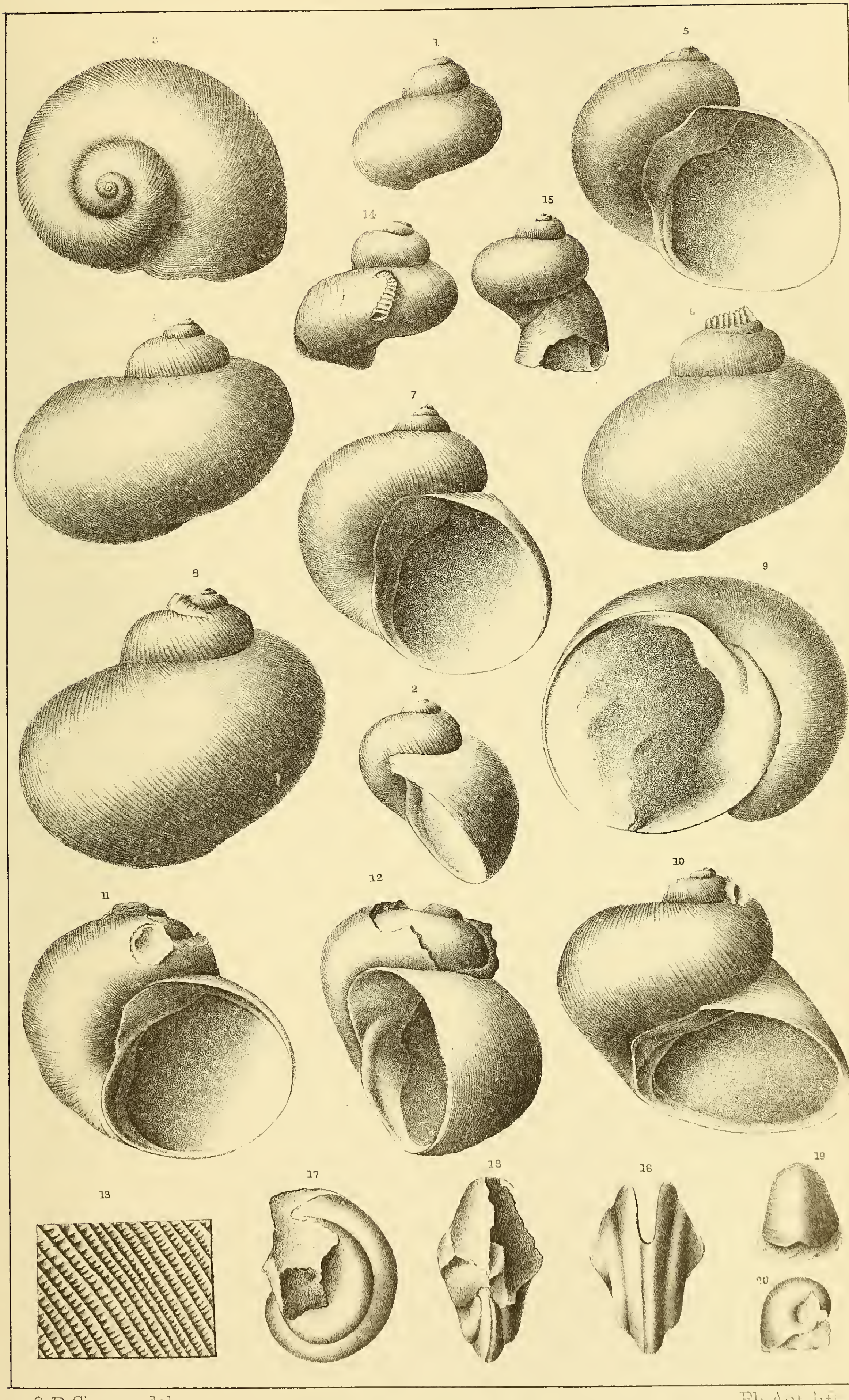
Bellerophon tuber *Hall.*

Page 177.

Figs. 19, 20. Dorsal and lateral views of a specimen, enlarged to two diameters.

NIAGARA GROUP.

(GASTEROPODA.)



G. B. Simpson, del.

Ph Ast lith

PLATE XXXI.

Cornulites proprius *Hall.*

Page 182.

Fig. 1. A group of young individuals attached to a young shell of *Strophostylus cyclostomus*, enlarged to two diameters. This group has the peculiarity of forming an irregular circle—the only instance of this kind observed.

Fig. 2. A large specimen attached to a shell of the same species as above.

Fig. 3. A group of three individuals of different sizes attached to the shell of *Platyostoma Niagarense.*

Fig. 4. Lateral view of a large specimen, showing the usual characters of the fully developed form.

Fig. 5. A smaller specimen which is attached to the side of the cup of *Eucalyptocrinus crassus.* The attached portion of the tube is flattened on the lower side and thickened above, and united by nearly its entire width to the crinoidal plates.

Fig. 6. A specimen of very irregular growth and strongly striated surface.

Fig. 7. Lateral view of a similar specimen, showing, as in the preceding, the repairs of injuries received during life.

Fig. 8. An enlargement of the surface, showing the character of the longitudinal striæ, and the abrupt change at one of the concentric ridges.

Fig. 9. A longitudinal section of a large imperfect specimen, showing the cellulose texture of the substance, and also the annulated character of the interior face of the tube.

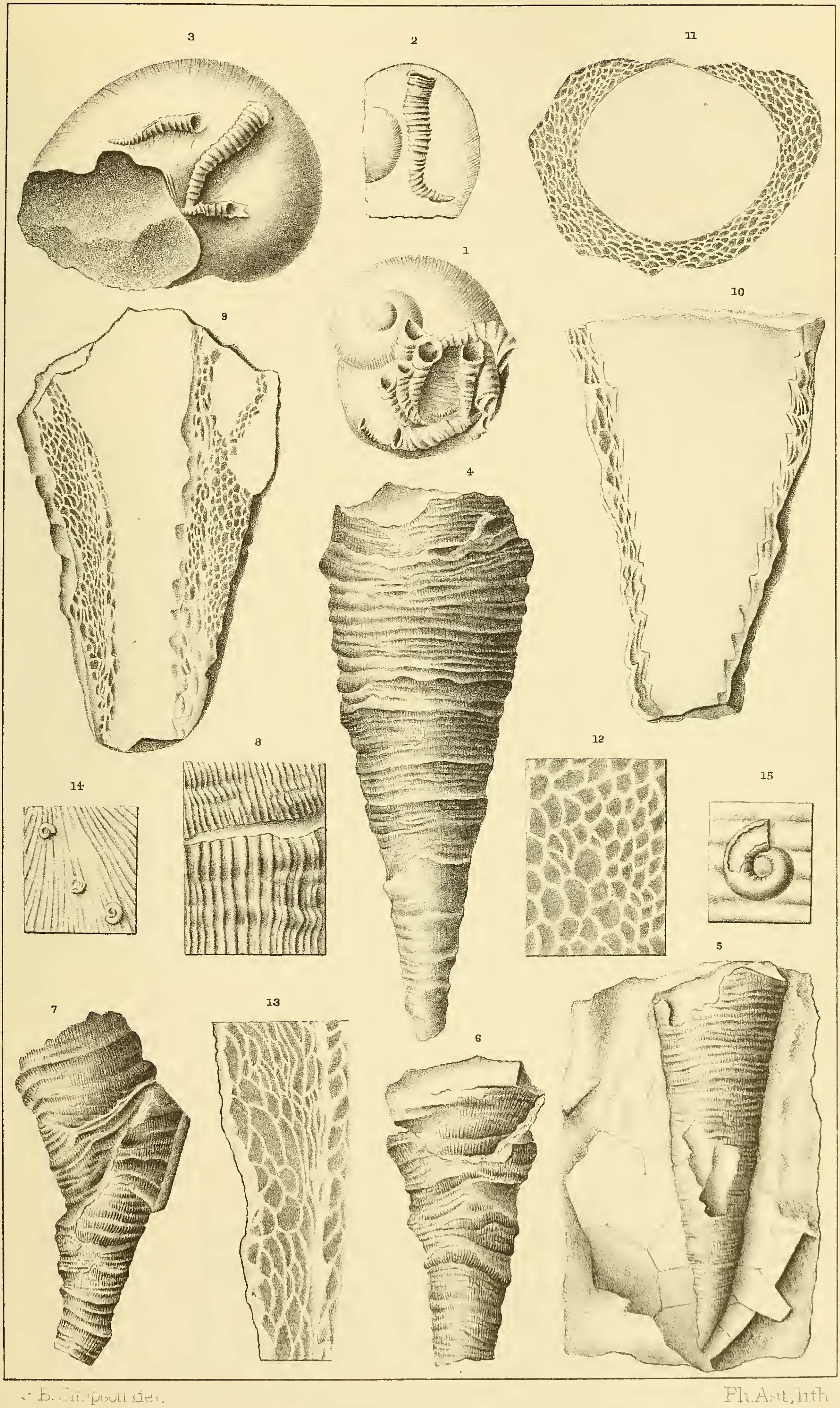
Fig. 10. A longitudinal section of a large specimen, where the walls have been quite thin, showing the annulation of the inner surface and a thin coating of cellulose tissue, chiefly on one side.

Fig. 11. A transverse section of a specimen enlarged, showing the vesicular texture of the test.

Fig. 12. A still farther enlargement from the same specimen.

Fig. 13. An enlargement of a part of the left side of specimen fig. 9, near the middle of the length, showing the partial obliteration of the annulations, on the interior at this point, by the formation of vesicular tissue upon the inner face. This change is probably the result of thickening and contracting the space with the advancing age of the individual; the usual and almost invariable mode of increase being by exterior additions of tissue.

Forms like those represented in figures 1, 2 and 3 have sometimes been referred to Cornulites, Tentaculites, and to column bases of Cystidians. More recently Prof. Nicholson has proposed the names Ortonia and Conchicolites for similar forms. The absolute connection of these small annulated forms with the larger ones, like figures 4, 5, 6 and 7, has been demonstrated; and we find the smaller attached forms, where there has been a thickening of the exterior, and a partial obliteration of the regular annulations, giving the individuals the aspect of the bases of figures 4 and 5. Moreover, longitudinal sections of these small annulated forms show vesicular structures similar to the larger ones. In one example before me, the interior wall of the tube is



J. B. Simpson del. Ph. Ast, lith

PLATE XXXI — (*Continued*).

well marked, with an exterior thickening of loose texture; and in another specimen, the inner wall is similarly well-defined, with an exterior thickening of the substance which is distinctly vesicular in structure.

SPIRORBIS INORNATUS *Hall*.

Page 181.

Fig. 14. A group of three specimens, natural size, attached to the surface of a *Strophomena*.

Fig. 15. A specimen enlarged, to show the character of the shell and the incipient annulations.

PLATE XXXII.

Leperditia faba *Hall.*

Page 186.

Fig. 1. The right side of a specimen greatly enlarged, showing the line of the hinge and the projection of the left valve above the right.

Fig. 2. Basal view of the same specimen, showing the convexity of the valves.

Fig. 3. The left side of a specimen, showing the overlapping of the valves at the base.

Beyrichia granulosa *Hall.*

Page 186.

Fig. 4. An enlargement of a right valve with the dorsal margin incomplete, showing the general form and granulose surface. The granulae as represented are too regularly disposed.

Cyphaspis Christyi *Hall.*

Page 188.

Fig. 5. A separate head, imperfect on the eye-tubercles and the glabella; enlarged to two diameters.

Fig. 6. An entire individual, enlarged to two diameters.

Fig. 7. Profile of the same specimen, showing the elevation of the body, enlarged to correspond with the preceding figure.

Calymene Niagarensis *Hall.*

Page 187.

Fig. 8. The upper surface of a large specimen, slightly distorted about the cephalic shield.

Fig. 9. The under side of the same, showing the hypostoma in place.

Fig. 10. The upper surface of a larger cephalic shield, showing nearly perfect eye-tubercles.

Figs. 11, 12. Front and lower side of the same specimen, showing the continuation of the facial sutures.

Fig. 13. A separated glabella and fixed cheeks.

Fig. 14. Profile of the specimen fig. 11.

Fig. 15. Profile of the specimen fig. 13, showing the line of the facial suture and elevation.

Ceraurus (Chierurus) Niagarensis *Hall.*

Page 189.

Fig. 16. A nearly entire pygidium, showing its form and characters.

Homalonotus delphinocephalus (*Green*).

Page 187.

Fig. 17. The upper surface of a fragment of a head, showing the characters as well as can be seen in any of the specimens known from this locality.

Fig. 18. An imperfect pygidium.

Illænus armatus ? *Hall.*

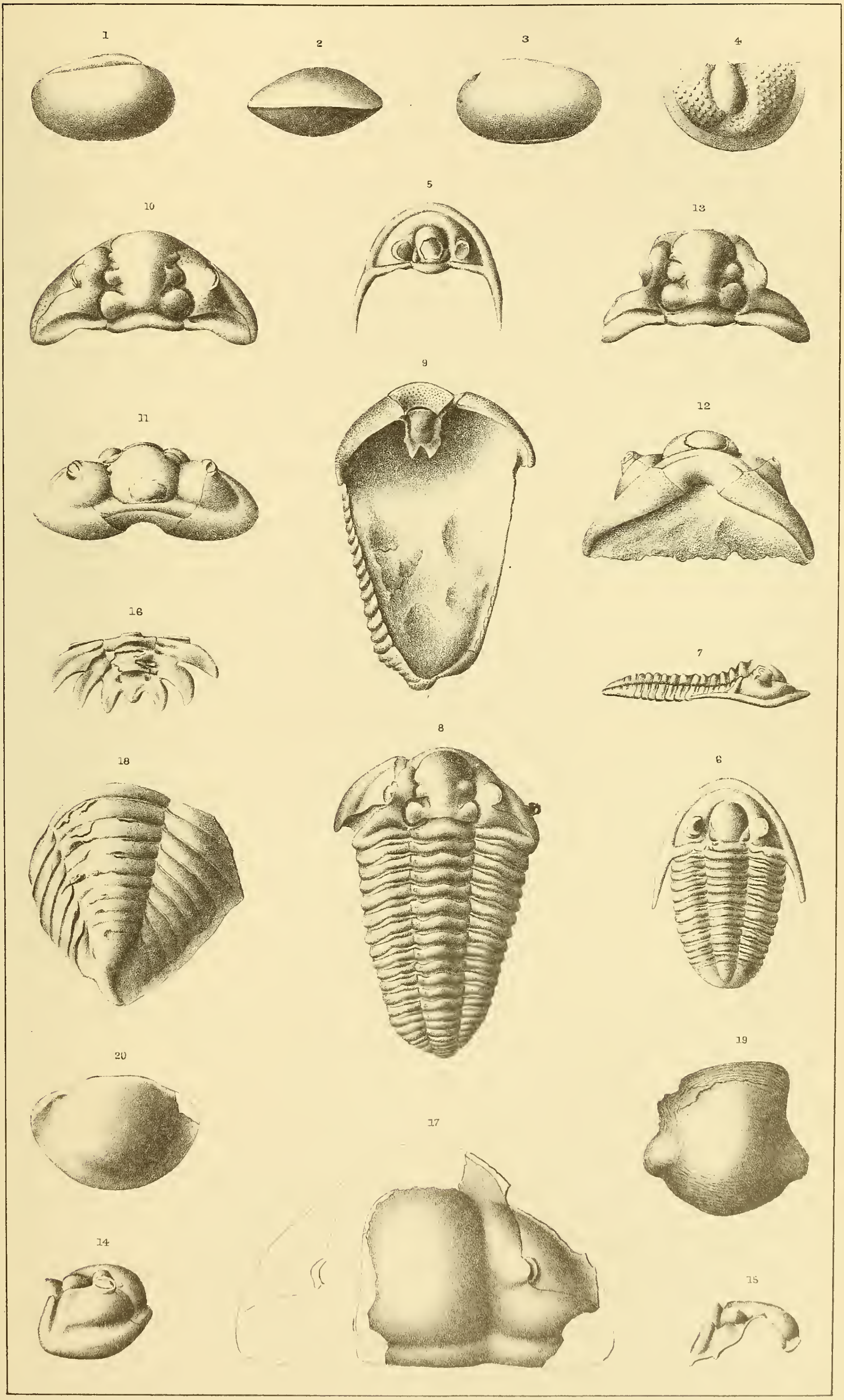
Page 189.

Fig. 19. An imperfect glabella.

Fig. 20. An imperfect pygidium, the anterior margin restored in outline at the right hand upper angle.

NIAGARA GROUP.

(CRUSTACEA.)



G. B. Simpson, del.

PLATE XXXIII.

Dalmanites vigilans *Hall.*

Page 193.

Fig. 1. The upper side of a cephalic shield, showing the characters observed on several individuals from this locality.

Fig. 2. The lower surface of the border of a head.

Figs. 3, 4. Two pygidia referred to the same species.

Dalmanites verrucosus *Hall.*

Page 195.

Fig. 5. A small head, having the usual character of this species.

Fig. 6. A larger head showing a slight spiniform node on the occipital ring.

Fig. 7. The dorsal surface of a large specimen, preserving the head and thorax entire, and the anterior part of the pygidium, with all their characteristic markings.

Fig. 8. A much larger imperfect head.

Fig. 9. Anterior view of a nearly perfect head, of somewhat more than the medium size, showing the anterior extension of the facial suture, on the left hand side of the figure.

Fig. 10. Lateral view of the same, showing the posterior extension of the facial suture.

Fig. 11. An enlargement of the eye.

Fig. 12. A profile view of a thoracic segment.

Figs. 13–15. The pygidia of three individuals, showing gradations in size.

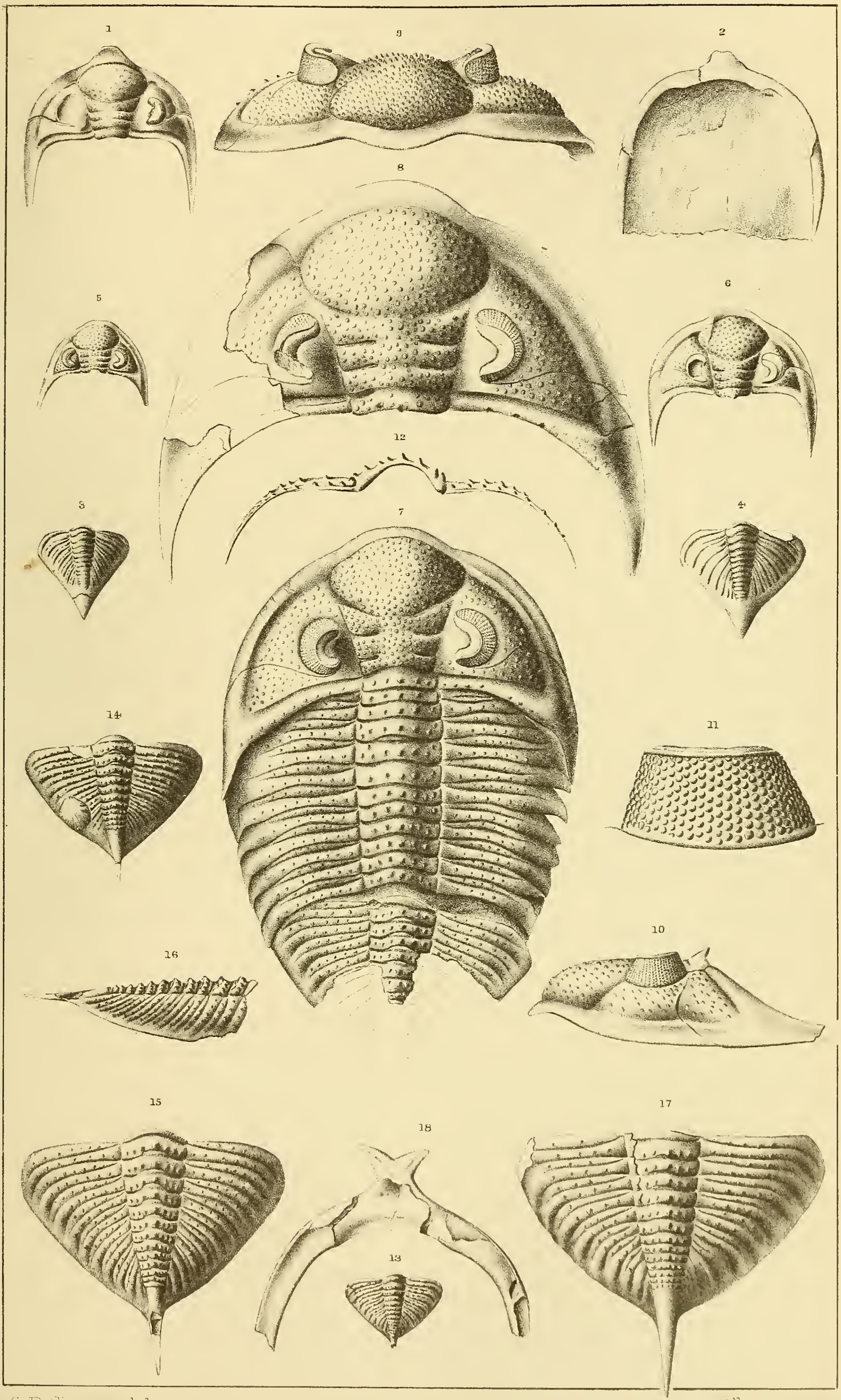
Fig. 16. Profile of the specimen fig. 15, showing the elevation of the axis.

Fig. 17. A larger pygidium, which is remarkably straight on the anterior margin.

Dalmanites bicornis *Hall.*

Page 196.

Fig. 18. The lower surface of the marginal rim of the head, showing the anterior bifurcating process. No other parts of this species are known at the present time.



G. B. Simpson del. Ph. Ast, lith

PLATE XXXIV.

LICHAS BREVICEPS *Hall.*

Page 197.

Fig. 1. The upper surface of an imperfect head; the typical form of the species.
Fig. 1 a. An enlargement of the surface of the glabella.
Fig. 2. Profile view of the same, showing the elevation of the glabellar lobe.
Fig. 3. An enlargement of the eye.
Fig. 4. An imperfect thorax and pygidium; the anterior part of the figure is restored in outline.
Fig. 5. The lower surface of a large imperfect pygidium, showing the striæ of the enfolded border.
Fig. 6. The upper surface of a smaller imperfect pygidium, restored in outline.
Fig. 7. The central portion of a large glabella; the outline is carried out to correspond with the specimen fig. 1.

LICHAS BOLTONI (*Bigsby*) *var.* OCCIDENTALIS *Hall.*

Page 198.

Fig. 8. The lower side of a large perfect pygidium, showing the broad inner lining of the border with its characteristic markings.
Fig. 9. The upper side of a smaller imperfect pygidium. The separation between the lobe of the axis and its continuation on the marginal expansion, is due to accidental pressure and partial distortion of the parts.
Fig. 10. The lower surface of a smaller pygidium, showing similar characters to fig. 8, except that it is more rounded on the posterior margin.
Fig. 11. The hypostoma of a specimen, probably of this variety, resembling those from the Niagara shale of New York.

LICHAS *sp.?*

Page 199.

Fig. 12. The anterior extension of a head of undetermined specific relations belonging to this genus.

DALMANITES VERRUCOSUS *Hall.*

Page 195.

Fig. 13. The lower surface of the marginal rim of the head, for comparison with fig. 2 of Pl. 33.
Fig. 14. The inner side of the crust of a pygidium, showing the points of attachment for natatory organs.*
Fig. 15. Profile view, looking across the elevation of these processes of attachment, and of the ridge corresponding to the dorsal furrow of the exterior.

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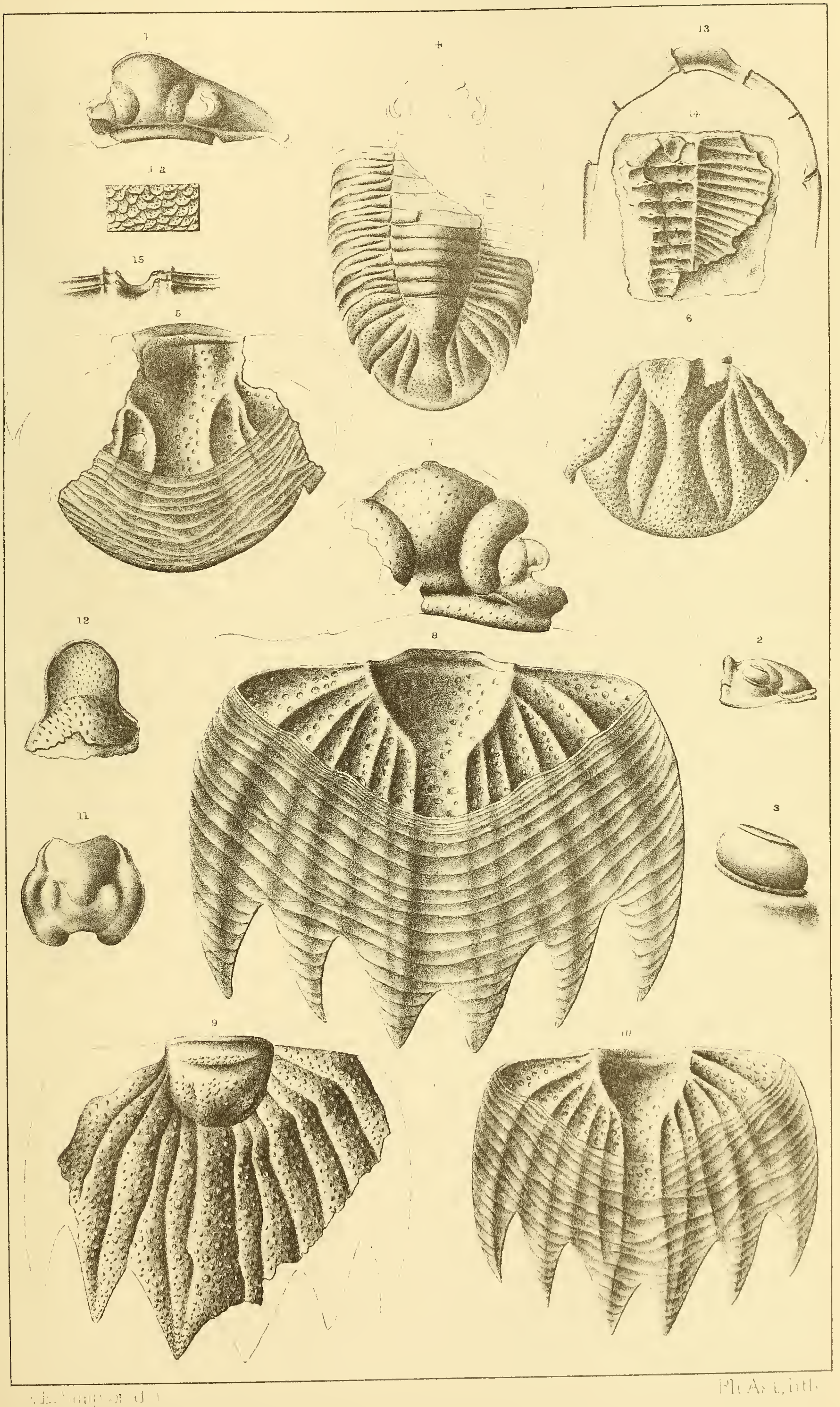
*See a paper in this Report, on the *Discovery of the Remains of Natatory and Branchial Appendages of Trilobites*, by C. D. Walcott.

NIAGARA GROUP.

(CRUSTACEA.)



Ph. Ast, lith.

PLATE XXXV.

Camarocrinus stellatus.

Page 207.

Fig. 1. Basal view of a large individual, showing the form and lobation of the body and the structure of the base with the attachment for the column. The bifurcations of the basal branches indicate that there were ten ambulacral openings to the interior chambers.

Fig. 2. *Id.* Lateral view showing the elevation of the body, and the variolate surface, produced by the weathering of the exterior.

Fig. 3. The base of a smaller specimen with the form and lobation of the body shown in outline. The base of this specimen is comparatively a little larger than in the preceding one. The external structure is shown, and a portion of the stellate surface at the right hand side of the figure. The portion in outline shows the internal chambers of the same specimen.

Fig. 4. *Id.* A portion of the surface enlarged six diameters showing the stellate network forming the exterior walls of the chambers. At the junction of the numerous ramifications the rays are thickened and elevated into a distinct node.

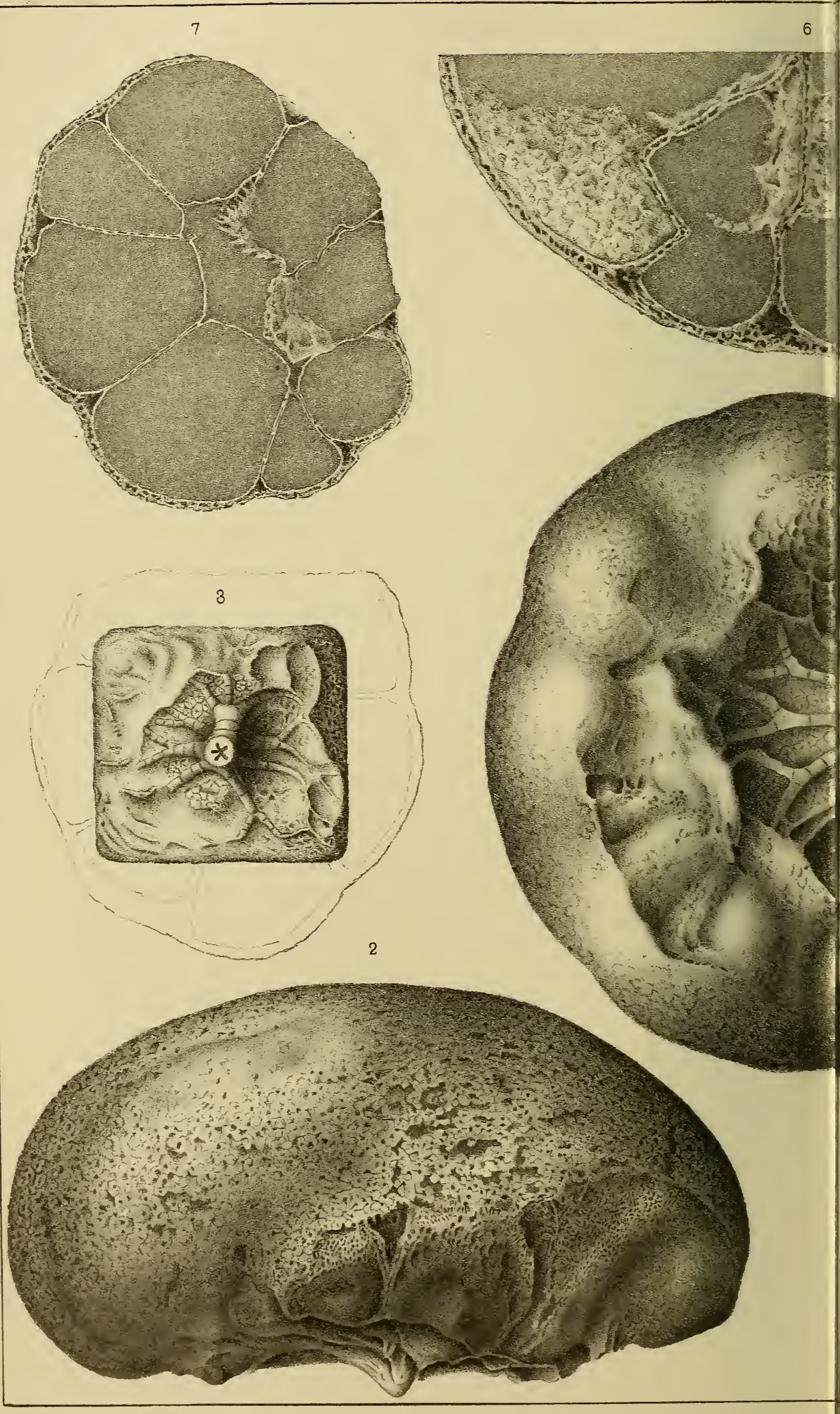
Fig. 5. A vertical section of specimen, fig. 1, showing the vertical axis and horizontal partitions of the body. The chamber indicated by *c*, appears to be composed of solid plates, occupying a position immediately above the column attachment, and corresponding to the position of a calyx proper. The double character of the exterior chamber walls is also shown, with the infolding of the interior layer to form the partitions of the chambers.

Fig. 6. Horizontal section of the lower half of fig. 1, showing portions of two large chambers and two smaller intermediate chambers.

Fig. 7. A horizontal section of a small individual, divided into eight irregular chambers, and an obscure central cavity, by the vertical partitions.

Fig. 8. Horizontal section near the summit of another example, showing a division into four equal and symmetrical chambers.

The specimens of this species here illustrated are from the Tentaculite limestone, *Schoharie, N. Y.*



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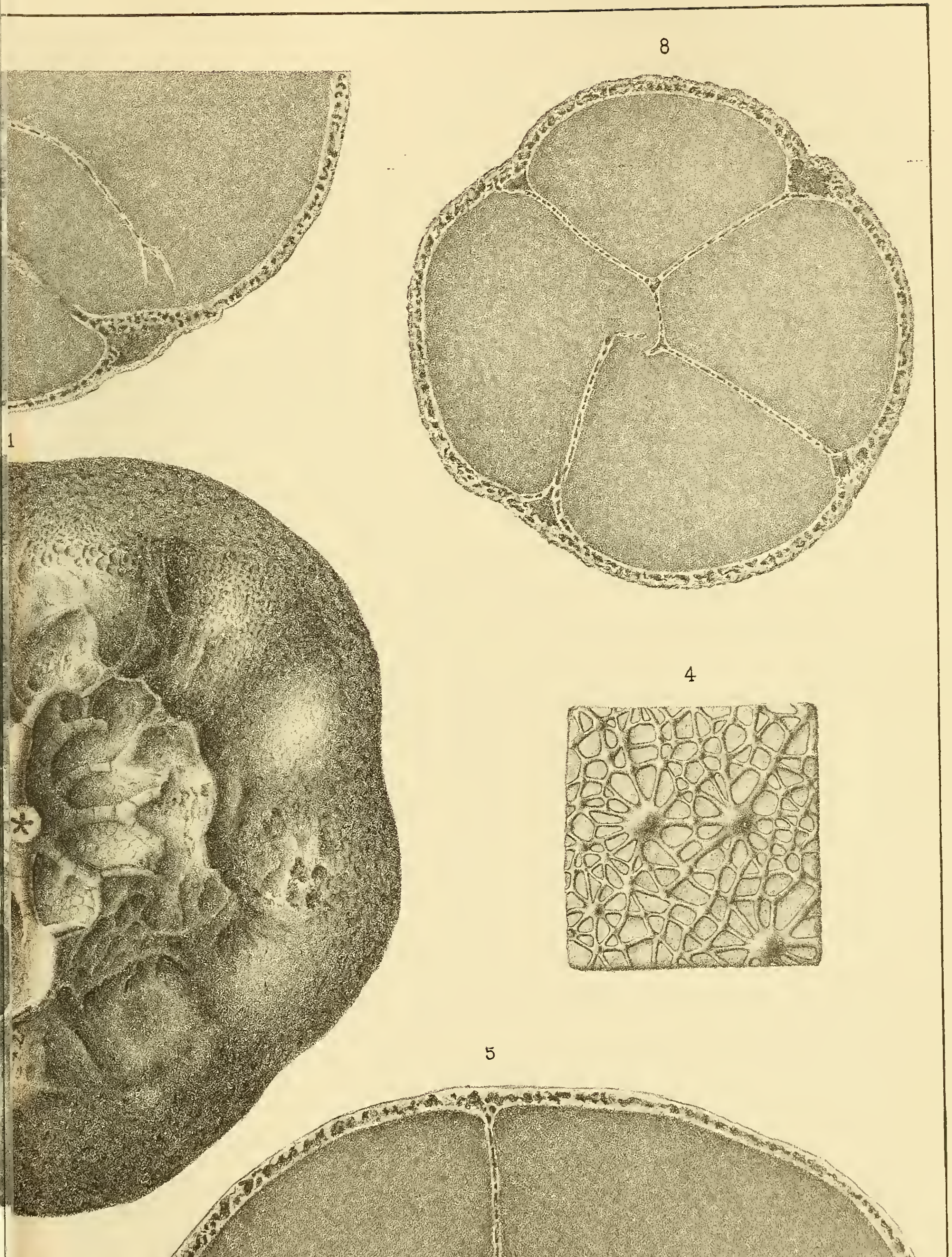
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1
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5
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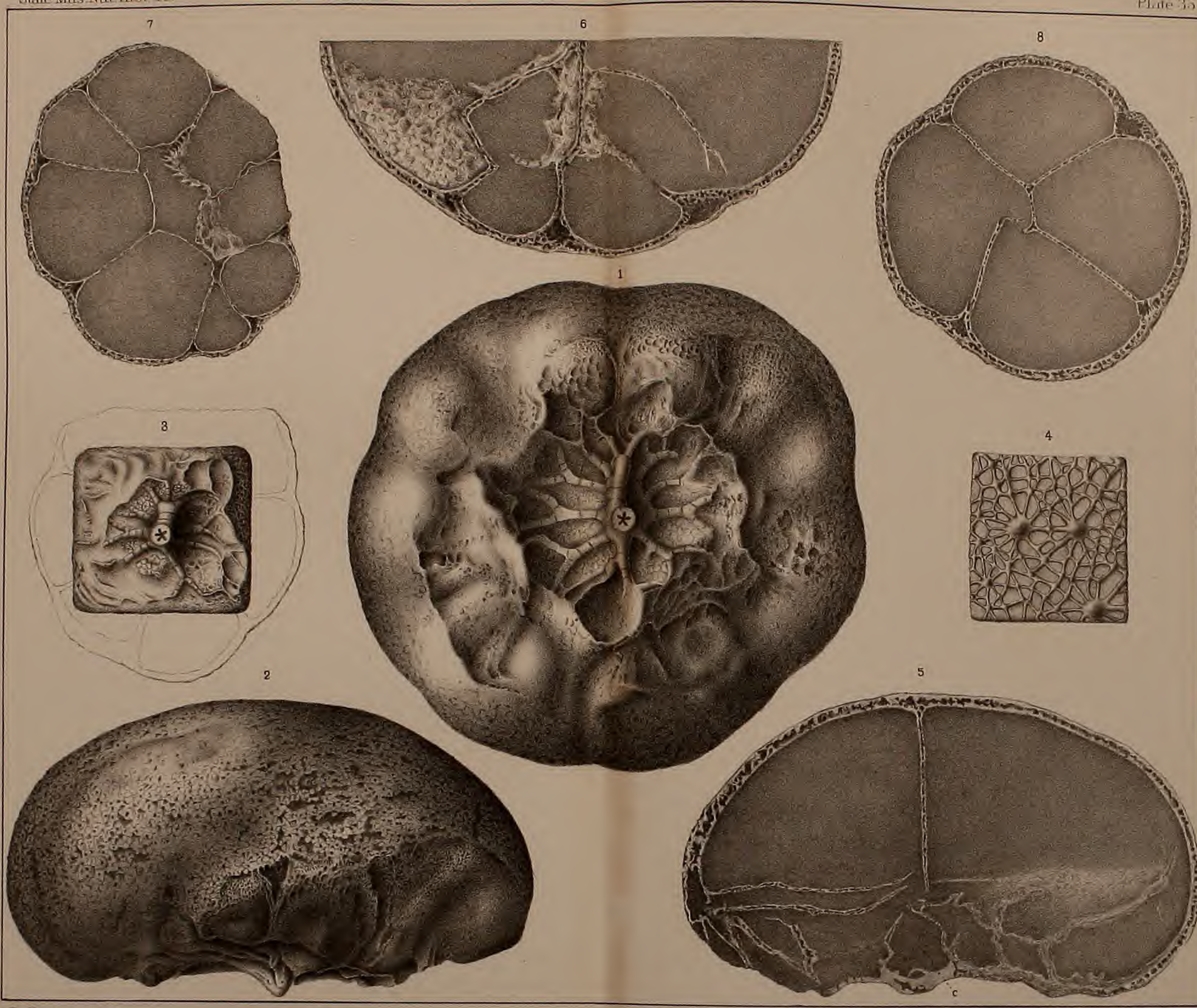

F. Emmons del. Phil. Ast lith.

PLATE XXXVI.

Camarocrinus Saffordi.

Page 208.

Fig. 1. Basal view of a well-preserved specimen, showing the form and lobation of the body, the projecting imperfect margin around the basal area, and the structure of the base. In this specimen there are five large and distinct ambulacra, opening into the interior cavities, and the bases of two small accessory columns on opposite sides of the central one.

Fig. 2. Lateral view of a specimen, consisting of five equal lobes: The external layer of the walls has been removed from the upper portion, showing the plates of the internal walls.

Fig. 3. Summit view of an example, showing its laterally compressed form, owing to the great development of two of the internal chambers and the corresponding lobes, and a partial or complete atrophy of the others.

Fig. 4. Lateral view of a specimen of subspherical form, without any well-defined lobation of the dome. The plates have been removed in the process of weathering, giving to the surface much the appearance of a Favosite.

Fig. 5. The basal area of an example enlarged two diameters, showing in detail the structure of this portion of the body.

Fig. 6. An enlargement to four diameters of a portion of the surface of the exterior walls of a specimen, showing the irregular polygonal plates, and the impressed sinuous or cerenulate sutures.

Camarocrinus Clarkii.

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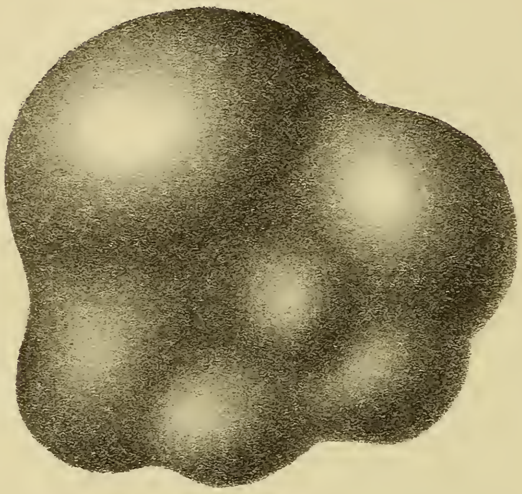
Fig. 7. Summit view of a specimen, showing the irregular form and unequal lobation of the body.

Fig. 8. *Id.* Basal view, showing the form, size, and position of the basal area, which is imperfectly preserved, but clearly indicates the numerous ambulacra, opening into the internal cavities.

The specimens illustrated on this plate are from the Lower Helderberg limestone, *Hardin county*, *Tenn.*

7



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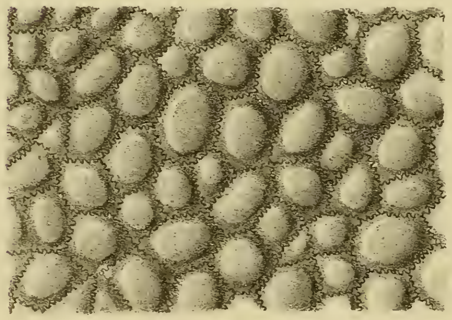

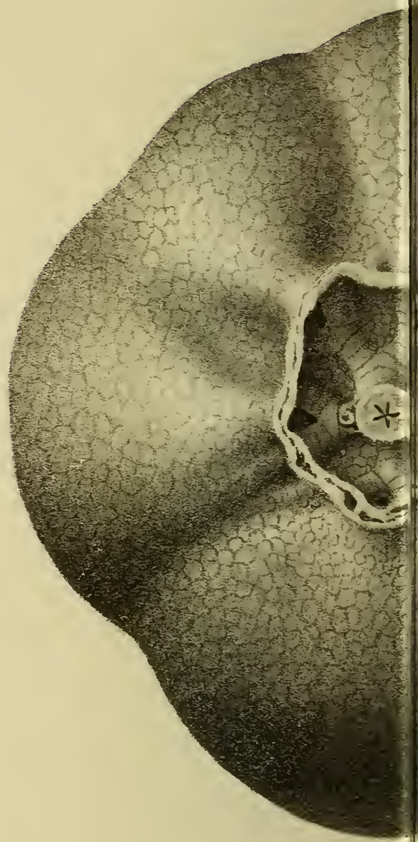

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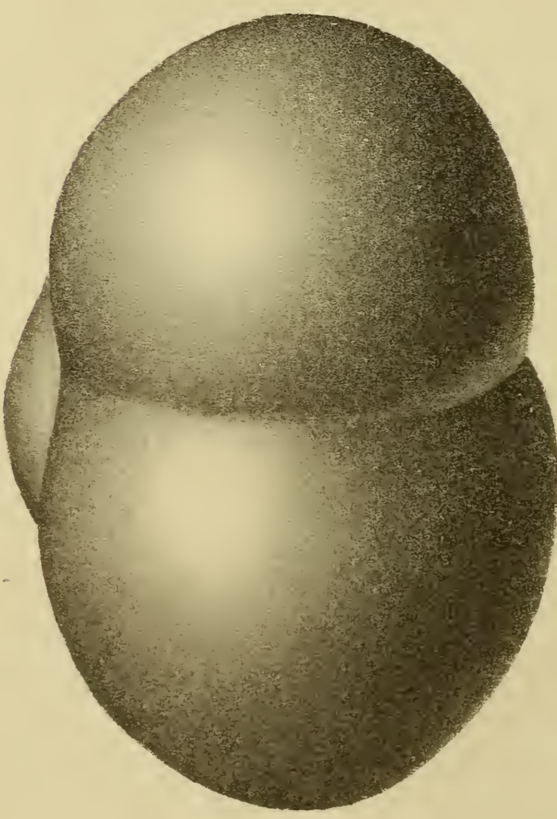

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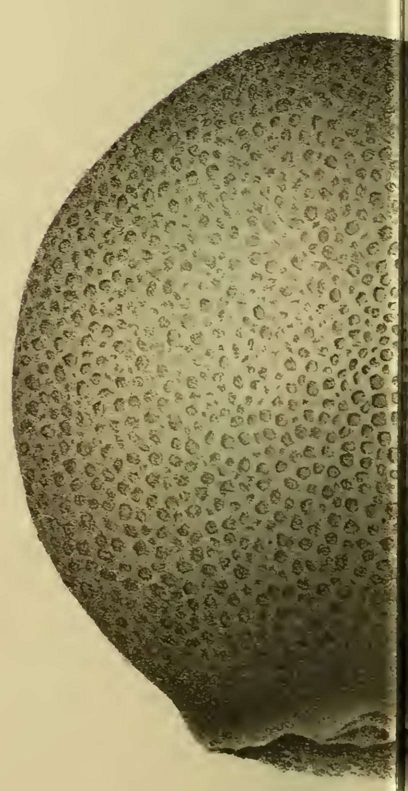

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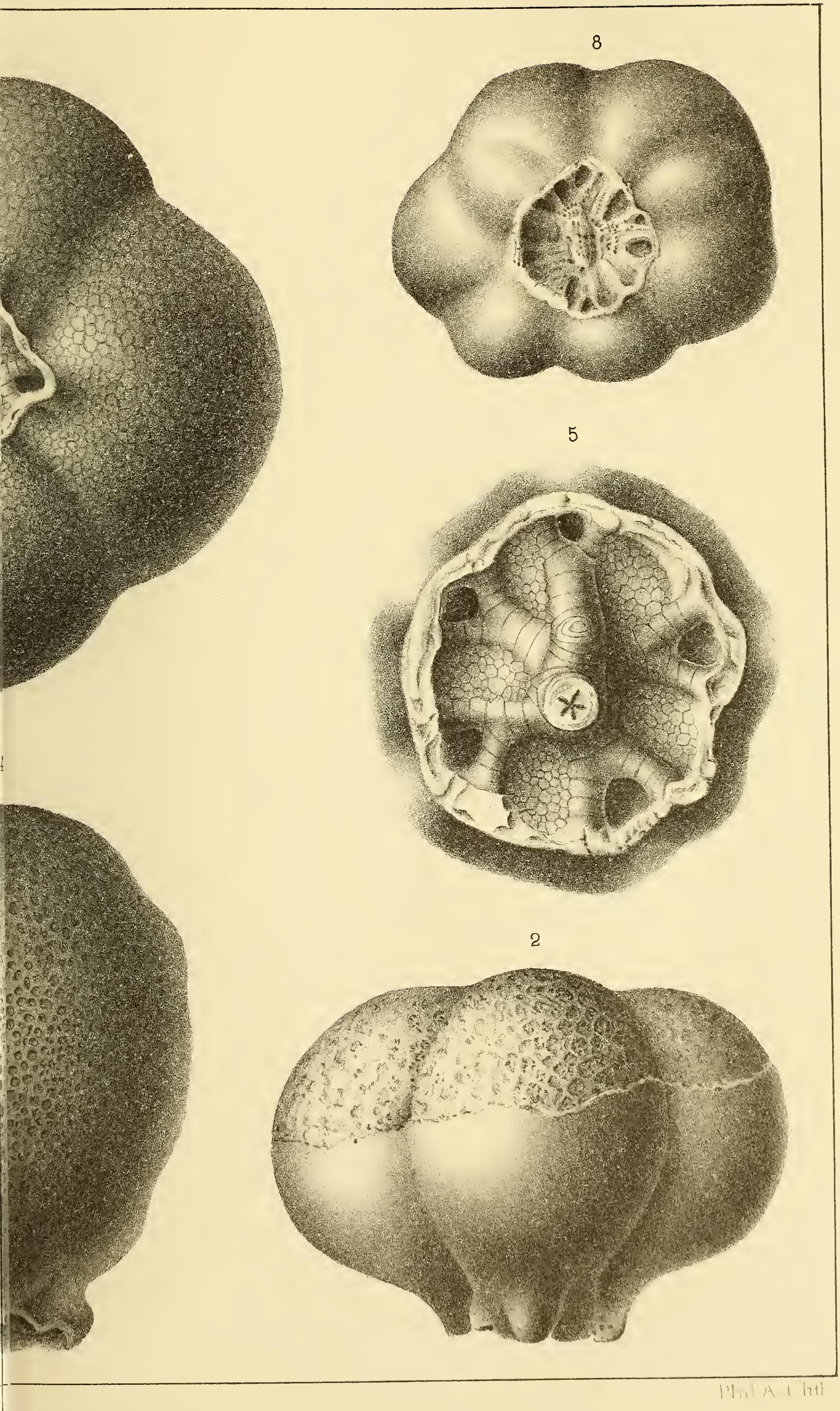
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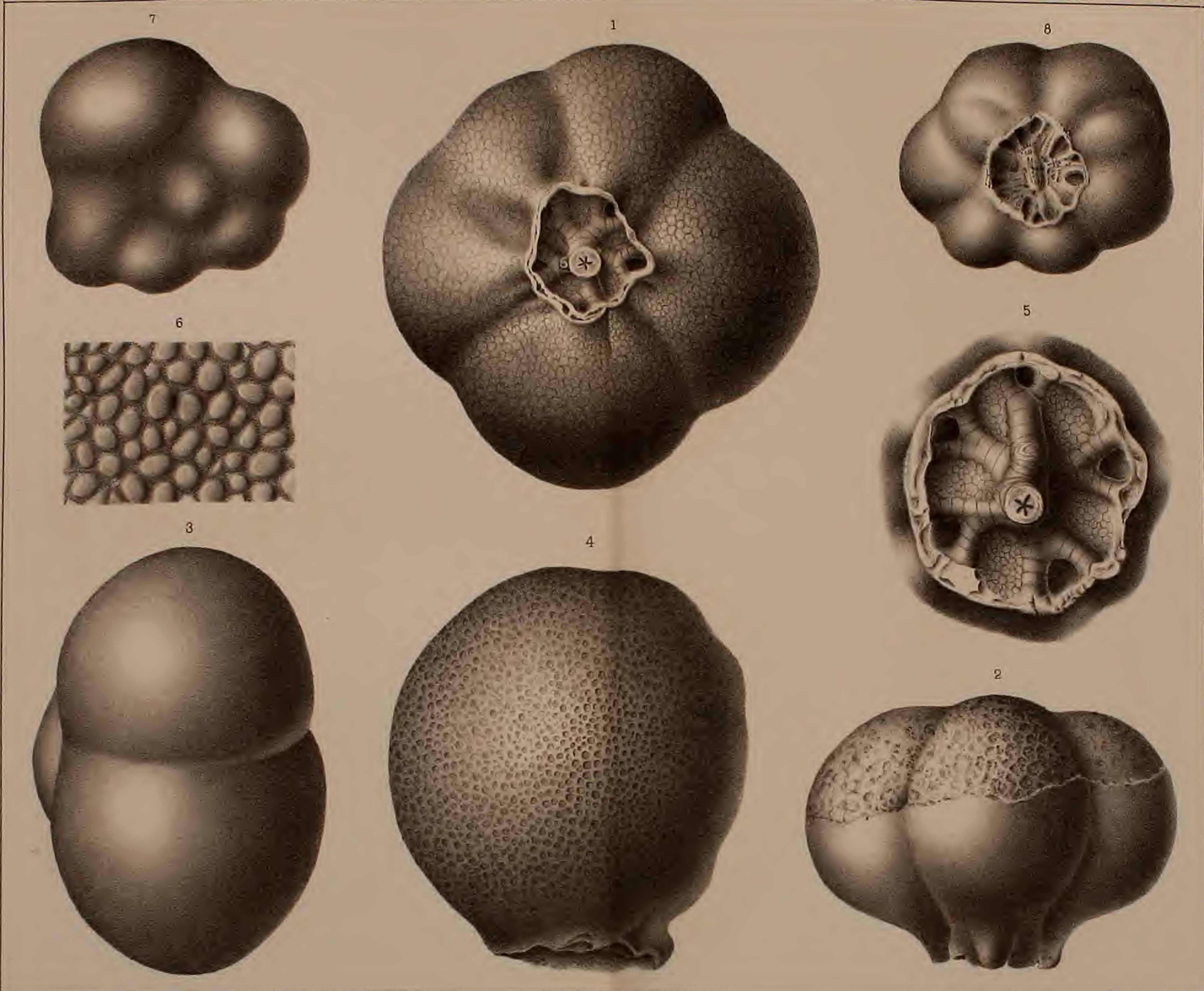

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PLATE XXXVII.

CAMAROCRINUS SAFFORDI.

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Fig. 1. An outline showing the form and lobation of a specimen, consisting of two large equal lobes and three smaller, nearly equal, accessory lobes.

Fig. 2. A horizontal section in outline, of the largest individual observed, showing the comparative thickness of the partitions and external walls, with five unequal internal chambers.

CAMEROCRINUS CLARKII.

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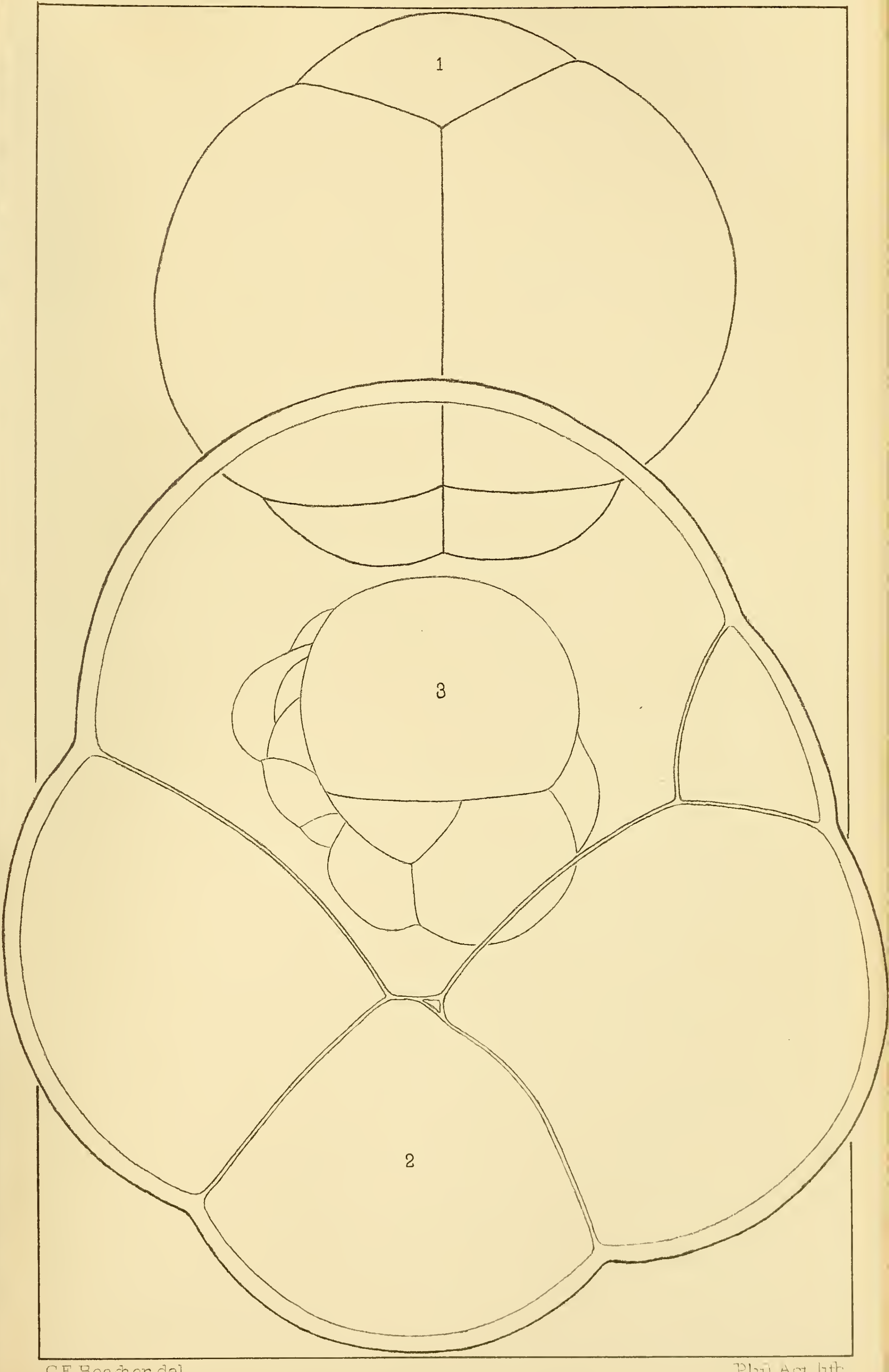
Fig. 3. A diagram of the internal chambers, drawn from the lobes shown on the exterior of the specimen represented in figs. 7, 8, pl. 36.



C. E. Beecher del. Phil. Ast. lith.

TWENTY-NINTH ANNUAL REPORT

ON THE

New York State Museum of Natural History

BY THE

REGENTS OF THE UNIVERSITY

OF THE

STATE OF NEW YORK.

TRANSMITTED TO THE LEGISLATURE APRIL 17, 1876.

JEROME B. PARMENTER, STATE PRINTER.
1878.

REGENTS OF THE UNIVERSITY.

STANDING COMMITTEE ON THE STATE MUSEUM.

STATE OF NEW YORK.

No. 64.

IN SENATE,

April 18, 1876.

TWENTY-NINTH ANNUAL REPORT

ON THE

STATE MUSEUM OF NATURAL HISTORY, BY THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK.

UNIVERSITY OF THE STATE OF NEW YORK:
OFFICE OF THE REGENTS,
ALBANY, *April* 17, 1876.

To the Hon. WILLIAM DORSHEIMER, *President of the Senate:*

SIR—I have the honor to transmit the Twenty-ninth Annual Report on the State Museum of Natural History, by the Regents of the University.

I remain, very respectfully,

Your obedient servant,

JOHN V. L. PRUYN,

Chancellor of the University.

REPORT.

To the Honorable the Legislature of the State of New York:

The Regents of the University, as Trustees of the State Museum of Natural History, respectfully submit this their twenty-ninth Annual Report.

The condition of the Museum and the work of the last year are exhibited in the reports of the Director and of the Botanist, hereto appended.

Respectfully submitted in behalf of the Regents.

JOHN V. L. PRUYN,
Chancellor of the University.

S. B. Woolworth,
Secretary.

Dated *March* 14, 1876.

REPORT

ON THE

STATE MUSEUM OF NATURAL HISTORY.

1876.

REPORT OF THE DIRECTOR.

ALBANY, *January*, 1876.

To the Honorable the Board of Regents of the University of the State of New York :

GENTLEMEN.—I have the honor to present to you the Annual Report upon the State Museum of Natural History, embracing a statement of the condition of the collections in the Museum, the additions made thereto by donations or otherwise, and the work done in the institution during the past year.

I am able to say that the collections in the several departments of the Museum are in good order and condition, and nearly all are satisfactorily arranged, as shown in the following detailed statement regarding each department. The want of space in every direction s becoming more apparent year by year, and the accumulation of specimens which cannot be placed on exhibition is rapidly increasing. This want of room is more especially felt in regard to the collection of New York Palæozoic Fossils which now occupies all the space allotted to it; while we have besides large collections of these for which there are no cases, nor any room to place cases in the present building.

In the Zoölogical Department we have no room to add another large specimen; and the additions made during the past few years have been disposed, often in violation of a strict systematic arrangement.

I have appended a special communication in reference to this department, and of the absolute necessity of providing additional space, if we are to receive the skeleton and skin of a rhinoceros and the skin of a giraffe, which I have considered it my duty to purchase and hold subject to your direction, and which are now in preparation for the Museum.

We have, as heretofore, been indebted to the kindness of Mr. T. L. Harison, Secretary of the State Agricultural Society, for the use of the Agricultural Hall, for the arrangement, labeling and distribution of our duplicate specimens; of which a detailed account will be given in the report. Owing to the fact that for a considerable portion of the year this hall has been occupied for other purposes on the first day of each week, each of these occasions requiring the removal of the specimens under investigation, has greatly retarded the progress of the work. For some months past, however, we have been going on without interruption.

I consider it my duty to repeat now, what I have so often said before, that the want of proper working rooms, no less than the want of space for arrangement of collections in the public rooms, greatly retards the progress of our work, and prevents, in a greater or less degree, every person connected with the institution from doing as much as he might, or of presenting in a proper manner the results of his labor ; and while I am sure that every one is willing and desirous of performing properly his duties, we are hindered from so doing by this condition of things, and the public are denied the satisfaction of seeing the results of these labors in the gradual extension of the Museum collection.

I beg, therefore, to submit for your consideration, that while, on every side, museums of natural history are being built up or greatly extended, the State Museum of New York, after an existence of more than thirty years, has now scarcely more ample accommodations than it had in the beginning, and its conveniences for working rooms are far inferior to what it possessed from 1843 to 1850.

The general work of the Museum, during the past year, may be enumerated under the following heads :

In the Botanical Department, a special report upon the work done will be presented by Mr. Peck.

In the Zoölogical Department there has been an arrangement of the Molluscan collections ; the preparation of a list of the New York Mollusca, and the addition of alcoholic specimens. In this department the Museum is very deficient in subjects which might be prepared and added to the cases, were means afforded for making zoölogical collections.

In the Geological and Palæontological Departments, there has been a rearrangement of the Geological series, with additions ; a partial rearrangement and relabeling of the Palæontological collection, with additions ; also field work and collections made. Enlarged figures of fossils have been prepared, to illustrate the characteristic form of each group, and some of them have been placed above the shelves of the cases.

In the Mineralogical Department there has been a rearrangement and relabeling of the New York collection and of the general collection of minerals; the preparation of mineral collections for distribution, cataloguing and distribution of duplicate collections of fossils and minerals.

A list of the additions and their sources, in each of the departments of the Museum, will be found in detail appended to this report.

Additions to the Museum by Donations.

In the Zoölogical Department, contributions have been made during the year by thirteen individuals in sixteen distinct donations. The Molluscan contributions of Dr. Lewis, consisting of about 550 specimens, are of great value to the Museum, as nearly all are in unusually fine condition, and among them are a number of rare species.

The Botanical Department has received donations from twenty-two individuals.

To the Geological, Palæontological and Mineralogical collections, donations have been made by sixteen individuals, of one hundred and fifty-five specimens.

To the Archæological Department, three donors have contributed.

The Library has received additions by donation of thirty-five volumes and forty-seven pamphlets, from ten individuals and nine societies or other organizations.

The whole number of donors to the several departments has been seventy-three.

Additions by Exchange.

A number of the additions to the Library have doubtless been made in consideration of Museum reports distributed. Only three exchanges proper are recorded, viz., one of geological specimens, one of minerals and one to the Library, in return for Museum reports.

General Work of the Museum.

Arrangement of Molluscan Collections.

In January last the services of Dr. James Lewis, of Mohawk, were engaged for the much needed work of revision, determination, labeling and cataloguing of the land and fresh-water shells of the United States belonging to the Museum. As stated in a former report, there was a large accumulation of specimens — from the collections made during the geological survey of the State, from the purchase of the Gould collection, and from various contributions — only a small portion of which had been incorporated with the Museum collections. Dr. Lewis' familiarity with most of the species enabled him to pass this material under his critical review during a few weeks' engagement at the Museum, and it is due to him to say that the work, requiring much experience and discrimination, was satisfactorily accomplished.

The collections consist largely of Unionidæ. Of these, each example has had inscribed on the inner side of one valve the serial number or order given in the "Synopsis of the Family Unionidæ;" * thereby insuring the proper reference, should the specimen become separated from its label. These specimens have been arranged in three collections (catalogues of which are herewith presented), viz.:

1. Unionidæ of the State of New York. All the species credited to the State, with the single exception of *Unio Boydianus* Lea, fifty-two in number, are represented in this collection by from one to fourteen specimens and in 227 examples.

2. Unionidæ of the Gould Collection, consisting of 310 species and five varieties, represented in 1,042 examples. A few only of these are exhibited under glass, where the species is shown in specimens from different localities; otherwise the series, for want of room, is arranged in drawers 43 to 51 of the Gould cabinets. Access to these may at any time be obtained by the student through application at the Director's room.

3. Unionidæ of the General Collection, consisting of 254 species in 1,221 specimens. These are arranged in drawers beneath the New York State Molluscan Collection.

In the above named three collections are contained 382 distinct species of Uniones, showing a very favorable comparison with the principal collections in the country.†

In addition to the above Museum collections of Unionidæ, duplicates in species have been set aside, and are available for exchanges.

There have also been arranged and catalogued by Dr. Lewis, three other collections, viz.:

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*By Isaac Lea, LL. D. Fourth edition. Philadelphia, 1870. The Library of the Museum has received a copy of this volume through the kindness of Dr. Lea, at the request of Dr. Lewis.

†The private collection of Dr. Lewis contains 420 species; the collection of the Buffalo Society of Natural History is nearly as large; Dr. Lea's collection has about 500 species; the collection of the Museum of Comparative Zoology at Cambridge is represented to contain 600 species. The entire number of known species, from all parts of the world, as given in the Synopsis of Dr. Lea, is 1,067, of which the larger number occur within the United States.

1. Corbiculadæ of the State of New York, seventeen species represented in 227 specimens.

2. Land shells of the State of New York, seventy-six species represented in 1,117 specimens.

3. Land shells of the United States, sixty-two species represented in 512 specimens.

A list of the Mollusca of the State of New York (land, fresh water and marine), drawn from our collections, from the lists of Dr. Lewis, and from other reliable sources, has been nearly completed. This was intended for presentation with the present report, in order that, through its indication of the species in the possession of the Museum, it might serve as an aid in supplying our numerous deficiencies. It is temporarily withheld, to be given in a more complete form.

Geological and Palæontological Collections.

The labeling of the Palæontological collection has been continued. A large portion (the entire series from the Potsdam Sandstone to the Chemung group), has been reviewed and relabeled in accordance with the present nomenclature. This work had become necessary by the generic changes made since the original descriptions. The original name is retained on the label as a synonym, together with reference to the original description.

A considerable number of specimens have been added to the collections, especially in the Corals of the Upper Helderberg Limestone, and in those of the Coralline Limestone; while a large number of specimens are ready for arrangement.

Several improvements in the condition of the cases have been authorized by the Commissioners of the Land Office, affording facilities for the better arrangement of the specimens.

In the Twenty-fourth report of the State Museum, a list is given of specimens from the Lower Carboniferous Limestone of Burlington, Iowa, and from the Waverly Sandstone of Ohio, which were temporarily arranged in the cases. These specimens have been withdrawn and will be replaced by others of similar character belonging to the State.

Mineralogical Collection.

Heretofore I have communicated to you the condition of the Museum Collection of Minerals. With the approval of the Regents the Collection has been submitted to the examination and revision of

Professor Albert H. Chester of Hamilton College. The labels of Prof. Chester have been copied upon cards. The original labels, which had become discolored by long exposure, have been laid aside, to serve for future reference should it become necessary; their number recorded on the new card label, and also attached to the specimen, and the collection replaced and rearranged upon the shelves by Mr. Charles Sheldon, a volunteer assistant in the Museum.

About two years ago, a commencement was made in the arrangement of a general collection of Minerals — partly by selecting from the New York State collection such extra-limital species as had become incorporated with it, and partly by adding New York specimens proper, which had accumulated in the Museum. By this course we were able to conform the collection to the original plan of Dr. Lewis C. Beck, the mineralogist of the New York Geological Survey, and to present in a classified series the minerals of the State of New York. This work was begun and carried out under my direction, so far as our material then permitted, by Mr. Calloway while acting as special assistant. It was then suspended until we had an opportunity of selecting from the Simms and the Gebhard collections, purchased by the State, and from the Van Rensselaer collection, which had been presented to the Museum. The mineralogical portion of the three collections above named, viz., the Simms collection, purchased in 1870; the Gebhard collection, purchased in 1871, and the Van Rensselaer collection, donated in 1872; have occupied us for the last few months. The labeling will soon be completed.

Among the Simms' minerals (about 500 specimens altogether) are a number of calcites, and gold, silver and other ores from the western Territories, which are of value for the general collection. The Gebhard minerals (nearly 1,800 specimens) include many valuable foreign examples, the larger number of which have been selected for the general Museum collection, or reserved for exchanges. The Van Rensselaer collection, including a number of fossils mostly of the more modern geological formations, consists of nearly 5,000 specimens. The value of this contribution is seriously impaired by the entire absence of indication of localities. It affords, nevertheless, many fine examples of minerals for our General collection, and will furnish numerous duplicates for distribution to the colleges and normal schools of the State.

All the above minerals have been ticketed with the name of their collector as a record of their source. Upon the completion of their labeling, the portion reserved for the Museum will be arranged upon the shelves; the portion intended for exchanges will be placed in drawers or in labeled boxes; the remainder will be distributed among the duplicate collections now being made up, or set aside for such object as may hereafter be directed by the Regents.

Distribution of Duplicate Fossils and Minerals.

The distribution of duplicate specimens belonging to the Museum has been directed, by legislative enactments, to five Institutions in our State, viz.:

1. Rensselaer Polytechnic Institute, Troy. (Laws of 1864, chapter 320.)

2. Long Island Historical Society, Brooklyn. (Laws of 1865, chapter 198.)

3. Cornell Library, Ithaca. (Laws of 1865, chapter 697.) Transferred to Cornell University, Ithaca. (Laws of 1868, chapter 169.)

4. American Museum of Natural History, New York. (Laws of 1869, chapter 774.)

5. Syracuse University. (Laws of 1872, chapter 541.)

In the distribution of the duplicate fossils, the specimens were arranged in a serial order, giving to each collection, one or more characteristic specimens of the same species. Some of the species being much more numerous than others, were continued in distribution beyond the number of collections required by the legislative acts cited; and twenty collections in all were thus made up, the last ones containing, of course, comparatively few species. It was, and still is, intended to continue the distribution, in the same manner, of all the duplicates which we now have, or which may come into our possession in future, unless otherwise directed. The collections already arranged, are packed in boxes and numbered accordingly.

The collections for the Rensselaer Polytechnic Institute, the Long Island Historical Society, the Cornell University, and the Syracuse University have already been sent to their destination.

By direction of the Secretary of the Board of Regents, a collection has been sent to the Normal and Training School at Oswego; and also one to the Normal School in Albany.

Of the twenty collections which have been prepared and catalogued, fourteen remain at the Museum to be disposed of in accordance with the existing legislative enactments, and the direction hereafter to be given by the Board of Regents.

The five collections distributed, contain 2,367 fossil and rock specimens and 291 specimens of minerals — a total of 2,658 specimens, all authentically labeled. The total number of specimens already arranged in all the twenty collections, and labeled with name and locality, including a few smaller collections, is more than twelve thousand.

I am very respectfully,

Your obedient servant,

JAMES HALL,

Director.

ADDITIONS TO THE STATE MUSEUM

DURING THE YEAR 1875.

I. ZOÖLOGICAL.

Forty-three species and four varieties of U. S. Land and Freshwater Shells (number of examples not recorded); Feb. 1, 1875.

Twenty-nine species of the same, in 181 examples; Feb. 18th.

Eighty-seven species of the same, in 520 examples; March 15th: a total of 159 species. From Dr. JAMES LEWIS, Mohawk, N. Y.

Samia Cecropia (Linn.), June 26th. From O. F. RUSS, Albany, N. Y.

Larvæ of *Samia Cecropia* (Linn.) and *Anisota senatoria* (Sm.-Abb.); Aug. 24th. From R. W. DOWSE, Albany, N. Y.

Corydalis cornuta (Linn.), the Hellgrammite fly; July 15th. From T. H. GIBBON, Albany, N. Y.

Larva of *Thyreus Abbotii* Swains; June 16th.

Larva of *Pyrrharctia isabella* (Sm.-Abb.), taken Dec. 22d, in motion, in the open air. From Miss ALICE DEWITT SPRAGUE, Castleton, N. Y.

Monohammus titillator (Fabr.); Aug. 17th. From FREDERICK COOK, Albany, N. Y.

Larvæ of *Lachnosterna quercina* (Knoch). From W. W. HILL, Albany, N. Y.

Alaus oculatus (Linn.), the owl beetle, taken from the stump of a cherry tree at Castleton, Dec. 28th. From C. H. VAN BENTHUYSEN, Albany, N. Y.

A Hair-snake, *Gordius longilobatus* Leidy, drawn from a water-faucet in Albany. From H. P. PHELPS, Albany, N. Y.

A specimen of the Lesser Red Poll, *Ægiothus linaria* Cab., shot in New Scotland, Albany county, N. Y. From JOHN S. MOAK.

Bonaparte's Gull, *Larus* (*Chrœcocephalus*) *Philadelphia* (Ord.) Gray. Taken May 3d on the Hudson river, near Albany. Purchased for the Museum.

Ruby-throated Humming-bird, *Trochilus colubris* (Linn.). From VERPLANCK COLVIN, Albany, N. Y.

A Sea Lamprey, *Petromyzon Americanus* Lesu., taken in the Hudson river, at Albany, May 10th; length, twenty-nine inches. Purchased for the Museum.

A Red-fin, *Leuciscus cornutus* Mitch. From W. W. HILL, Albany, N. Y.

A specimen of the spiny box-fish, *Chilomycterus geometricus* (Linn.) Kaup (Diodon maculato-striatus *Dekay*). New York harbor, Oct. 5th. From CHARLES E. SCHARFF, Albany N. Y.

A Collection made at Danville, Illinois, consisting of about 300 examples of Lepidoptera; Coleoptera in about 500 examples; Hymenoptera, ten examples; Diptera, twelve examples; Orthoptera, about thirty examples; Neuroptera, about twenty examples; Homoptera, about thirty examples.

An alcoholic collection of Larvæ of Insects, etc., in alcohol, nineteen bottles; Araneina, twenty bottles; Pedipalpi, four bottles; Myriopoda, thirteen bottles.

Among the Lepidoptera are the following species:

Sesia marginalis Grote.
Deilephila tersa (Linn.).
Philampelus Pandorus (Hübn.).
Cressonia Juglandis (Sm.-Abb.).
Macrosila 5-maculata (Steph.).
Macrosila Carolina (Linn.).
Dolba Hylæus (Drury).
Papilio Asterias Fabr.
Papilio Philenor Linn.
Papilio Troilus Linn.
Papilio Cresphontes Cram.
Papilio Turnus Linn.
Papilio Ajax v. *Marcellus.*
Pieris Protodice Boisd.-Lec.
Colias Philodice Godart.
Danais Archippus (Fabr.).
Argynnis Cybele (Fabr.).
Grapta interro. v. *umbrosa.*
Grapta Progne (Cram.).
Pyrameis Atalanta (Linn.).
Vanessa Antiopa (Linn.).
Actias Luna (Linn.).
Samia Cecropia (Linn.).
Spilosoma Virginica (Fabr.).
Arctia Virgo (Linn.).
Dipterygia pinastri (Linn.).
Erasteria carneola Guen.
Drasteria erechtea (Cram.).
Catocala innubens Guen.
Hæmatopis grataria (Fabr.).

A list of the Coleoptera, etc., will be given hereafter.

From WILLIAM GURLEY, at Ithaca, N. Y. A very large proportion had become entirely worthless from the depredations of the Anthrenus. Received in exchange for Museum reports.

Menobranchus lateralis Harl., from a tributary of the Hudson river near Albany. From ROBERT T. L. CRAFTS, Newtonville, N. Y.

II. BOTANICAL.

Three beans, from coast of Texas. From James S. Polhemus.

Three species of Ferns, and *Mitremyces lutescens* Schw. From Mrs. E. E. Atwater, Chicago, Ill.

Mitremyces lutescens S. From Mrs. T. E. Morris, Potomac, Va.

Scirpus maritimus L., and *Botrychium matricariæfolium* Braun. From Mrs. S. M. Rust, Syracuse, N. Y.

Botrychium matricariæfolium Braun. From Mrs. Barnes, Syracuse, N. Y.

Two species of Arceuthobium and a Fern. From Mrs. L. A. Millington, Glens Falls, N. Y.

Pinus contorta Dougl., and five species of Ferns. From W. W. Hill, Albany, N. Y.

Pinus contorta Dougl. From C. Devol, M. D., Albany, N. Y.

A Lichen and six species of Fungi. From W. R. Girard, Poughkeepsie, N. Y.

Three species of Fungi. From E. C. Howe, M. D., Yonkers, N. Y.

Podisoma macropus Schw. From I. A. Lapham, Milwaukee, Wis.

Rumex Engelmanni Ledeb. From Prof. James Hall, Albany, N. Y.

Three rare species of flowering plants. From Prof. G. H. French, Irvington, Ill.

Uromyces Junci Schw., on *Juncus Balticus*. From H. Gillman, Detroit, Mich.

Rhytisma acerinum Fr. From C. F. Parker, Germantown, Pa.

Two species of Fungi (one new). From Prof. C. E. Bessey, Ames, Iowa.

Azalea viscosa L. From Rev. H. Wibbe, Oswego, N. Y.

Six species of Fungi. From C. C. Frost, Brattleborough, Vt.

Pannaria crassophylla Tuckm. From E. A. Rau, Bethlehem, Pa.

Two species of Ferns and six of Fungi. From H. A. Warne, Oneida, N. Y.

Twelve species of Fungi. From J. B. Ellis, Newfield, N. J.

Thirty-two species of Fungi, several of them new. From Hon. G. W. Clinton, Buffalo, N. Y.

One hundred and sixteen species of Fungi, new to the State Herbarium. By collection of the Botanist, CHARLES H. PECK.

III. GEOLOGICAL, PALÆONTOLOGICAL AND MINERALOGICAL.

A block of Medina Sandstone ($12\frac{1}{2} \times 7 \times 6$ inches), with six styles of dressing. From Fulton, Oswego county, N. Y. No. 161 in Economic Collection.

A block of Grey Sandstone ($7 \times 6 \times 3$ inches), with six styles of dressing. From Portage, Livingston county, N. Y. No. 162 in Economic Collection. From Hon. E. W. LEAVENWORTH, Syracuse, N. Y.

Slickensides, in Hudson River Shales, from a well at the Albany Rural Cemetery. From JAMES GAZELEY, Albany, N. Y.

Head of fossil fish, *Macropetalichthys Sullivanti* Newberry. From the Upper Helderberg group. Ohio. (Name of donor lost.)

Gyroceras Matheri Conrad. From WILLIAM YOUNGBLUT, Albany, N. Y.

Two slabs from the Chemung group, containing numerous specimens of *Dictyophyton filitextile* Hall. Concord, Erie county, Pa. Purchased of WILLIAM GROVES.

Dictyophyton Conradi Hall. Type specimen. Sixteenth Report on the State Cabinet of Natural History (1863, p. 89, pl. v, fig. 2 and pl. v a, fig. 2). From SAMUEL EWING, Randolph, Cattaraugus county, N. Y. (Loaned for description in 1863, and subsequently donated to the Museum Collections).

A piece of Sandstone marked with concentric lines from pyritiferous decomposition. From J. E. ALLANSON, Albany, N. Y.

A concretion of unusual form, taken from a gravel bed at Coxsackie, N. Y. From DANIEL FORD, East Albany, N. Y.

Fifty-six specimens of Claystones and concretionary masses from a clay bed on the N. Y. C. and H. R. railroad at West Albany. From F. FIEDLER, West Albany, N. Y.

Lignite, taken from blue clay, 65 feet below the surface, in Washington, D. C., by JAMES A. BRIGGS, Brooklyn, N. Y. Deposited by T. L. HARISON, Secretary of N. Y. State Agricultural Society.

A Collection of seventy-three specimens, from the Rocky Mountains, of silicified wood, hot springs deposits, basalt, lignite, iron ore, gold and silver ores, granite, fossils, etc. From C. J. RONEY, of the University of Chicago, in exchange for Museum reports.

Two specimens of argentiferous lead ore, from Newburyport, Mass. From J. C. Hoadley, Lawrence, Mass.

Iron pyrites, from Schodack Landing, N. Y. From Ira Rightmeyer.

Fossil fish-spine, from near Waterloo, N. Y. From C. Merydeth Woodward, M. D., through Dr. Armsby.

Quartz and Calcite, from Westerlo, Albany county, N. Y. From Enoch Mabey, Albany, N. Y.

Specular Iron, from Canton, St. Lawrence county, N. Y. From J. M. Christy, Gallitzin, Cambria county, Pa.

IV. ARCHÆOLOGICAL.

A glazed earthen cup and pewter spoon, found in excavating for the N. Y. Central R. R. at Mohawk, N. Y. From Dr. James Lewis, Mohawk.

A pod augur, of the style used in the last century. From John Ferguson, Worcester, Otsego county, N. Y.

An Indian stone chisel. From George W. Brower, Schenectady, N. Y.

V. TO THE LIBRARY.

Reports on the Geological Survey of the State of Missouri, 1855–1871. By G. C. Broadhead, F. B. Meek and B. F. Shumard. Jefferson City, 1873. Royal, 8vo., pp. 323.

Geological Survey of Missouri. Raphael Pumpelly, Director. Preliminary Report on the Iron Ores and Coal Fields, from the Field Work of 1872; with an Atlas. New York, 1873. Royal, 8vo., pp.; Part I, 214; Part II, 441.

Report on the Geological Survey of the State of Missouri, including Field Work of 1873–1874; with 91 illustrations and an Atlas. Garland C. Broadhead, State Geologist. Jefferson City, 1874. Royal, 8vo., pp. 734, xlix. From Garland C. Broadhead.

Report on the Geological Survey of the State of Iowa: Embracing the results of investigations made during portions of the years 1855, 1856 and 1857. By James Hall, State Geologist; J. D. Whitney, Chemist and Mineralogist. Volume I, Part I, Geology. Volume I, Part II, Palæontology. Published by authority of the Legislature of Iowa, 1858. Two volumes, royal 8vo., pp. 724, with maps, sections and twenty-nine plates. From Prof. James Hall.

Fifth and Sixth Annual Reports of the American Museum of Natural History. New York, 1874. Pamph., 8vo., pp. 52. From A. S. Bickmore, Superintendent.

A Treatise on some Insects injurious to Vegetation. By Thaddeus William Harris, M. D. Third Edition. Boston, 1862. 8vo., pp. 640, plates 8. In Exchange.

Memoirs of the American Association for the Advancement of Science. Vol. I. Salem, Mass., 1875. Fossil Butterflies, by Samuel H. Scudder. Pamph., quarto, pp. 99, plates 3.

Memoirs of the Boston Society of Natural History. Vol. II, Part III. No. IV. The Species of the Lepidopterous Genus Pamphila. By Samuel H. Scudder. Boston, December, 1874. Pamph., quarto, pp. 341–353; plates X and XI.

Memoirs of the Boston Society of Natural History. Vol. II. Art. XVI. The Structure and Transformations of Eumæus Atala. By Samuel H. Scudder. Pamph., quarto, pp. 413–419. Pl. XIV.

Memoirs of the Peabody Academy of Science. Vol. I. No. I. Revision of the Large, Stylated, Fossorial Crickets. By Samuel H. Scudder. Salem, Mass., 1869. Royal, 8vo., pp. 28. 1 plate.

Materials for a Monograph of the North American Orthoptera, including a Catalogue of the known New England species. By Samuel H. Scudder. In Journal B. S. N. H., November, 1862, pp. 409–480.

Revision of the hitherto known species of the Genus Chionobas in North America. By Samuel H. Scudder. From the Proceedings of the Entomological Society of Philadelphia. July, 1865. 8vo., pp. 28.

Notes on the Stridulation of some New England Orthoptera. By Samuel H. Scudder. From the Proceedings of the Boston Society of Natural History. Vol. XI. Published April, 1868. 8vo., pp. 8.

Entomological Notes, I. By Samuel H. Scudder. From the Proceedings of the Bost. Soc. Nat. Hist. Vol. XI. January 22, 1868; February 5, 1868; February 26, 1868; March 25, 1868. Pp. 11.

Entomological Notes, III. By Samuel H. Scudder. From the Proceedings of the Bost. Soc. Nat. Hist. Vol. XIII, 1870, and Vol. XVI, 1874. 8vo., pp. 34 and 1 plate.

Entomological Notes, IV. By Samuel H. Scudder. Reprinted from Proc. Bost. Soc. Nat. Hist. Vol. XVII. 1874–5. 8vo., pp. 91.

Note sur l'Œuf et le Jeune Age de la Chenille d'Œneis Ællo. Par

Samuel H. Scudder. Extrait des Annales de la Société de Belgique. Tome XVI, 1873. 8vo., pp. 4. 1 plate.

The Two Principal Groups of the Urbicolæ (Hesperidæ auct). By Samuel H. Scudder. From the Bulletin of the Buffalo Society of Natural Sciences. Vol. I, Art. XIX. 1873. 8vo., pp. 2.

Note on the Species of Glaucopsyche, from Eastern North America. By Samuel H. Scudder. From the Bulletin of the Buffalo Society of Natural Sciences. Vol. I, Art. XX. 1873. 8vo., pp. 2.

The Natural History of a Polymorphic Butterfly. By Samuel H. Scudder. From the American Naturalist. Vol. VIII. May, 1874. 8vo., pp. 257–266.

Historical Sketch of the Generic Names proposed for Butterflies. By Samuel H. Scudder. From the Proceedings of the American Academy of Arts and Sciences, Boston, Vol. X (2d S., Vol. II). Salem, 1875. 8vo., pp. 293.

The above fifteen publications from the Author.

Bulletin de la Société Impériale des Naturalistes de Moscou. Année 1873, Nos. 3, 4. Année 1874, Nos. 1, 2, 3 and 4. Moscou, 1874, 1875. 6 pamphlets, 8vo. From the Society.

Exploration of the Colorado River of the West and its Tributaries. Explored in 1869, 1870, 1871 and 1872 under the Direction of the Secretary of the Smithsonian Institution. Washington, 1875. Quarto, pp. 291.

Catalogue of North American Mammals, chiefly in the Museum of the Smithsonian Institution. By Spencer F. Baird. Washington, 1857. Pamph., quarto, pp. .

Monograph of American Corbiculadæ (recent and fossil). Prepared for the Smithsonian Institution by Temple Prime. Washington, December, 1865. Pamph., 8vo., pp. 80.

Researches upon the Hydrobiinæ and Allied Forms, chiefly made upon Materials in the Museum of the Smithsonian Institution. By Dr. William Stimpson. Washington, August, 1865. Pamph., 8vo., pp. 59.

Land and Freshwater Shells of North America. Part I. Pulmonata Geophila. By W. G. Binney and T. Bland. Washington, February, 1869. 8vo., pp. 316.

Land and Freshwater Shells of North America. Part II. Pulmonata Limnophila and Thalassophila. By W. G. Binney. Washington, September, 1865. 8vo., pp. 159.

Land and Freshwater Shells of North America. Part III. Ampullariidæ, Valvatidæ, Viviparidæ, etc. By W. G. Binney. Washington, September, 1865. 8vo., pp. 120.

Land and Freshwater Shells of North America. Part IV. Strepomatidæ. By George W. Tryon. Washington, December, 1873. 8vo., pp. 435.

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From the SMITHSONIAN INSTITUTION, Washington, D. C.

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Annual Report of the United States Geographical and Geological Survey of the Territories, embracing Colorado, being a Report of Progress of Exploration for the year 1873, by F. V. Hayden, United States Geologist. Washington, 1874. 8vo., pp. 718.

Department of the Interior. Report of the United States Geological Survey of the Territories. F. V. Hayden, United States Geologist in charge. In five volumes.

——. Vol. I: Part I. Contributions to the Extinct Vertebrate Fauna of the Western Territories. By Prof. Joseph Leidy. Washington, 1873. Quarto, pp. 358, plates 37.

——. Vol. II. The Vertebrata of the Cretaceous Formations of the West. Washington, 1875. Quarto, pp. 302. plates 57.

——. Vol. V: Part I. Synopsis of the Acrididæ of North America. By Cyrus Thomas, Ph. D. Washington, 1873. Quarto, pp. 262, 1 plate.

——. Vol. VI. Contributions to the Fossil Flora of the Western Territories. Part I. The Cretaceous Flora. By Leo Lesquereux. Washington, 1874. Quarto, pp. 136, plates 30.

Miscellaneous Publications, No. 3. Birds of the North-west: A Hand-book of the Ornithology of the Region drained by the Missouri River and its Tributaries. By Elliott Coues, U. S. Army. Washington, 1874. 8vo., pp. 791.

Miscellaneous Publications, No. 4. Synopsis of the Flora of Colorado, by Thomas C. Porter and John M. Coulter. Washington, 1874. 8vo., pp. 180.

Lists of Elevations principally in that portion of the United States west of the Mississippi River. By Henry Gannett, M. E. Washington, 1875. Pamph., 8vo., pp. 72.

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Do. Bulletin No. 4. Second Series. June 10, 1875. Pamph., 8vo., pp. 215–231.

Circulars of Information of the Bureau of Education. No. 1, 1875. Washington, 1875. Pamph., 8vo., pp. 114.

Do. ——. No. 2, 1875. Education in Japan. Washington, 1875. Pamph., 8vo., pp. 64.

Do. ——. No. 3, 1875. An Account of the Systems of Public Instruction in Belgium, Russia, Turkey, Servia and Egypt. Washington, 1875. Pamph., 8vo., pp. 108.

Do. ——. No. 4, 1875. Waste of Labor in the Work of Education. By P. A. Chadbourne, LL.D. Washington, 1875. Pamph., 8vo., pp. 16.

Do. ——. No. 5, 1875. Suggestions respecting the Educational Exhibit at the International Centennial Exhibition, 1876. Washington, 1875. Pamph., 8vo., pp. 26.

Do. ——. No. 6, 1875. Statements relating to Reformatory, Charitable and Industrial Schools for the Young. Washington, 1875. Pamph., 8vo., pp. 208.

Report of the Commissioner of Education for the year 1874. Washington, 1875. 8vo., pp. 935.

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Report of the Regents of the University on the Boundaries of the State of New York. Albany, 1874. 8vo., pp. 350.

Fifty-fourth, Fifty-fifth and Fifty-sixth Annual Reports of the Trustees of the New York State Library. Albany, 1872, 1873 and 1874. Three volumes, 8vo. (one in paper, two in cloth), pp. 156, 192, 185.

Laws of the State of New York, passed at the Ninety-third–Ninety-seventh Sessions of the Legislature. Albany, 1870–1874. 8 volumes, 8vo.

From the Regents of the University of the State of New York.

The Sixth, Eighth, Eleventh, Fourteenth, Fifteenth, Sixteenth to Twentieth Annual Reports of the Superintendent of Public Instruction of the State of New York. Albany, 1860, 1862, 1865, 1868–1874. Ten volumes (four in paper and six in cloth), 8vo. From the DEPARTMENT OF PUBLIC INSTRUCTION, Albany, N. Y.

Journal of the American Geographical Society of New York, Vol. IV, 1873. 8vo., pp. 468. From the SOCIETY.

Bulletin of the St. Petersburg Imperial Botanical Garden. Tome III, P. I; Tome III, P. II. St. Petersburg, 1875. 8vo. From E. R. DE TRAUTVETTER, Director.

Sitzungs-Berichte der naturwissenschaftlichen Gesellchaft Isis in Dresden. Jahrgang, 1874, April bis December, 4–12. Dresden, 1874, 1875. Two pamphlets, 8vo. From the SOCIETY.

Bulletin de la Société des Sciences Historiques et Naturelles de L'Yonne. Année 1874–28e vol. Année 1875, 29e vol. Auxerre, 1874, 1875. From the SOCIETY.

The American Journal of Science and Arts. New Haven. Vol. IX, 1875; Vol. X, 1875.

The American Naturalist. Salem, Mass., 1875, vol. IX.

Bulletin of the Buffalo Society of Natural Sciences. Vol. II, pp. 201–319. Buffalo, 1875. 8vo. The above three publications by subscription.

REPORT OF THE BOTANIST.

S. B. Woolworth, LL. D., *Secretary of the Board of Regents of the University:*

Sir. — Since the date of my last report, specimens of two hundred and twenty-five species of plants have been mounted and placed in the State Herbarium, of which two hundred and one were not before represented. A list of these is marked (1).

Specimens have been collected in the counties of Albany, Rensselaer and Lewis. These represent one hundred and sixteen species of fungi new to the Herbarium. Sixty-eight of them are regarded as new or undescribed species. A list of collected plants is marked (2).

Specimens of thirty-seven species, new to the Herbarium and not among my collections of the past season, have been received from correspondents. Twelve of them are regarded as new or hitherto undescribed species. If the contributed specimens be added to those of my own collecting, the total number of additional species represented is one hundred and fifty-three. This does not include extra-limital species, specimens of a considerable number of which have been received. A list of contributors and their contributions is marked (3).

Notices of previously unreported species, with descriptions of new species, are marked (4).

Notices of species previously reported, with remarks and observations, are marked (5).

Nearly three hundred species of fungi that attack and inhabit living plants have been detected in the State.

They affect almost as many species of flowering plants. In some cases several parasites attack the same host plant; in others, one parasite attacks two or more host plants indiscriminately. But, in many instances, a single parasite is peculiar to a single supporting plant, in which cases the latter may be taken by the student as a guide in his search for the description of the former. A Puccinia found on the leaves of the dwarf cornel, *Cornus Canadensis*, is almost certain to answer to the description of *Puccinia porphyrogenita*, and an Æcidium on the leaves of the barberry, *Berberis vulgaris*, will scarcely be any other than *Æcidium Berberidis.*

A fact of still greater moment is, that some of our cultivated plants are attacked by fungoid foes which, minute as they are, materially diminish their vigor, impair their useful products and, in some instances, even destroy their vitality. Raspberries are attacked by the American raspberry rust, *Uredo luminata;* pea vines, by the pea mildew, *Erysiphe Martii;* oats and wheat, by the grain smut, *Ustilago Carbo;* plum and cherry trees, by the black-knot, *Sphæria morbosa*, and lettuce and onions by their respective molds, *Peronospora gangliformis* and *Peronospora Schleideniana.* Such fungi must be regarded as injurious to the interests of the husbandman, nor is the pecuniary loss which they occasion trivial or inconsiderable. The loss produced by the potato mold alone, *Peronospora infestans*, abundantly warrants all the effort and labor and study that have been devoted to the investigation of the history of the fungus and to the discovery of some efficient means for preventing its attacks or overcoming their destructive consequences.

On the other hand those fungi that infest noxious weeds and hinder their dissemination and multiplication, must be regarded as the friends and allies of man. Thus the thistle rust, *Trichobasis suaveolens*, an early state of *Puccinia Compositarum*, sometimes attacks the Canada thistle with great virulence, and so impairs its vigor as to prevent the development of the seeds, thereby checking the propagation and spread of this pestilent plant. So, also, the troublesome bur-grass, *Cenchrus tribuloides*, is sometimes infested by a smut fungus, *Ustilago Syntherismæ*, which not only prevents the development of the seeds of the grass but also of the annoying bur-like involucres. It may yet be found practicable to keep down this grass by the artificial dissemination of the spores of its parasitic fungus in those light, sandy soils where the grass usually abounds. It certainly is desirable that the life histories of these fungoid friends and foes should be better understood than they now are, and that the means of multiplying or diminishing their numbers according to their character should be under the control of the farmer.

With these thoughts in mind it has seemed advisable to group together the names of the parasitic fungi hitherto found in the State, with their supporting plants. The list of these is marked (6).

(1.)

PLANTS MOUNTED.

Not new to the Herbarium.

Nuphar advena *Ait.*
Rhus venenata *DC.*
Geum Virginianum *L.*
Pinguicula vulgaris *L.*
Lophanthus scrophulariæfolius
Trillium erect. v. album *Ph.*
Allium vineale *L.*
A. tricoccum *Ait.*
Scirpus Eriophorum *Mx.*
Eriophorum Virginicum *L.*
E. gracile *Koch.*
Carex exilis *Dew.*
C. fœnea *Willd.*
C. Grayii *Carey.*
C. livida *Willd.*
C. Crawei *Dew.*
Eleusine Indica *Gært.*
Millium effusum *L.*
Poa trivialis *L.*
P. alsodes *Gr.*
Asplenium thelypteroides *Mx.*
Onoclea sensibilis *L.*
Lygodium palmatum *Sw.*
Ophioglossum vulgatum *L.*

New to the Herbarium.

Negundo aceroides *Mœnch.*
Sedum reflexum *L.*
Nardosmia palmata *Hook.*
Aster amethystinus *Nutt.*
Centaurea nigra *L.*
Verbena bracteosa *Mx.*
Callitriche heterophylla *Ph.*
Habenaria leucophæa *Nutt.*
Allium Canadense *Kalm.*
Barbula recurvifolia *Schp.*
Hypnum compactum *C. Mull.*
Biatora uliginosa *Schrad.*
Collema limosum *Ach.*
Synalissa Schæreri *Mass.*
Spirogyra longata *Ktz.*
Hydrogastrum granulatum *Desv.*
Pleurococcus vulgaris *Mengh.*
Agaricus pusillomyces *Pk.*
A. tenerrimus *Berk.*
A. Austini *Pk.*
A. Watsoni *Pk.*
A. erinaceëllus *Pk.*
A. Colvini *Pk.*
Coprinus Seymouri *Pk.*
Hygrophorus marginatus *Pk.*
H. parvulus *Pk.*
H. Peckianus *Howe.*
Cantharellus pruinosus *Pk.*
Lentinus umbilicatus *Pk.*
Boletus Spraguei *Frost.*
B. chromapes *Frost.*
Polyporus Stephensii *Berk.*
Hydnum aurantiacum *Batsch.*
H. auriscalpium *L.*
Michenera Artocreas *B. & C.*
Stereum candidum *Schw.*
Corticium giganteum *Fr.*
C. colliculosum *B. & C.*
Cyphella muscigena *Fr.*
Solenia filicina *Pk.*
Clavaria pyxidata *Pers.*
C. rugosa *Bull.*
C. pulchra *Pk.*
C. gracillima *Pk.*
Typhula Grevillei *Fr.*
Tremella vesicaria *Bull.*
Physarum contextum *Pers.*
P. albicans *Pk.*
Dictydium umbilicatum *Schrad.*
Phoma pallens *B. & C.*

Phoma Mariæ *Clinton.*
Diplodia Herbarum *Lev.*
Sphæropsis Sambuci *Pk.*
S. biformis *Pk.*
S. Squieriæ *Clinton.*
S. Wilsoni *Clinton.*
S. Clintonii *Pk.*
Hendersonia Peckii *Clinton.*
H. Mariæ *Clinton.*
H. Sarmentorum *West.*
Vermicularia coptina *Pk.*
Septoria Coptidis *B. & C.*
S. maculosa *Ger.*
S. Wilsoni *Clinton.*
S. sambucina *Pk.*
S. Scrophulariæ *Pk.*
S. Rhoidis *B. & C.*
Dinemasporium Pezizula *B. & C.*
Asteroma Rosæ *DC.*
Morthiera Mespili *Fckl.*
Discella discoidea *C. & P.*
Sphæronema conforme *Pk.*
S. oxysporum *Berk.*
Coryneum Kunzei *Cd.*
Melanconium disseminatum *Fr.*
M. minutissimum *Schw.*
Pestalozzia insidens *Zab.*
P. rostrata *Zab.*
P. monochæta *Desm.*
Septonema Peziza *C. & E.*
Sporidesmium Lepraria *Berk.*
Puccinia Sorghi *Schw.*
P. bullaria *Lk.*
P. Smilacis *Schw.*
P. Dayi *Clinton.*
P. Clintonii *Pk.*
Ustilago neglecta *Niessl.*
Uromyces Graminum *Ck.*
U. Phaseoli *Strauss.*
Protomyces Menyanthis *D. By.*
Peridermium columnare *A. & S.*

Æcidium album *Clinton.*
Æ. Nesææ *Ger.*
Æ. dracontiatum *Schw.*
Cystopus Bliti *Biv.*
Stilbum candidum *Pk.*
S. aurifilum *Ger.*
Monotospora biseptata *Pk.*
Stachybotrys lobulata *Berk.*
Haplographium apiculatum *Pk.*
Helminthosporium Urticæ *Pk.*
Macrosporium Saponariæ *Pk.*
Nematogonum aurantiacum *Desm.*
Erysiphella aggregata *Pk.*
Microsphæra Van Bruntiana *Ger.*
M. Platani *Howe.*
M. Symphoricarpi *Howe.*
M. Menispermi *Howe.*
M. abbreviata *Pk.*
Uncinula luculenta *Howe.*
Chætomium Douglasii *Schw.*
Peronospora obliqua *Ck.*
P. Geranii *Pk.*
Geoglossum velutipes *Pk.*
Peziza amplispora *C. & P.*
P. pallidula *C. & P.*
P. omphalodes *Bull.*
P. sepulta *Fr.*
P. ovilla *Pk.*
P. clandestina *Bull.*
P. Cucurbitæ *Ger.*
P. hyalina *Pers.*
P. scirpina *Pk.*
P. Pteridis *A. & S.*
P. corneola *C. & P.*
P. subatra *C. & P.*
P. atrocinerea *Ck.*
Helotium pileatum *Pk.*
H. salicellum *Fr.*
Patellaria fenestrata *C. & P.*
P. dispersa *Ger.*
P. fusispora *C. & P.*

Sphinctrina tigillaris *B. & Br.*
Cenangium Rubi *Fr.*
C. deformatum *Pk.*
C. Aucupariæ *Fr.*
Stictis pupula *Fr.*
S. hysterina *Fr.*
S. quercina *Pk.*
Rhytisma Urticæ *Fr.*
Hysterium Rousselii *De Not.*
H. magnosporium *Ger.*
Colpoma Ledi *Pk.*
Ailographum subconfluens *Pk.*
Torrubia superficialis *Pk.*
T. clavulata *Schw.*
Epichloe typhina *Berk.*
Nectria sanguinea *Fr.*
Hypoxylon Sassafras *Schw.*
Dothidea Linderæ *Ger.*
D. clavispora *C. & P.*
Melogramma gyrosum *Schw.*
M. Bulliardi *Tul.*
Diatrype aspera *Fr.*
D. subclypeata *C. & P.*
D. anomala *Pk.*
Melanconis bicornis *Ck.*
Valsa Prunastri *Fr.*
V. Rubi *Fckl.*
V. Woolworthi *Pk.*
V. leiphemia *Fr.*
V. acerina *Pk.*
V. oxyspora *Pk.*
V. obscura *Pk.*
V. mucronata *Pk.*
Valsa suffusa *Fr.*
V. femoralis *Pk.*
V. sambucina *Pk.*
Cucurbitaria alnea *Pk.*
C. seriata *Pk.*
Lophiostoma Jerdoni *B. & Br.*
L. macrostoma *Fr.*
L. triseptata *Pk.*
L. Scrophulariæ *Pk.*
L. Spirææ *Pk.*
Sphæria pulicaris *Pers.*
S. hirtissima *Pk.*
S. subcorticalis *Pk.*
S. phæostromoides *Pk.*
S. amphicornis *Ellis.*
S. canina *Pk.*
S. valsoides *Pk.*
S. minima *Awd.*
S. Scoriadea *Fr.*
S. monosperma *Pk.*
S. rubefaciens *Pk.*
S. Urticæ *Rabh.*
S. mirabilis *Pk.*
S. tubæformis *Tode.*
Sphærella sparsa *Awd.*
S. carpinea *Fr.*
S. indistincta *Pk.*
S. orbicularis *Pk.*
S. oblivia *Ck.*
Venturia Myrtilli *Ck.*
V. Clintonii *Pk.*
V. Kalmiæ *Pk.*

(2.)

PLANTS COLLECTED.

Agaricus transmutans *Pk.*
A. sapidus *Kalchb.*
A. abundans *Pk.*
A. citrinellus *Pers.*
A. stylobates *Pers.*
A. pubescentipes *Pk.*
A. pruinatipes *Pk.*
A. teneroides *Pk.*
A. placomyces *Pk.*
A. squalidellus *Pk.*
A. elongatipes *Pk.*
A. atomatoides *Pk.*
A. incertus *Pk.*
Coprinus pulchrifolius *Pk.*
C. plumbeus *Pk.*
Cortinarius splendidus *Pk.*
C. sphagnophilus *Pk.*
C. robustus *Pk.*
C. castanellus *Pk.*
Gomphidius rhodoxanthus *Schw.*
Hygrophorus speciosus *Pk.*
Lactarius scrobiculatus *Scop.*
L. vellereus *Fr.*
L. subpurpureus *Pk.*
L. parvus *Pk.*
Marasmius spongiosus *B. & C.*
Boletus badius *Fr.*
B. Russellii *Frost.*
B. Peckii *Frost.*
B. nigrellus *Pk.*
B. griseus Frost.
B. ornatipes *Pk.*
B. Ravenelii *B. & C.*
Exobasidium Cassandræ *Pk.*
Phallus Dæmonum *Fr.*
Lycoperdon coloratum *Pk.*
Chondrioderma Michelii *Lib.*
Lamproderma physaroides *A. & S.*
Cryptosporium Caricis *Cd.*
Sphæropsis propullans *Schw.*
S. Gallæ *Schw.*
Discosia faginea *Lib.*
Melasmia alnea *Lev.*
Septoria cerasina *Pk.*
S. difformis *C. & P.*
Excipula leucotricha *Pk.*
Discella Platani *Pk.*
D. Kalmiæ *Pk.*
D. macrosperma *Pk.*
Melanconium pallidum *Pk.*
Phragmidium gracile *Grev.*
Ustilago Candollei *Tul.*
Uromyces Claytoniæ *C. & P.*
Coleosporium ochraceum *Bon.*
Cystopus Portulacæ *DC.*
Stilbum vulgare *Tode.*
Epicoccum neglectum *Desm.*
Periconia truncata *C. & P.*
P. corticalis *C. & P.*
Helminthosporium oosporum *Cd.*
H. episphœricum *C. & P.*
Polyactis pulvinata *B. & C.*
Peronospora effusa *Grev.*
P. pygmæa *Ung.*
Ramularia Nemopanthis *C. & P.*
Oidium leucoconium *Desm.*
Stysanus Stemonitis *Cd.*
Dactylium roseum *Berk.*
Fusisporium phyllogenum *C. & P.*
F. parasiticum *Pk.*
Chætomium funicolum *Ck.*
Peziza imperialis *Pk.*
P. griseo-rosea *Ger.*
P. albospadicea *Grev.*
P. bronca *Pk.*
P. longipes *C. & P.*

Peziza agrostina *Pk.*
P. Pinastri *C. & P.*
P. Thalictri *Pk.*
P. virginella *Ck.*
P. subtilissima *Ck.*
Helotium hydrogenum *Pk.*
H. saprophyllum *C. & P.*
Ascobolus ciliatus *Schm.*
A. furfuraceus *Pers.*
Bulgaria purpurea *Fckl.*
Stictis versicolor *Fr.*
S. filicina *Pk.*
Hypocrea rufa *Fr.*
H. chromosperma *C. & P.*
H. apiculata *C. & P.*
Hypomyces transformans *Pk.*
Dothidea filicina *Fr.*
Valsa trichispora *C. & P.*
V. tumidula *C. & P.*
Valsa cinctula *C. & P.*
V. Fraxinicola *C. & P.*
V. Linderæ *Pk.*
Sphæria fulgida *C. & P.*
S. squalidula *C. & P.*
S. salebrosa *C. & P.*
S. recessa *C. & P.*
S. interstitialis *C. & P.*
S. obtusissima *B. & C.*
S. Fimeti *Pers.*
S. spiculosa *Pers.*
S. obducens *Fr.*
S. ceanothina *Pk.*
S. melantera *Pk.*
S. minutella *Pk.*
S. smilacinina *Pk.*
S. culmifraga *Desm.*
S. Collinsii *Schw.*
Sphærella colorata *Pk.*

(3.)

CONTRIBUTORS AND THEIR CONTRIBUTIONS.

Mrs. E. E. Atwater, Chicago, Ill.

Phegopteris Dryopteris *Fee.*
P. polypodioides *Fee.*
Cystopteris fragilis *Bernh.*
Mitremyces lutescens *Schw.*

Mrs. T. E. Morris, Potomac, Va.

Mitremyces lutescens *Schw.*

Mrs. S. M. Rust, Syracuse, N. Y.

Scirpus maritimus *L.*
Botrychium matricariæfolium.

Mrs. Barnes, Syracuse, N. Y.

Botrychium matricariæfolium *A. Br.*

Mrs. L. A. Millington, Glens Falls, N. Y.

Arceuthobium Americanum *Engelm.*
Arceuthobium robustum *Engelm.*
Aspid. Noveb. v. fragrans *Mill.*

W. W. HILL, Albany, N. Y.

Pinus contorta *Dougl.*
Aspidium spinulosum *Sw.*
Asplenium Filix-fœmina *Bernh.*
Woodwardia Virginica *Sm.*
Dicksonia punctilobula *Kze.*
Botrychium matricariæfolium.

C. DEVOL, M. D., Albany, N. Y.

Pinus contorta *Dougl.*

W. R. GERARD, Poughkeepsie, N. Y.

Omphalaria pulvinata *Nyl.*
Agaricus tremulus *Schæff.*
Boletus parasiticus *Bull.*
Melanogaster ambiguus *Tul.*
Uncinula geniculata *Ger.*
Helotium æruginosum *Fr.*
Bulgaria purpurea *Fckl.*

E. C. HOWE, M. D., Yonkers, N. Y.

Badhamia hyalina *Pers.*
Septoria Ulmi *Kze.*
Diatrype Smilacicola *Schw.*

I. A. LAPHAM, Milwaukee, Wis.

Podisoma macropus *Schw.*

Prof. J. HALL, Albany, N. Y.

Rumex Engelmanni *Ledeb.*

Prof. G. H. FRENCH, Irvington, Ill.

Dryas octopetala *L.*
Jamesia Americana *T. & G.*
Heuchera bracteata *Seringe.*

H. GILLMAN, Detroit, Mich.

Uryomces Junci *Schw.*

C. F. PARKER, Germantown, Pa.

Rhytisma acerinum *Fr.*

Prof. C. E. BESSEY, Ames, Iowa.

Septoria Besseyi *Pk.*
Cystopus candidus *Lev.*

Rev. H. WIBBE, Oswego, N. Y.

Azalea viscosa *L.*

C. C. Frost, Brattleborough, Vt.

Marasmius archyropus *Fr.*
M. erythropus *Fr.*
Boletus griseus *Frost.*
Paxillus porosus *Berk.*
Lycoperdon cyathiforme *Bosc.*
Endobotrys elegans *B. & C.*

E. A. Rau, Bethlehem, Pa.

Pannaria crossophylla *Tuckm.*

H. A. Warne, Oneida, N. Y.

Pellæa gracilis *Hook.*
Scolopendrium vulgare *Sm.*
Guepinia helvelloides *DC.*
Lactarius vellereus *Fr.*
Phragmidium mucronatum *Fr.*
P. gracile *Grev.*
Lycoperdon constellatum *Fr.*
L. Warnei *Pk.*

J. B. Ellis, Newfield, N. J.

Hymenochæte agglutinans *Ellis.*
Peziza inquinans *Ck.*
P. nigrescens *Ck.*
Dermatea tabacina *Ck.*
Hypocrea rufa *Fr.*
H. consimilis *Ellis.*
Ombrophila violacea *Fr.*
O. purpurascens *Fr.*
O. subaurea *Ck.*
Sporidesmium rude *Ellis.*
Diatrype moroides *C. & P.*
Menispora ciliata *Cd.*

Hon. G. W. Clinton, Buffalo, N. Y.

Corticium sulfureum *Fr.*
Phoma nebulosum *Berk.*
Peckia Clintonii *Pk.*
P. Sarraceniæ *P. & C.*
Cryptosporium Noveboracense.
Septoria Polygalæ *P. & C.*
S. emaculata *P. & C.*
Vermicularia concentrica *P. & C.*
Discosia rugulosa *B. & C.*
Pestalozzia Guepini *Desm.*
Sporidesmium concinnum *Berk.*
Clasterisporium uncinatum *Clint.*
Puccinia Calthæ *Lk.*
P. Gentianæ *Strauss.*
P. Physostegiæ *P. & C.*
Cystopus spinulosus *DeBy.*
Graphiolum Phœnicis *Poit.*
Stilbum smaragdinum *A. & S.*
Ægerita candida *Pers.*
Cercospora Callæ *P. & C.*
Ramularia Nemopanthis *C. & P.*
Zygodesmus hydnoides *B. & C.*
Bulgaria purpurea *Fckl.*
Tympanis gyrosa *B. & C.*
Hypocrea patella *C. & P.*
H. chromosperma *C. & P.*
Hypoxylon fuscopurpureum *Schw.*
Diatrype Cephalanthi *Schw.*
Melogramma superficialis *P. & C.*
Valsa leptasca *P. & C.*
Sphæria spermoides *Hoffm.*
S. exilis *A. & S.*

(4.)

PLANTS NOT BEFORE REPORTED.

OMPHALARIA PULVINATA *Nyl.*

Poughkeepsie. *W. R. Gerard.*

AGARICUS (TRICHOLOMA) TRANSMUTANS *n. sp.*

Pileus convex, smooth, very viscid or glutinous and alutaceous when moist, becoming brownish or reddish-brown when dry; lamellæ narrow, close, some of them branched, whitish or pale yellow, becoming spotted with reddish stains; stem equal or slightly tapering upwards, smooth, stuffed or hollow, whitish, often marked with reddish stains; spores subglobose, .0002′ * in diameter.

Plant 3′–4′ high, pileus 2′–3′ broad, stem 3″–5″ thick.

Ground in woods. Sandlake. August.

It occurs in wet weather and manifests a tendency to grow in circles.

AGARICUS SAPIDUS *Kalchb.*

Trunks of trees and old stumps. Albany and Knowersville. June and October.

The cæspitose habit and lilac-tinted spores are to be observed in distinguishing this species from its allies. It is considered edible.

AGARICUS TREMULUS *Schæff.*

Mosses. Poughkeepsie. *Gerard.*

AGARICUS (COLLYBIA) ABUNDANS *n. sp.*

Pileus thin, convex or expanded, subumbilicate, innate-fibrillose, whitish inclining to fuscous, often a little darker and more densely fibrillose on the disk, the thin margin easily splitting; lamellæ narrow, close, adnate, sometimes veiny, white; stem equal, smooth, hollow, easily splitting, often curved, colored like the pileus, pruinose at the top.

Plant gregarious or subcæspitose, 1′–2′ high, pileus 1′–1.5′ broad, stem 1″ thick.

Decaying trunks in woods. Sandlake and Greig. August and September.

This fungus is not frequent, but when it does occur it is usually in great abundance. When drying the margin rolls inward and the color becomes darker.

* One accent signifies inch or inches, two accents line or lines.

Agaricus citrinellus *Pers.*

Decaying mossy trunks in woods. Greig. September.

Agaricus stylobates *Pers.*

Among fallen leaves in woods. Sandlake. August.

The pileus in our specimens is grayish and the striations are dichotomous.

Agaricus (Volvaria) pubescentipes *n. sp.*

Pileus convex, dry, white, clothed with minute hairy squamules or reflexed fibrils, fimbriate on the margin; lamellæ close, free, white, then flesh-colored, sometimes minutely serrated or eroded on the edge; stem slender, subequal, pubescent; volva subappressed, white; spores elliptical, .00025′–.00028′ long, usually containing a single nucleus.

Plant about 1′ high, pileus 6″–12″ broad, stem 1″ thick.

Ground in borders of deciduous woods. Sandlake. August.

The different pileus as well as habitat separates this from *A. hypopithys.* (Plate 1, figs. 1–3.)

Agaricus (Naucoria) pruinatipes *n. sp.*

Pileus regular, convex, smooth, hygrophanous, brownish when moist, ochraceous-yellow when dry, flesh whitish; lamellæ close, nearly plane, rounded behind, pale-cinnamon; stem equal, firm, stuffed or hollow, pruinose, striate, pallid or cinereous; spores subelliptical, brownish-ferruginous, .00025′ long.

Plant 1′–2′ high, pileus 1′–1.5′ broad, stem about 1″ thick.

Ground in woods. Greig. September.

The pruinosity of the stem is due to the presence of minute flocculent or mealy squamules.

Agaricus (Galera) teneroides *n. sp.*

Pileus thin, campanulate or expanded, hygrophanous, brownish-cinnamon and striatulate when moist, paler when dry; lamellæ narrow, close, yellowish-cinnamon; stem straight, equal, hollow, colored like the pileus; spores subluteous, nearly elliptical, .0003′–.00035′ long.

Plant gregarious, 1′–1.5′ high, pileus 8″–12″ broad, stem .5″ thick.

Ground in wood roads. Greig. September.

This species is closely related to *A. tener*, from which it differs in its more expanded pileus, more narrow lamellæ, shorter stem and smaller paler spores. Its color is nearly the same as that of *A. tener.*

AGARICUS (PSALLIOTA) PLACOMYCES *n. sp.*

Pileus rather thin, expanded, plane, dry, squamulose, whitish, the disk and small scales brown; lamellæ close, free, white, then pinkish, finally blackish-brown; stem smooth, containing a small pith, slightly tapering upward, bulbous, whitish, the bulb stained with yellow and usually giving rise to one or two root-like processes; annulus large, flabby, often studded with drops of a dark-colored fluid; spores elliptical, brown, .00018′–.0002′ long.

Plant 3′–5′ high, pileus 2′–3′ broad, stem 2″–4″ thick.

Ground under hemlock trees. Oneida. *H. A. Warne.* Knowersville. July.

This is a beautiful Agaric, the flattened pileus being finely adorned by the minute brown scales.

AGARICUS (HYPHOLOMA) SQUALIDELLUS *n. sp.*

Pileus thin, subconical, convex or subcampanulate, expanded when old, smooth, hygrophanous, ochraceous-yellow when dry, darker and striatulate when moist, squalid and spore-stained when old; lamellæ broad, lax, rounded behind, whitish, then purplish-brown with a whitish edge; stem slender, stuffed, fibrous, subflexuous, reddish-brown; spores elliptical, purple-brown, .00035′–.0004′ long.

Plant gregarious, 1′–2′high, pileus 6″–12″ broad, stem 1″ thick.

Damp ground in or near wood roads. Greig. September.

A small form sometimes occurs with the pileus gibbous or broadly umbonate.

AGARICUS (PSILOCYBE) ELONGATIPES *n. sp.*

Pileus thin, convex, then expanded, smooth, moist, yellow; lamellæ subdistant, broad, plane, then ventricose, yellowish becoming brown, usually with the edge whitish; stems elongated, subfragile, flexuous, equal, stuffed or hollow, usually with a few silky fibrils, pallid or rufous; spores brown, elliptical, .0004′–.0005′ long.

Plant 3′–5′ high, pileus 6″–10″ broad, stem 1″ thick.

Among sphagnum in marshes and wet places in woods. Greig. September.

It appears to be allied to *A. elongatus.* When young the presence of a slight veil is manifest.

AGARICUS (HYPHOLOMA) INCERTUS *n. sp.*

Pileus fragile, convex or subcampanulate, then expanded, hygrophanous, often radiately-wrinkled, whitish with the disk yellowish, the thin margin sometimes purplish-tinted, often wavy, adorned by fragments of the white flocculent fugacious veil; lamellæ close, narrow, whitish, then rosy-brown, the edge often uneven; stem equal, straight, hollow, easily splitting, whitish, pruinose or slightly furfuraceous at the top; spores elliptical, purplish-brown, .0003′ long, .0002′ broad.

Plant gregarious or subcæspitose, 2′–3′ high, pileus 1′–2′ broad, stem 1″–2″ thick.

Ground among bushes. Green Island and Sandlake. June and July.

The veil is sometimes so strongly developed as to form an imperfect annulus. The color is nearly white from the first.

Agaricus (Psilocybe) atomatoides *n. sp.*

Pileus rather thin, fragile, convex or subcampanulate, then expanded, rugose-wrinkled, subhygrophanous, sprinkled with minute shining particles and with tufts of the white floccose fugacious veil, grayish or ochraceous-brown, sometimes with a pinkish tint; lamellæ rather broad, subventricose, rounded behind, cinereous then dark-brown; stem equal, hollow, clothed when young with minute floccose scales, pruinose at the top, whitish; flesh cinereous; spores subelliptical, blackish brown, .00028′–.0003′ long, .00016′ broad.

Plant 1.5′–2′ high, pileus 8″–12″ broad, stem 1″ thick.

Ground and decaying wood under pine trees. West Albany. June and July.

In very wet weather the pileus has a dark watery appearance but it dries quickly. The spores in the mass are almost black, nevertheless the plant is closely related to the fragile species of Psilocybe.

Coprinus pulchrifolius *n. sp.*

Pileus membranaceous, conical or campanulate, striate to the small even yellowish disk, cinereous, sprinkled with minute whitish scales or granules; lamellæ narrow, crowded, free, cinnamon-brown, often furnished with a few minute hyaline spine-like processes; stem slender, fragile, hollow, white; spores elliptical, brown with a slight rosy tinge .0003′ long.

Plant solitary, 2′–3′ high, pileus 6″–12″ broad, stem scarcely 1″ thick.

Ground in woods. Greig. September.

This remarkable species does not accord well with the characters of the genus to which I have referred it, neither in the color of the spores nor in the persistent nature of the lamellæ, for I have not found these to be deliquescent. Nor will it do to place it among the Psathyræ, for the lamellæ are free and the pileus is not hygrophanous. Also, the free lamellæ and brown spores forbid its reference to Psathyrella. I have, therefore, thought best for the present to place it in the genus Coprinus, some of the species of which it much resembles in external appearance.

Coprinus plumbeus *n. sp.*

Pileus submembranaceous, fragile, campanulate, sulcate-striate nearly to the apex, leaden-gray, tawny or brownish-yellow on the small disk, sprinkled with tawny-cinereous hairs or flocci; lamellæ narrow, close, free; stem slightly tapering upward, hollow, floccose, white; spores elliptical, .0004′ long, .00025′ broad.

Plant 3′–5′ high, pileus 1′–1.5′ broad, stem 1″–2″ thick.

Ground in wood roads. Greig. September.

Cortinarius (Phlegmacium) sphagnophilus *n. sp.*

Pileus convex or expanded, smooth, viscid, pale-brown, marked with darker watery spots, especially on the margin; lamellæ broad, subdistant, transversely rugulose, violaceous, then cinnamon; stem long, firm, bulbous, silky, striate, pale-violaceous; spores oblong-elliptical, .0004′–.0005′ long.

Plant 5′–6′ high, pileus 2′–3′ broad, stem 4″–5″ thick.

Sphagnous marshes. Greig. September.

The spotted pileus is a distinctive feature in this species.

Cortinarius (Myxacium) splendidus *n. sp.*

Pileus convex or subcampanulate, viscid, pale-fuscous; lamellæ not crowded, whitish, then cinnamon; stem equal, viscid, violaceous, whitish above; spores with an apiculus at one end, .0006′–.00065′ long.

Plant 3′ high, pileus 2′ broad, stem 3″–5″ thick.

Ground in woods. Sandlake. August.

The shining brown pileus and violet colored stem afford a singular combination of colors. The plant is apparently very rare.

Cortinarius (Inoloma) robustus *n. sp.*

Pileus hemispherical, then expanded, smooth, pale-bay, the margin sometimes lobed; lamellæ close, pale-cinnamon; stem stout, solid, bulbous, pallid, clothed with whitish silky fibrils; spores elliptical, .00035′ long.

Plant 2′–4′ high, pileus 2′–3′ broad, stem 3″–6″ thick.

Ground in woods. Greig. September.

The plant is quite variable in size but it usually has a stout, rugged appearance.

CORTINARIUS (DERMOCYBE) CASTANELLUS *n. sp.*

Pileus thin, convex or expanded, umbonate, smooth, shining, dark-chestnut color, the umbo almost black; lamellæ close, rounded behind, cinnamon; stem silky, equal, stuffed or hollow, pallid or whitish, obscurely violaceous above; spores elliptical, .00035′ long.

Plant 2′ high, pileus 6″–12″ broad, stem 1″–2″ thick.

Ground in open fields. West Albany. October.

The smaller size of the plant, the umbonate pileus and larger spores distinguish this from *C. nigrellus*, which it somewhat resembles in color.

GOMPHIDIUS RHODOXANTHUS *Schw.*

Ground in deciduous woods. Sandlake. August.

The pileus is not always red, but varies sometimes toward yellow, sometimes toward brown. The spores are oblong, .0004′–.0005′ in length.

HYGROPHORUS SPECIOSUS *n. sp.*

Pileus at first ovate or subconical, then expanded with the thin margin decurved, smooth, glutinous, often with a small umbo, bright red or scarlet, becoming yellowish; lamellæ arcuate, decurrent, sub-distant, white, the interspaces sometimes veiny; stem long, subequal, solid, white or yellowish, sometimes viscid; spores elliptical, .0003′–.00035′ long.

Plant gregarious, 3′–5′ high, pileus 1′–2′ broad, stem 3″–5″ thick.

Ground under or near larch trees. Greig and Center. September and October.

This is a very showy plant. The small umbo or disk retains the red color longer than the rest of the pileus. (Plate 2, figs. 1–5.)

LACTARIUS SCROBICULATUS *Scop.*

Ground in woods. Bethlehem. August.

LACTARIUS VELLEREUS *Fr.*

Ground in woods. Sandlake. Oneida. *Warne.* August.

The tomentum of the pileus and pubescence of the stem are frequently obsolete or indistinct.

LACTARIUS SUBPURPUREUS *n. sp.*

Pileus at first convex, then expanded or depressed, smooth, sub-viscid, variegated with purplish and cinereous hues; lamellæ dull-red or purplish; stem equal, colored like the pileus; milk sparse, dark-red.

Plant 2′–4′ high, pileus 2′–3′ broad, stem 3″–5″ thick.

Mossy ground in swamps. Sandlake. August.

The species is related to *L. deliciosus*, but there are no orange hues either to the plant or the milk as in that species.

LACTARIUS PARVUS *n. sp.*

Pileus nearly plane, then depressed, smooth, reddish-brown, becoming paler; lamellæ crowded, narrow, white, then tinged with yellow; stem mostly short, often curved, stuffed, equal or slightly tapering upward, whitish; milk white, taste acrid; spores globose, rough, .00033′ in diameter.

Plant about 1′ high, pileus 6″–12″ broad, stem 1″–2″ thick.

Decaying stumps in woods. Sandlake and Greig. August and September.

MARASMIUS SPONGIOSUS *B. & C.*

Ground among fallen leaves. West Albany and Center. August.

BOLETUS BADIUS *Fr.*

Woods. Greig and Sandlake. August and September.

BOLETUS PARASITICUS *Bull.*

Parasitic on *Scleroderma vulgare*. Willowemoc. *Gerard.*

BOLETUS RUSSELLII *Frost.*

Woods. Sandlake. August.

This species is rare with us. It is remarkable for its long lacunose-reticulated and roughly lacerated stem, which is narrowed at the top and sometimes strongly curved at the base. Mr. Frost finds a form with the stem much twisted.

BOLETUS RAVENELII *B. & C.*

Woods. Sandlake. August.

If I understand this species correctly it often attains much larger dimensions than those given in the description. The tubes are at first whitish but in drying they change to a brown color. They become dingy-brown where bruised. The stem sometimes tapers downwards and is usually peronate and more or less annulate by the yellow veil. The pileus is reddish where the pulverulence has vanished. The plant is sometimes cæspitose.

BOLETUS NIGRELLUS *n. sp.*

Pileus dry, minutely tomentulose, blackish; tubes plane or convex, scarcely depressed around the stem, small, unequal, subrotund, whitish, then tinged with pink; stem equal, short, even, colored like the pileus;

flesh white, unchangeable; spores oblong, mostly narrowed toward one end, .0004′–.0005′ long.

Plant 3′–4′ high, pileus 3′–4′ broad, stem 6″–10″ thick.

Woods. Sandlake. August.

BOLETUS PECKII *Frost n. sp.*

Pileus dry, firm, minutely tomentulose, red, fading to buff-brown, the margin usually retaining its color longer than the disk; tubes nearly plane, adnate or slightly decurrent, yellow, turning blue when wounded; stem equal or subventricose, strongly reticulated, red, yellow at the top; spores ochraceous-brown, oblong, .00035′–.0004′ long.

Plant 3′–4′ high, pileus 2′–3′ broad, stem 3″–6″ thick.

Ground in deciduous woods. Sandlake. August.

The stem is generally brighter colored than the pileus and retains its color longer. The species should be referred to the *Calopodes*.

BOLETUS GRISEUS *Frost n. sp.*

Pileus dry, firm, nearly smooth, gray or grayish black; tubes nearly plane, adnate, sometimes slightly depressed around the stem, small, unequal, subrotund, white; stem whitish or yellowish, strongly reticulated, often abruptly narrowed and yellow at the base; flesh whitish or gray; spores ochraceous-brown, oblong, .0004′–.0005′ long.

Plant 3′–4′ high, pileus 2′–4′ broad, stem 6″–12″ thick.

Deciduous woods. Sandlake. August.

The plants have a rather strong unpleasant odor. The color of the pileus is variable, but it is generally some shade of gray. The reticulations of the stem are finer at the top, coarser, elongated and somewhat compound toward the base, but in the dried specimens the finer reticulations at the top of the stem are the most distinct, the others becoming obsolete. My esteemed friend, Mr. Frost, finds a form which he considers a variety of this species, differing from the type in having the tubes flesh and stem yellow.

GUEPINIA HELVELLOIDES *DC.*

Decayed wood partly buried. Oneida. *Warne.*

Mr. Warne remarks that he has found it in but one limited locality, four or five feet square, and that its color when fresh is a very beautiful reddish-brown.

PHLEBIA PILEATA *n. sp.*

Pilei coriaceous, effuso-reflexed, more or less imbricated and laterally confluent, concentrically sulcate, zonate, subtomentose, purplish-brown; hymenium a little paler, usually stained with red or orange on the margin, the folds crowded, radiating, frequently interrupted behind and appearing like coarse papillæ, when dry suffused with a dull tawny bloom; spores elliptical, colorless, .0003′ long.

Dead branches of beech. Greig. September.

CORTICIUM SULPHUREUM *Fr.*

Decaying wood. Buffalo. *Clinton.*

EXOBASIDIUM CASSANDRÆ *n. sp.*

Gall a suborbicular thickened portion of the leaf, generally concave above, convex below, two to four lines in diameter, red or yellow, at length white pruinose on the lower surface; spores oblong, colorless, variable in size, .0002′–.0005′ long.

Living leaves of *Cassandra calyculata.* Buffalo. *Clinton.* Sandlake. July. Perhaps this is only a form of *E. Vaccinii.*

MELANOGASTER AMBIGUUS *Tul.*

Clay banks. Poughkeepsie. *Gerard.*

PHALLUS DÆMONUM *Fr.*

Shaded ground. Albany. September.

This is placed by some in a genus *Dictyophora.*

LYCOPERDON CONSTELLATUM *Fr.*

Fallen leaves under trees. Oneida. *Warne.* August.

This is a fine species, having, if possible, a more shaggy appearance than *L. pedicellatum* and *L. separans.* The spinous processes are either straight or curved. The color is a cervine brown, and scarcely changes in drying. (Plate 2, figs. 13 and 14.)

LYCOPERDON COLORATUM *n. sp.*

Peridium subglobose or obovate, subsessile, six to ten lines in diameter, radicating, yellow or reddish-yellow, membranaceous, roughened with minute granular or furfuraceous warts; capillitium and spores pale, the latter globose, .00016′–.0002′ in diameter.

Ground in bushy places. Sandlake. August.

The species is remarkable for the pale color of the capillitium and the yellow hue of the peridium.

CHONDRIODERMA MICHELII *Lib.*

Fallen leaves, grass and twigs. West Albany. September. (Plate 1, figs. 4–6.)

BADHAMIA HYALINA *Pers.* (*Didymium simulans* Howe.)

Ailanthus bark. Yonkers. *Howe.*

LAMPRODERMA PHYSAROIDES *A. & S.*
Decaying wood. Buffalo. *Clinton.* Indian Lake.

PHOMA NEBULOSUM *Berk.*
Dead nettle stems. Buffalo. *Clinton.* May.

CRYPTOSPORIUM CARICIS *Cd.*
Dead leaves of sedges. West Albany. May.

CRYPTOSPORIUM NOVEBORACENSE *B & C.*
Bark of hemlock. Markham Station. *Clinton.* May.

PECKIA *Clinton nov. gen.*
Perithecia carbonaceous, sphæriform, glabrous; spores concatenate.
The strings of spores are nearly or quite colorless, sometimes branched in a retiform manner, sometimes involved in mucus. The character of the perithecia separates the genus from *Myxormia.*

PECKIA SARRACENIÆ *Peck & Clinton, n. sp.*
Perithecia scattered or collected in small groups, sometimes seated on blackish spots, small, slightly prominent, black; strings of spores retiformly branched, spores oblong, narrow, colorless, .0003′ long.
Dead leaves of pitcher plant, *Sarracenia purpurea.* Buffalo. *Clinton.*

PECKIA CLINTONII *n. sp.*
Perithecia scattered, prominent on both surfaces of the leaf, smooth, black; strings of spores involved in mucus; spores subquadrate, slightly tinged with green, .0002′ long.
Decaying leaves of *Smilacina trifolia.* Buffalo. *Clinton.* April.
The strings of spores sometimes adhere to each other laterally. Sometimes there is the appearance of a spurious or divided endochrome in the spores. (Plate 2, figs. 6–9.)

SPHÆROPSIS GALLÆ. (*Sphæria Gallae* Schw.)
Old galls and twigs of butternut, *Juglans cinerea.* Bethlehem.
The perithecia on the galls are so crowded that they appear to the naked eye to form a continuous black crust.

SPHÆROPSIS PROPULLANS. (*Sphæria propullans* Schw.)
Dead stems of *Celastrus scandens.* Greenbush.

VERMICULARIA CONCENTRICA *P. & C. n. sp.*
Perithecia small, black, beset with straight rigid bristles, concentrically placed on arid orbicular spots; spores oblong, slightly curved, pointed at each end, colorless, .0008′–.001′ long.

Living leaves of *Trillium erythrocarpum*. Pine Valley. *Clinton*. July.

The tissues at length fall out from the affected spot, leaving apertures through the leaf. The perithecia are less regularly disposed near the center of the spots. Judge Clinton also sends a variety on leaves of *Viola rotundifolia* in which the concentric arrangement of the perithecia is not at all perceptible, but I detect no other difference.

DISCOSIA FAGINEA *Lib.*

Fallen beech leaves. Portville. September.

DISCOSIA RUGULOSA *B. & C.*

Leaves of hickory, *Carya alba*. Chautauqua Lake. *Clinton*.

MELASMIA ALNEA *Lev.*

Living leaves of alder, *Alnus serrulata*. Center. August.

SEPTORIA CERASINA *n. sp.*

Spots scattered or confluent, rather small, subangular, brown or reddish-brown; perithecia few, collapsed when dry, appearing as if margined, pallid or amber-colored; tendrils whitish; spores long, filiform, generally strongly curved, .002′–.003′ long.

Lower surface of cherry leaves, *Prunus serotinus*. Lake Pleasant. August.

This is quite unlike *Phyllosticta sanguinea* Desm., as represented by specimens from the collection of that gentleman. Frequently only one perithecium occupies a spot.

SEPTORIA POLYGALÆ *P. & C. n. sp.*

Perithecia minute, scattered or clustered, black; spores filiform, slender, straight or slightly curved, .001′–0016′ long.

Dead leaves of *Polygala paucifolia*. Portage. *Clinton*. May.

SEPTORIA EMACULATA *P. & C. n. sp.*

Perithecia rather large, scattered, prominent, black; spores filiform, curved or flexuous, usually containing several nucleoli, .002′-.0035′ long.

Pods and living leaves of *Lathyrus palustris*. Buffalo. *Clinton*. July.

The leaves are without spots. The perithecia appear on one or both surfaces.

SEPTORIA DIFFORMIS *C. & P. n. sp.*

Spots suborbicular, brown; perithecia crowded, black, amphigenous; spores profuse, linear, straight or curved, hyaline, .0006′

long, oozing out and covering the spots with a white or glaucous bloom.

Living leaves of *Vaccinium Pennsylvanicum.* Lake Pleasant. August.

SEPTORIA ULMI *Kze.*

Elm leaves. New Baltimore. *Howe.* Catskill mountains.

EXCIPULA LEUCOTRICHA *n. sp.*

Perithecia small, scattered, the disk plane or slightly convex, orbicular, elliptical or elongated, black, surrounded by a few long septate whitish hairs; spores fusiform, colorless, .0003′–.0004′ long.

Dead grass leaves. West Albany. June.

The species is well marked by the pale delicate hairs of the perithecium.

DISCELLA MACROSPERMA *n. sp.*

Perithecia obsolete; mass of spores prominent, reddish-brown or blackish, pale when moist; spores oblong, straight or slightly curved, often narrowed toward one end, colorless, .0013′–.0016 long, .0004′ broad, containing a granular endochrome.

Dead bark of willows. North Greenbush. July.

DISCELLA PLATANI *n. sp.*

Pustules small, erumpent, pallid; spores subelliptical or oblong, smooth, deciduous, colorless, .0003′–.0005′ long.

Dead twigs of buttonwood, *Platanus occidentalis.* Bethlehem. May.

The sporophores rarely remain attached to the spores and these have no granular aspect as in *D. platyspora.*

DISCELLA KALMIÆ *n. sp.*

Pustules small, erumpent, at length blackish, the perithecia mostly deficient above and somewhat excipuliform; spores oblong-obovate, sometimes slightly curved, colorless, .0004′–.0006′ long.

Dead stems of sheep laurel, *Kalmia angustifolia.* Sandlake. June.

MELANCONIUM PALLIDUM *n. sp.*

Stroma small, yellowish; spores oozing out in a blackish mass, separately pallid or almost colorless, ovate or oblong, often slightly curved and subcymbiform, .0006′–.0007′ long.

Dead branches of *Carya alba.* West Troy. June.

The species is remarkable for the pale color of the spores. These sometimes contain two or three large nuclei. (Plate 1, figs. 7 and 8.)

Sporidesmium concinnum *Berk.*

Decaying wood. Markham Station. *Clinton.* May.

Clasterisporium uncinatum *Clinton n. sp.*

Thinly effused, blackish-brown ; spores large, subfusiform, straight or curved, five to seven-septate, colored, .0016′–.002′ long, tapering below into the pale or colorless septate short pedicel which is strongly curved, coiled or uncinate at the narrowed base.

Lower surface of fallen oak leaves. Buffalo. *Clinton.* Nov.

The cells of the spores are often nucleate, and the terminal cell is sometimes truncate and paler than the others. The uncinate base of the pedicel is a characteristic feature. (Plate 1, figs. 9 and 10.)

C. pedunculatum, which in a former report was referred to this genus, must be placed in the genus *Helminthosporium*. It becomes *H. attenuatum* C. & P.

Phragmidium gracile *Grev.*

Leaves of *Rubus odoratus*. Bethlehem, Trenton Falls and Watkin's Glen. September.

This plant was formerly reported as a variety of *Phragmidium mucronatum*, but having compared it with authenticated European specimens of both forms of that species, I am satisfied that our plant is distinct. In the Uredo form the spots are more definite, the sori and spores are larger and the latter have a more coarsely-roughened epispore. In the Brand form the spores are longer and yet more narrow, the papillæ are more prominent and the mucro is generally longer and roughened.

Puccinia Gentianæ *Strauss.*

Leaves of *Gentiana Andrewsii*. Buffalo. *Clinton.* August.

Puccinia Calthæ *Lk.*

Leaves of *Caltha palustris*. Buffalo. *Clinton.* July.

Puccinia Physostegiæ *P. & C. n. sp.*

Spots none; sori evenly scattered, small, rotund, surrounded by the ruptured epidermis, blackish-brown ; spores elliptical, scarcely constricted, .0014′–.0016′ long, .0008′–.001′ broad ; pedicels short, slender.

Lower surface of leaves of *Physostegia Virginiana*. Strawberry Island. *Clinton.* August. (Plate 2, figs. 25 and 26.)

Uromyces Claytoniæ *C. & P. n. sp.*

Sori amphigenous, scattered, small, ovate or elliptical, brown ; spores oval or elliptical, with a slight apiculus, .0013′–.0016′ long, about .001′ broad ; pedicels slender, short, hyaline.

Leaves of *Claytonia Caroliniana*. Cold Spring. June.

Ustilago Candollei *Tul.*

Heads of flowers of *Polygonum sagittatum.* Forestburgh. September.

The more even and darker colored spores separate this from *U. utriculosa.*

Ustilago Montagnei *Tul.* var. major *Desm.*

Heads of flowers of *Rhynchospora glomerata.* Long Island. *E. S. Miller.*

The larger size of the spores, with their remarkable pustules, serve to distinguish this from *U. Montagnei*, to which, as a variety, it is referred. I have thought it worthy of illustration. (Plate 1, figs. 11–12.)

Coleosporium ochraceum *Bon.*

Leaves of *Agrimonia Eupatoria.* Greenport. July.

This is *Uredo Agrimoniæ* Schw. according to Dr. Curtis.

Cystopus Portulacæ *DC.*

Leaves of purslane, *Portulaca oleracea.* Sandlake and Fishkill. August and September.

Cystopus spinulosus *De Bary.*

Leaves of Canada thistle, *Cirsium Canadense.* Buffalo. *Clinton.*

Graphiolum Phœnicis *Poit.*

Leaves of *Phœnix dissectifolia.* Conservatories, Buffalo. *Clinton.* May.

Stilbum vulgare *Tode.*

Decaying wood. Sandlake. August.

Stilbum smaragdinum *A. & S.*

Decaying wood. Markham Station. *Clinton.* May.

Epicoccum neglectum *Desm.*

Decaying stems of Indian corn, etc. Buffalo. *Clinton.* North Greenbush. July.

The spores in our specimens often exceed the dimensions given in the description of this species.

Ægerita candida *Pers.*

Decaying wood. Grand Island and Sodus Bay. *Clinton.* October and November.

Periconia truncata *C. & P. n. sp.*

Scattered, black; stem rather thick, composed of loosely compacted slender septate threads; capitulum expanded, truncate; spores elliptical, attenuated towards either end.

Dead branches of apple trees. Center. May.

PERICONIA CORTICALIS *C. & P. n. sp.*

Scattered, black; stem erect, rigid, composed of slender septate threads which are free at the apex forming a subglobose head and bearing at the tips minute globose spores, .00012′ in diameter.

Bark of *Thuja occidentalis.* Adirondack Mts. July.

HELMINTHOSPORIUM OÖSPORUM *Cd.*

Dead stems of grape vines. Watkins. September.

HELMINTHOSPORIUM EPISPHÆRICUM *C. & P. n. sp.*

Flocci rather long, tufted, slender, flexuous, septate, rarely branched, blackish-brown; spores oblong-clavate, three to four septate, .002′–.003′ long, truncate at the apex, the second and third cells from the top generally more highly colored than the others.

On some effete Diatrype. Albany. August. (Pl. 2, figs. 18–20.)

CERCOSPORA CALLÆ *P. & C. n. sp.*

Spots definite, narrow, oblong, pallid; flocci amphigenous, minutely tufted, short, flexuous, somewhat nodulose, not at all or indistinctly septate, slightly colored, cinereous or subolivaceous in the mass; spores colorless, terminal, at first simple, then elongated and one to five-septate, nearly straight, cylindrical or obclavate, .001′–003′ long.

Living leaves of *Calla palustris.* Buffalo. *Clinton.* August.

PERONOSPORA PYGMÆA *Ung.*

Leaves of *Anemone Pennsylvanica.* Bethlehem. May and June.

PERONOSPORA EFFUSA *Grev.*

Leaves of *Chenopodium album.* West Albany. August and Sept.

RAMULARIA NEMOPANTHIS *C. & P. n. sp.*

Spots brownish, rather irregular; flocci hypophyllous, fasciculate, short, delicate; spores fusiform or cylindrical, .0008′ long, .0002′ broad.

Living leaves of *Nemopanthes Canadensis.* Buffalo. *Clinton.* Kasoag. July.

POLYACTIS PULVINATA *B. & C.*

Dead trunks and branches of alders. Center. October.

OIDIUM LEUCOCONIUM *Desm.*

Living rose leaves. Conservatories, Buffalo. *Clinton.* Wild rose leaves. West Albany. July and November.

Judge Clinton remarks that the fungus curls and kills the leaves of the cultivated roses. The fungus is now regarded as a state of *Sphærotheca pannosa*, the perfect condition of which we have not yet seen.

STYSANUS STEMONITIS *Cd.*

Fallen leaves of *Amelanchier Canadensis.*

Our specimens do not fully agree with the description and are therefore referred here with some hesitation. The stem is black and has a decidedly swollen or bulbiform base so that, after the spores have fallen, the plant might readily be taken for a Sphæria with a long subulate ostiolum.

DACTYLIUM ROSEUM *Berk.*

On apples. Albany. November.

The apples were first attacked by *Spilocæa Pomi*, then on these affected spots this fungus appeared, forming a whitish, scarcely roseate, effused pulverulent mass.

FUSISPORIUM PHYLLOGENUM *C. & P. n. sp.*

Hypophyllous, collected in suborbicular spots; flocci fasciculate, simple or branched, nodulose; spores cylindrical, curved, three to seven-septate, colorless, .0025′–.003′ long.

Living leaves of *Erigeron annuum.* Bethlehem. October.

FUSISPORIUM PARASITICUM *n. sp.*

Flocci delicate, tufted, sometimes branched, white; spores unequal in length, three to five-septate, straight or curved, usually pointed at one end and obtuse at the other, colorless, .0012′–.002′ long.

On *Sphæria Collinsii.* Center. July.

ZYGODESMUS HYDNOIDES *B. & C.*

Decaying wood. Buffalo. *Clinton.* September.

CHÆTOMIUM FUNICOLUM *Ck.*

Old broom. Albany.

The specimens are old and without asci and are to this extent doubtful, but they appear to belong here.

UNCINULA GENICULATA *Ger.*

Leaves of *Morus rubra.* Poughkeepsie. *Gerard.* September.

GEOGLOSSUM NIGRITUM *Pers.*

Marshy ground in woods. Greig. September. (Plate 1, figs. 20–22.)

Externally this species resembles *G. Peckianum*, from which it is separated by its spores paraphyses and somewhat porous club. From *G. glabrum* it is at once distinguished by its glabrous stem and the longer, not moniliform, terminal joints of the paraphyses. Its spores scarcely differ from those of *G. glabrum* except in being more narrow.

The spores of *G. glabrum* having been described in the Handbook as three to four-septate, I was led to consider a similar plant with seven-septate spores as distinct and described it in the 25th Report under the name *Geoglossum simile.* But the description on which I relied proves to have been erroneous, and the spores of *G. glabrum* have since been published as seven septate, so that *G. simile* of the 25th Report becomes a synonym of *G. glabrum.*

The application of the specific name *glabrum* to the plant designated by it is unfortunate and liable to mislead the student, for the stem is covered by a kind of minutely-tufted tomentum of matted septate filaments, which, with the projecting masses of spores from the mature club, give the plant a scarcely less hairy aspect than that of *Geoglossum hirsutum.*

PEZIZA IMPERIALIS *n. sp.*

Bright sulphur-yellow; cups irregular, six to twelve lines broad, often split on one side, with the margin incurved, externally pruinose-tomentose, the disk glabrous, becoming slightly orange-tinted in drying; stem thick, somewhat lacunose, usually narrowed at the top, four to eight lines high; asci cylindrical; spores elliptical, .0004′ long, .0002′ broad; paraphyses filiform, slightly thickened at the top.

Ground in woods. Greig. September.

In consequence of the bright color the plant is quite showy. The external pruinosity is due to the presence of a minute tomentum. The species is apparently allied to *P. sordescens* B. & C., but unless that species is badly described our plant must be distinct. (Plate 1, figs. 13–15.)

PEZIZA GRISEO-ROSEA *Ger.*

Ground in woods. Knowersville and Sandlake. July and August.

PEZIZA ALBOSPADICEA *Grev.*

Ground in woods. Sandlake. August.

PEZIZA BRONCA *n. sp.*

Cups gregarious or crowded, sessile, subhemispherical, four to nine lines broad, whitish or very pale-buff, externally roughened by small crowded whitish warts; asci cylindrical; spores elliptical, one to two-nucleate, .0008′–.0009′ long, .0005′ broad.

Ground. Knowersville and Sandlake. July and August. (Plate 2, figs. 10–12.)

PEZIZA LONGIPES *C. & P.*

Petioles of fallen leaves. Memphis. August.

PEZIZA AGROSTINA *n. sp.*

Cups scattered, small, .02′–.03′ broad when dry, subsessile, hemispherical or subglobose, externally hairy, of a dull pinkish hue, the hairs of the margin bent inwards when moist, usually with longer subulate whitish points, the others not subulate, often rough and more or less septate; disk pallid or cream-colored; asci cylindrical; spores subcylindrical, .00025′–.0003′ long; paraphyses broad, longer than the asci, tapering upwards to a point.

Dead stems of *Calamagrostis Canadensis.* West Albany. June.

The peculiar paraphyses indicate an alliance with *P. apala*, *P. brunneola*, etc. The species belongs to the *Dasyscyphæ.*

PEZIZA SUBTILISSIMA *Ck.*

Dead branches of pine. West Albany. July.

PEZIZA VIRGINELLA *Ck.*

Fallen leaves. Center. May.

PEZIZA PINASTRI *C. & P.*

Dead pine leaves adhering to cut branches. Center. May.

PEZIZA THALICTRI *n. sp.*

Cups abundant, sessile, bursting through the epidermis, small, punctiform when dry, externally black, the margin usually whitish or cinereous and subfimbriate; disk cinereous; asci oblong; spores crowded, elongated, simple or multinucleate, .001′–.0012′ long, .0002′ broad.

Base of dead stems of *Thalictrum cornuti.* Center. May.

When moist the cups expand, revealing the disk. The substance is then so much swollen that the black exterior breaks up into small scales, giving a scabrous appearance to the cups. The species should be referred to the section *Mollisia.*

HELOTIUM SAPROPHYLLUM *C. & P. n. sp.*

Minute, stipitate, ochraceous; cups plane; stems slender, slightly thickened upwards, as long as or longer than the diameter of the cup; asci sublanceolate; spores lanceolate or somewhat clavate, biseriate, one to two-nucleate, .0008′ long, .00025′ broad.

Fallen leaves. Lake Pleasant. August.

The species is closely related to *H. fastidiosum* but is smaller throughout.

HELOTIUM HYDROGENUM *n. sp.*

Gregarious or scattered, sessile, smooth, externally brownish; disk nearly plane, margined, pallid or yellowish, becoming tinged with brown or green in drying; asci subclavate; spores subcylindrical, slightly curved, often containing several minute nuclei, .0005′–.0006′ long.

Decaying wood lying in water. Sandlake. July.

The plants on the upper surface of the wood have the disk more yellow than those just at or beneath the surface of the water. They were associated with *Mitrula paludosa* and *Vibrissea Truncorum.*

ASCOBOLUS FURFURACEUS *Pers.*

Excrement of cattle. Buffalo. *Clinton.* Sandlake and West Albany. July and August.

When fresh the cups have a beautiful greenish-yellow color.

ASCOBOLUS CILIATUS *Schm.*

Excrement of cattle. Buffalo. *Clinton.* November.

TYMPANIS GYROSA *B. & C.*

Dead branches of apple tree. Silver Lake. *Clinton.* June.

BULGARIA PURPUREA *Fckl.*

Decaying wood. Poughkeepsie. *Gerard.* Buffalo. *Clinton.* Greig, East Worcester and Catskill Mts. July to September.

The long spores, .0006′–.001′, separate this from *B. sarcoides.*

STICTIS VERSICOLOR *Fr.*

Dead branches and decaying wood. Buffalo. *Clinton.* West Troy. July.

STICTIS FILICINA *n. sp.*

Pustulate, erumpent, surrounded by the lacerated epidermis; disk plane or concave, pallid or cream-colored; spores filiform, .0016′–.002′ long.

Dead stems of *Osmunda cinnamomea.* Center. May.

The pustules are numerous and brownish at first. The covering epidermis is at length lacerated, the numerous narrow suberect laciniæ retaining their brownish hue.

HYPOCREA CHROMOSPERMA *C. & P. n. sp.*

Fleshy, soft, convex, orbicular, one to two lines broad, flattened and patellate when dry, whitish or watery tan-color; ostiola slightly prominent; asci cylindrical; spores quadrate-globose, brownish when mature, .00016′–.0002′ in diameter.

Decaying wood. Buffalo. *Clinton.* Greenbush and Croghan. July to September.

The colored spores are a noticeable feature.

HYPOCREA PATELLA *C. & P. n. sp.*

Fleshy, patellate, discoid, one to two lines broad, pale ochraceous; asci cylindrical; spores globose, sixteen, hyaline, .00012′–.00016′ in diameter.

Decaying wood. Buffalo. *Clinton.* March and April.

This plant resembles externally some species of Helotium. The ostiola are smaller and less prominent than in the preceding species.

HYPOCREA RUFA *Fr.*

Dead alders. Center.

HYPOCREA APICULATA *C. & P. n. sp.*

Fleshy, soft, growing in irregular patches, smooth, ochraceous inclining to orange, the extreme margin barren; asci cylindrical; spores fusiform, with an apiculus at each extremity, uniseptate, colorless, .0011′–.0015′ long, .0003′–.0004′ broad.

Ground and rocks. Catskill Mts. and Sandlake. June to August.

The color of the ostiola in this species is variable, ranging from amber to orange.

HYPOMYCES TRANSFORMANS *n. sp.*

Subiculum effused, variable in color, pallid, golden-yellow, ochraceous or brick-red; perithecia ovate or subglobose, papillate, sunk in the subiculum; ostiola prominent, obtuse, amber or orange; asci cylindrical; spores fusiform, apiculate at each end, somewhat rough, simple or rarely with the endochrome obscurely divided, colorless, .0013′–.0015′ long.

Parasitic on *Cantharellus cibarius*, which it transforms into an irregular mass. Sandlake. August.

The spores of *Hypocrea apiculata* resemble those of this and other species of *Hypomyces*, but the plant is not "parasitic on fungi," an essential character in the genus *Hypomyces* as at present defined. Neither do its spores agree well with the spore-character of the genus *Hypocrea* to which the species is referred, so that the plant must be regarded as an aberrant species intermediate between the two genera. It therefore becomes a question whether the two genera are well separated and whether they ought not to be reunited.

MELOGRAMMA SUPERFICIALIS *P. & C. n. sp.*

Stroma superficial, depressed, one to two lines broad, pale or yellowish within; perithecia unequal, more or less irregular, crowded, depressed, blackish-brown or black; asci very broad, varying from subglobose to oblong-clavate, fugacious; spores oblong, obtuse, fenestrate, slightly constricted at the center and appearing uniseptate, .001′–.0013′ long.

Bark of living mountain ash, *Pyrus Americanus*. Buffalo. *Clinton*. May.

DOTHIDEA FILICINA *Fr.*

Dead stems of *Pteris aquilina*. Center. May.

The spores in our specimens are oblong-fusiform, triseptate, .001′–.0012′ long, either with or without a hyaline appendage at each end.

DIATRYPE SMILACICOLA *Schw.* (*Hypoxylon Smilacicola*. Howe.)

Dead stems of Smilax. Yonkers. *Howe*.

DIATRYPE CEPHALANTHI *Schw.*

Dead stems of *Cephalanthus occidentalis*. Buffalo. *Clinton*. July. Catskill.

It belongs to the section *Diatrypella*.

DIATRYPE ADUSTA *C. & P. n. sp.*

Pustules small, slightly elevated, subconical, blackish, covered by the epidermis which is pierced by the very small disk; stroma white; ostiola few, small, black; asci cylindrical; spores uniseriate, simple, elliptical, colored, .0007′–.0009′ long.

Dead branches. New Baltimore. *Howe*.

VALSA TRICHISPORA *C. & P. n. sp.*

Small, pustulate; stroma cortical, pale ochraceous as well as the erumpent disk; perithecia few, dark-brown when mature; ostiola exserted, quadrisulcate; asci clavate; spores filiform, hyaline, five to seven-septate, .0024′ long, .0001′ broad.

Dead twigs of oak. Greenbush.

It looks like a miniature *Valsa leiphemia*.

VALSA TUMIDULA *C. & P. n. sp.*

Erumpent, piercing the elevated discolored cuticle, ultimately exposing the blackened disk; perithecia four to six, semi-immersed in the wood, circumscribed by a black line; ostiola obtuse, quadrisulcate; asci clavate; spores linear, straight or curved, obtuse, hyaline, .0004′–.0005′ long.

Dead branches of Cratægus. Garrisons. June.

Valsa cinctula *C. & P. n. sp.*

Pustulate; perithecia few, clustered, black; ostiola cylindrical, thick, piercing the whitish disk which encircles them with an irregular white ring; asci clavate; spores fasciculate, linear, multinucleate, at length three to seven-septate, .0024′ long, .0002′ broad.

Dead branches of chestnut. Guilderland. May. (Plate 2, figs. 21–24.)

Valsa Fraxinicola *C. & P. n. sp.*

Pustulate, perforating the epidermis; perithecia ovoid, black, circinating; ostiola rather long, convergent, somewhat quadrisulcate; asci clavate; spores minute, sausage-shaped, crowded at the apex of the asci.

Ash branches. Tyre. September.

Valsa Linderæ *n. sp.*

Pustules small, rather prominent, crowded or scattered, closely surrounded by the ruptured epidermis, circumscribed by a black line; ostiola crowded, short, dull black, obliterating the blackish disk; perithecia usually four to six, nestling in the inner bark; asci slender, clavate; spores eight, yellowish in the mass, cylindrical, curved, obtuse, .0003′–.0005′ long.

Dead branches of the spice bush, *Lindera Benzoin*. Albany. July.

Valsa leptasca *P. & C. n. sp.*

Subpustulate, blackish, erumpent; perithecia small, numerous, tapering above into the papillate or subconical ostiola; asci elongated, cylindrical, slender; spores uniseriate, simple, oblong or elliptical-oblong, usually binucleate, colorless, .0003′ long.

Dead branches of *Rhus typhina*. Buffalo. *Clinton*. July and August.

Sometimes the pustules are confluent or effused, in which case the plant might be taken for a Sphæria.

Sphæria Collinsii *Schw.*

Leaves of *Amelanchier Canadensis*. Center. May.

This remarkable Sphæria was found in considerable quantity in the locality mentioned. It attacks all the leaves on an affected branch, and even the branch itself gives indications of the presence and influence of the fungus. It is more or less contorted, swollen and deflected toward the ground. The upper surface of the leaves assumes a dark-green or lurid hue, the lower surface being wholly occupied by matted filaments, the subiculum of the Sphæria. This is at first olive-brown in color, but at length black spots appear upon it. These gradually enlarge until the whole surface becomes black. With this change in the color of the subiculum, the perithecia appear, but they do not, apparently, perfect their spores until the following spring, spore-bearing specimens having been found in May. The affected leaves adhere to the branch during the winter and the early part of the following summer. These dry leaves, when seen among the surrounding green leaves that put forth before these have fallen, together with the drooping branch that bears them, are deceptively imitative of dead leaves on a branch that has been broken down but still adheres by a shred to the parent trunk. The young fungus commences its growth before the old one of the previous year has disappeared. I have taken from the same tree, at the same time, old leaves bearing the mature Sphæria, and young leaves bearing the subiculum and young perithecia of the succeeding crop. The fungus does not appear to kill the branch it attacks.

As Schweinitz does not describe the fruit of this fungus I subjoin the following description of its characters:

Asci cylindrical; spores uniseriate, abruptly narrowed at one end and divided by an obscure septum into two very unequal parts, colorless, .0004′–.0005′ long.

This fungus is manifestly closely allied to *Sphæria morbosa*, which some European mycologists have referred to the genus *Cucurbitaria*, but as the erumpent character of the Cucurbitariæ is not present in *S. Collinsii*, the species is left where Schweinitz placed it.

SPHÆRIA (VILLOSÆ) CÆSARIATA *C. & P. n. sp.*

Perithecia gregarious, about .012′ in diameter, subglobose, papillate, black, shining, beset with scattered erect rigid septate black hairs; asci cylindrical or clavate; spores biseriate, narrowly fusiform, five to seven-septate, greenish, .0015′–.0017′ long, each cell nucleate.

Decaying wood. Portville. September.

SPHÆRIA (VILLOSÆ) LEONINA *C. & P. n. sp.*

Perithecia subconfluent or rarely scattered, dark-brown, oval, covered with a short thick tawny-orange tomentum, the papillate apex naked; asci clavate or cylindrical; spores biseriate, lanceolate, uniseptate, constricted, at length triseptate, brown, .0014′–.0015′ long; paraphyses slender, filiform.

Cut surface of wood. Portville. September.

SPHÆRIA FIMETI *Pers.*

Horse dung. Sandlake. July.

SPHÆRIA OBDUCENS *Fr.*

Ash branches. Bethlehem. June.

SPHÆRIA SPERMOIDES *Hoffm.*

Decaying wood. Buffalo. *Clinton.* May.

SPHÆRIA (DENUDATÆ) SALEBROSA *C. & P. n. sp.*

Perithecia gregarious or crowded, globose, rough, black, depressed and umbilicate, pierced at the apex and faintly radiately sulcate, .02′–.03′ broad; asci cylindrical or clavate; spores lanceolate, acute uniseptate, constricted at the septum, brown, .0014′–.002′ long, .0003′–.0004′ broad; paraphyses numerous, filiform.

Dead stems of shrubs. Center. October.

SPHÆRIA (DENUDATÆ) RECESSA *C. & P. n. sp.*

Perithecia gregarious, at first semi-immersed, smooth, flattened, dark-brown or black, .012′ broad; asci subclavate; spores one or two-seriate, elliptical, uniseptate, deeply constricted at the septum, colorless, .0005′–.0008′ long, .00025′–.0004′ broad.

Decaying wood. Tyre. September.

The perithecia have a somewhat discoid appearance.

SPHÆRIA (DENUDATÆ) SQUALIDULA *C. & P. n. sp.*

Perithecia gregarious, globose, semi-immersed, pierced at the apex, about .012′ broad, black; asci cylindrical; spores uniseriate, elliptical, simple, binucleate, colorless, .0005′–.0007′ long.

Decaying chestnut wood. Portville. September.

SPHÆRIA (DENUDATÆ) INTERSTITIALIS *C. & P. n. sp.*

Perithecia gregarious, at first semi-immersed, always apparently so by nestling between the fibres of the wood, subglobose, pierced at the apex, black, .012′–.02′ in diameter; asci cylindrical; spores uniseriate, polymorphous, triseptate, with occasional vertical septa, deeply constricted, brown, .0012′–.0014′ long, .0005′–.00065′ broad.

Decorticated wood of cherry. Greenbush. November.

SPHÆRIA EXILIS *A. & S.*

Decaying wood. Markham Station. *Clinton.* May.

SPHÆRIA SPICULOSA *Pers.*

Dead branches. North Greenbush. July.

SPHÆRIA OBTUSISSIMA *B. & C.*

Decaying maple wood. Sandlake. July.

I depend upon specimens received from the late Dr. Curtis for the validity of this determination as I have seen no description of the species.

SPHÆRIA (OBTECTÆ) CEANOTHINA *n. sp.*

Perithecia small, scattered or rarely two or three crowded together, smooth, subglobose; ostiola piercing the epidermis, somewhat rugged, often curved or deformed; spores crowded or biseriate, oblong, obtuse, sometimes curved, colorless, 0005′– 0006′ long.

Dead stems of *Ceanothus Americanus*. Center. May.

SPHÆRIA (OBTECTÆ) MELANTERA *n. sp.*

Perithecia gregarious, minute, covered by the blackened epidermis; asci linear; spores crowded or biseriate, oblong or subfusiform, triseptate, slightly constricted at the septa, colored, .0005′–.0007′ long.

Dead stems of raspberry, *Rubus strigosus*. Center. May.

SPHÆRIA (CAULICOLÆ) FULGIDA *C. & P. n. sp.*

Perithecia gregarious, sometimes disposed in lines, soon free, globose, black, smooth, shining, scarcely papillate, .01′–.012′ in diameter, at length collapsed; asci clavate or cylindrical; spores filiform, curved or flexuous, multinucleate, at length multiseptate, colorless, .003′ long.

Dead stems of herbs. Albany. May.

This is allied to *S. rubella*, *S. acuminata*, *S. Bardanæ* and *S. Urticæ*.

SPHÆRIA (CAULICOLÆ) SMILACININA *n. sp.*

Perithecia abundant, minute, at first covered by the thin often blackened epidermis, slightly prominent; asci cylindrical or subclavate; spores crowded, ovate or unequally elliptical, pale greenish-yellow, .0005′–.0006′ long, usually containing a single large nucleus.

Dead stems of *Smilacina stellata*. Center. May.

SPHÆRIA (CAULICOLÆ) MINUTELLA *n. sp.*

Perithecia minute, somewhat flattened, black, the upper part at length breaking away leaving the base attached to the matrix; asci sublanceolate; spores oblong, simple, colorless, .0003′ long.

Dead stems of herbs. North Greenbush. June.

SPHÆRIA CULMIFRAGA *Desm.*

Dead stems of grass. Watkins. September.

SPHÆRELLA COLORATA *n. sp.*

Spots orbicular, small, scattered or rarely confluent, reddish-brown, usually with a darker margin; perithecia minute, black, epiphyllous; asci cylindrical; spores cylindrical or subfusiform, uniseptate, colorless, .0006′–.0007′ long.

Living leaves of sheep laurel, *Kalmia angustifolia.* Center. July. The spots are more distinctly margined on the upper than on the lower surface of the leaf. They are sometimes greyish. Plate 2, figs. 15–17.)

(5.)

PLANTS PREVIOUSLY REPORTED—REMARKS AND OBSERVATIONS.

The first twelve species of fungi here given were reported without description. They are now repeated with descriptions.

DOTHIDEA CLAVISPORA. (*Hysterium clavisporum* C. & P.).

Stroma small, oblong, elliptical or linear, at first covered by the epidermis, then erumpent, longitudinally striate under a lens, black; asci clavate; spores crowded, clavate, multiseptate, colored, .001′–.0013′ long.

Dead stems of *Phragmites communis.*

The fungus frequently grows in long lines or series. Mature fruit-bearing specimens especially occur on the older and more discolored stems. The septa are from five to nine, the intervals between them being very short. The basal cell is usually the longest.

HYSTERIUM EXARIDUM *C. & P.*

Superficial, seated on irregular bleached spots; perithecia elliptical, minutely rugose, opaque, black; lips elevated, paler, connivent; asci clavate; spores filiform, hyaline.

Fallen leaves of *Kalmia angustifolia.*

COLPOMA JUNIPERINUM *C. & P.*

Perithecia gregarious, oblong or elliptical, sometimes slightly elongated and flexuous, covered by the epidermis which is ultimately ruptured in an irregular manner, blackish, disk pallid, at length exposed; asci clavate; spores filiform; paraphyses slender, filiform, at first curved or circinate at the tips.

Bark of *Juniperus Virginiana.*

DIATRYPE MOROIDES *C. & P.*

Rather small, erumpent, the disk at length obliterated by the crowded somewhat prominent hemispherical black ostiola; perithecia crowded, blackish; asci cylindrical; spores uniseriate, oblong, uniseptate, colored, .0005′–.0006′ long, about .0002′ broad.

Dead alders.

Valsa bicincta *C. & P.*

Erumpent; stroma dirty-white, mealy; perithecia six to ten, subglobose, disposed in circles, black; ostiola elongated, convergent; disk whitish, surrounded by a black line, at length obsolete; asci cylindrical; spores biseriate, fusiform, four-nucleate, .0004′–.0005′ long.

Dead branches of *Juglans cinerea.*

The spores in dried specimens sometimes have the appearance of being uniseptate or even triseptate from the division of the endochrome.

Lophiostoma turritum *C. & P.*

Perithecia subgregarious, emergent, prominent, subglobose, black, with broad compressed truncate necks; ostiola elongated; asci cylindrical or clavate; spores oblong-elliptical, five-septate, brown, .0008′–.0009′ long.

Dead willow branches.

The turret-shaped perithecia give a spinulose appearance to the twigs. The lips of the compressed ostiola are linear as in Hysterium.

Lophiostoma magnatum *C. & P.*

Perithecia subgregarious, semi-immersed, globose, rather large, somewhat thin and fragile, pitchy-black; ostiola short, compressed; asci cylindrical or clavate; spores biseriate, lanceolate, constricted in the center, three to five-septate, .002′–.0023′ long.

Decaying wood. It some resembles *L. macrostomum* in habit.

Sphæria (Villosæ) mutans *C. & P.*

Perithecia rather large, .026′–.036′ broad, gregarious or crowded, globose, papillate, black, at first clothed with a thin tawny evanescent tomentum, at length naked, smooth, shining; asci subcylindrical; spores uniseriate, elliptical, brown, .0004′–.0005′ long.

Decaying wood.

The species is allied to *S. mutabilis* Pers.

Sphæria (Villosæ) viridicoma *C. & P.*

Perithecia erumpent, then superficial, two or three together, ovate, black, clothed with a dense greenish tomentum, .03′–.04′ broad; ostiola thick, prominent, naked; asci clavate or cylindrical; spores one to two-seriate; lanceolate, uniseptate and four-nucleate or triseptate, deeply constricted at each septum, colorless, .0013′–.0018′ long, .0003′–.0004′ broad.

Decaying beech wood and branches.

The two central cells of the spores are nearly globose.

SPHÆRIA (CAULICOLÆ) SEMEN *C. & P.*

Perithecia soon free, globose, clustered, pierced at the apex, black; asci clavate or cylindrical; spores biseriate, lanceolate, straight or curved, triseptate, deeply constricted in the center, colorless, .0012′–.0013′ long.

Fallen petioles of mountain ash, *Pyrus Americana.*

SPHÆRIA (CAULICOLÆ) SUBCONICA *C. & P.*

Perithecia conoid, flattened at the base, somewhat collapsed when dry, seated beneath the epidermis which is at length thrown off, black; asci cylindrical; spores triseptate, brown, .0012′ long, .0003′ broad.

Dead stems of herbs.

It resembles *S. Doliolum* in habit, but differs in fruit.

SPHÆRIA (CAULICOLÆ) RACEMULA *C. & P.*

Perithecia cæspitose, rugose, small, flattened, black, at length collapsed, separating with the epidermis which is pierced by the elongated ostiola; asci clavate, sessile; spores narrowly lanceolate, colorless, four-nucleate, .0006′ long.

Dead stems of *Epilobium angustifolium.*

AZALEA VISCOSA *L.*

This beautiful shrub has been found in the town of Schodack, Rensselaer county by *Rev. H. Wibbe.*

ARCEUTHOBIUM PUSILLUM *Pk.*

Mrs. L. A. Millington informs me that she has found this parasite growing on upland spruces, so that it is not limited to those growing in and around marshes.

RUMEX ENGELMANNI *Ledeb.*

Grassy grounds. Albany. *Prof. J. Hall.*

SCIRPUS MARITIMUS *L.*

Fine specimens were collected near Syracuse by *Mrs. Rust.*

BOTRYCHIUM MATRICARIÆFOLIUM *A. Braun.*

Lewis county. *Mrs. Barnes* and *W. W. Hill.*

In the development of a science like Mycology it is not possible wholly to avoid mistakes and the necessity of changes in names and arrangement. Recent European publications enable me to make some corrections in the nomenclature of previous reports.

AGARICUS NAUCINUS *Fr.*

In the new edition of Epicrisis this species is described as having *globose spores;* it therefore becomes necessary to regard as a distinct species the plant reported under this name in the 23d Report, p. 72. I propose for it the name *Agaricus* (*Lepiota*) *naucinoides*, and add to the description already given the following: *Spores subelliptical*, .0003′–.00035′ *long*, .0002′–.00025′ *broad*, *generally with a single large nucleus.*

The difference in the spores, the smoother pileus and absence of an umbo will separate this from *A. naucinus.*

There is also another closely related species, *A. Schulzeri* Kalchb., which is said to have *ovate spores*, a small annulus, an umbonate pileus and a nauseous taste, characters by which it may be readily distinguished from our plant. *A. lævis* Krombh., and *A. cretaceus* Fr., are also liable to be confused with this plant if the spores be neglected, the former being distinguished by its rosy or flesh-colored spores, the latter by its brown spores. Thus it appears that there are five species that are not easily separated except by their spore characters; a strong indication of the importance of publishing these characters with the descriptions of species.

AGARICUS PONDEROSUS *Pk.* Report 26, p. 50.

This name being preoccupied is changed to *Agaricus magnivelaris* Pk.

AGARICUS COPRINOIDES *Pk.* Report 26, p. 59.

This name also has been applied to a European species and I would therefore name the American plant *Agaricus plicatellus* Pk.

AGARICUS LILACINUS *Pk.* Report 24, p. 63.

This, too, is applied in Europe to a different species. I would therefore substitute for it the more appropriate one, *Agaricus lilacifolius* Pk.

PLICATURA ALNI *Pk.*

In the first edition of Epicrisis the genus *Trogia* is limited to coriaceous Agaricini having the lamellæ or folds longitudinally *channelled* on the edge. In the Handbook of British Fungi the generic character of *Trogia* is so modified as to include species with *crisped* lamellæ, and *Cantharellus crispus* is referred to this genus. Also, in the second edition of Epicrisis the phrase "in spec. Europæa modo crispæ" is parenthetically inserted in the generic description of *Trogia* and *C. crispus* becomes *Trogia crispa.* If this classification is to be adopted and followed then *Plicatura Alni* must be changed to *Trogia Alni.* The reasons for its adoption are twofold. First it is the arrangement of the venerable Fries, the life-long student of fungi, who probably has no equal in the knowledge of the Agaricini and in the ability to judge concerning the value of their characters and their proper classification; second, the unnecessary multiplication of genera founded on slight differences is to be deprecated.

BOLETUS RETIPES *B. & C.* Report 23, p. 132.

As soon as the characters of this species were published by Rev. M. J. Berkeley, it became evident that the plant I had hesitatingly referred to it and described in the location cited was distinct. There is no pulverulence to our plant nor does it have "pilei arising from a common base." I would, therefore, give it the name *Boletus ornatipes*. Either this or a closely related form is regarded by my friend, Mr. C. C. Frost, as a variety of *B. griseus*, but the yellow flesh and the tubes, which are also yellow from the first, indicate to my mind a specific difference. It is by having respect to such a difference in color that the whole genus has been divided into primary series, and it hardly seems fitting to throw together, as varieties of one species, forms thus separated.

THELEPHORA PALLIDA *Schw.*

This name, being preoccupied, must be changed. I would substitute for it, *Thelephora Schweinitzii.*

PUCCINIA TIARELLÆ *B. & C.* Report 25, p. 115.

Since the publication of this species, for the authenticity of which I depended upon specimens received from the late Dr. Curtis, Rev. Dr. Berkeley has published in Grevillea, 1874, p. 53, under the same name, a species which is clearly quite different. He also finds *Puccinia Saxifragarum* on Tiarella leaves. Neither can this be our plant, for *P. Saxifragarum* has its spores much broader and more obtuse. In view, therefore, of the peculiar circumstances attending the publication of these two species under the same name, I deem it the most courteous, if not the most correct way, to drop the name *P. Tiarellæ* from its connection with the plant described in the 25th Report, and substitute for it the name *Puccinia spreta* Pk., thus leaving *P. Tiarellæ* B. & C. for the species to which it has been applied by Dr. Berkeley.

UROMYCES PELTANDRÆ *Howe.*

Some account of the synonymy of this species seems desirable. In the synopsis of the Fungi of North Carolina, Dr. Schweinitz describes a fungus under the name *Uredo Caladii*, giving Caladium as its habitat. In his Synopsis of North American Fungi, he changes the name of this fungus to *Uredo Ari-Virginici*, adding the remark, perhaps as a reason for the change, "it is not Caladium but Arum on which it is found frequently." This remark admits of two interpretations depending upon the stress given to the last word. He may have found the fungus at first on Caladium and afterwards more frequently on Arum, or he may at first have mistaken the host plant, Arum, for Caladium, in which case the remark must have been intended as a correction of that mistake, the word "frequently" being simply an additional idea. The latter appears to me to be the most natural interpretation. He does not mention the particular species in either case, but from the context it appears that the Caladium, real or supposed, was our present *Peltandra glauca*, and the Arum, our *Peltandra Virginica*. However this may be, the fungus inhabiting the latter plant was regarded as Schweinitz's species until Dr. Howe described it under the name *Uromyces Peltandræ*, and thus indicated more correctly its generic relations. He subsequently substituted the specific name *Ari-Virginici* for *Peltandræ*, but the law of priority works badly in this case, for the oldest name, *Caladii*, is manifestly inappropriate and was discarded by Schweinitz himself, and against the other there is, in the minds of some, an objection because of its compound character. *Uromyces Pontederiæ* Ger. is, according to specimens received from Mr. Gerard, on Peltandra leaves and not distinct from *U. Peltandræ*.

Until recently the Uromyces inhabiting the leaves of *Arisæma triphyllum* was considered specifically the same as the one on Peltandra leaves. Dr. M. C. Cooke has separated a form of this, in which the sori are clustered in spots, under the name *Uromyces Arisæmæ*. I am satisfied that this is not specifically distinct from the other form in which the sori are more evenly scattered over the whole surface of the leaf. There is no constant difference in the spores, and both forms manifestly run into each other in habit. Nor is there, in my opinion, any just ground for the separation of either from *U. Peltandræ* except perhaps as a variety, for the only appreciable differences I find between them are now and then a spore in the form on Peltandra leaves which slightly exceeds in size any that I find on Arisæma leaves and a greater tendency in the former to occupy the lower surface of the leaf, while in the latter there seems to be a greater tendency to occupy the upper surface. But both are frequently amphigenous in habit. I regard the following as the synonymy of the species:

Uredo Caladii *Schw.*	Synopsis Fung. Car.	No. 480.	
Uredo Ari-Virginici *Schw.*	Synopsis N. A. Fung.	No. 2839.	
Uredo " "	Rav. Fung. Car. Exsic.	Fasc. IV.	No. 96.
Uredo " "	Curtis Cat. N. C. Plants, p. 122.		
Uredo " "	N. Y. Cab. Rep., 23, p. 57.		
Uromyces Peltrandæ *Howe.*	Bull. Torr. Club.	1874, p. 3.	
Uromyces Ari-Virginici *Schw.*	" " "	" p. 43.	
Uromyces Pontederiæ *Ger.*	" " "	1875, p. 31.	
Uromyces Arisæmæ *Ck.*	" " "	" p. 32.	

UROMYCES LESPEDEZÆ *Schw.*

All our species of Lespedezæ are subject to the attacks of this fungus. The form that occurs on *L. capitata* usually has the spores and their pedicels a little longer than in the other forms and it was reported as distinct under the name *U. macrospora* B. & C., but I am now satisfied that it is unworthy of specific distinction. The form on

L. hirta was first described by Schweinitz as *Puccinia Lespedezæ-polystachiæ*, but afterwards, finding this fungus more abundant on *L. violacea*, he changed the name to *Puccinia Lespedezæ-violaceæ*. The fungus has for many years been referred to the genus Uromyces to to which it properly belongs.

The same author also published a fungus which he found on *L. procumbens*, giving it the name *Puccinia Lespedezæ-procumbentis*, and describing the spores as having a distinct septum after the manner of true Puccinia spores. This Puccinia does not appear to have been found by subsequent collectors, but the same Uromyces that occurs on other Lespedezæ is often found on L. procumbens also, and is sometimes designated as *Uromyces Lespedezæ-procumbentis* Schw., though this designation is wholly unwarranted by the description of Schweinitz's fungus. Inasmuch as the Uromyces is common to all our Lespedezæ it seems best to drop that part of its trivial name that implies a specific limitation to its habitat and write *Uromyces Lespedezæ* instead of *U. Lespedezæ-violaceæ.*

Uromyces pyriformis *Ck.*

As this fungus was reported without description, the following characters, kindly furnished by Dr. Cooke, are now given:

Amphigenous, erumpent; sori linear, sometimes confluent, rather pulverulent, purple-brown, margined by the fissured cuticle; pseudospores pyriform, deep-brown, epispore thickened above; pedicels rather short, thick, persistent, colored in the upper portion.

On *Acorus Calamus.*

The species is very closely allied to *U. Sparganii*, but appears to differ in habit.

Pileolaria brevipes *B. & R.*

This occurs with us on both sides of the leaves of *Rhus Toxicodendron*, and is sometimes found associated with *Uredo Toxicodendri* B. & R., which is probably its Uredo-form. I suppose the latter fungus to be the one described in Grevillea 1874, p. 56, as *Uromyces Toxicodendri* B. & R., although it does not well agree with the generic character of Uromyces for the pedicels are by no means *permanent*, since it is difficult to find one attached even to an immature spore. In this respect it is nearer Trichobasis, as a species of which it was formerly reported.

Peziza anomala *Pers.*

This is now generally admitted to be a species of Solenia. Some European mycologists consider it the same as *S. ochracea*, others regard it as distinct. The two are kept separate by Fries in his new edition of Epicrisis, and I am disposed to follow this arrangement, for so far as my observation goes they differ constantly in the color and shape of the tubes. *S. anomala* has also a tendency with us to grow in tufts, which I have not seen in *S. ochracea.*

PEZIZA SOLENIA *Pk.*

One author has referred this species to *Peziza Eupatorii* Schw. In establishing the species I depended upon the accuracy of Schweinitz's description, and in justification of my present opinion of the validity of it I quote the full description of *P. Eupatorii*, italicizing those parts not applicable to *P. Solenia.*

"P. EUPATORII L. V. S., *versus radices* in *maximis* caulibus emortuis Eupatorii *purpurei et maculati*, Bethl.

P. *gregaria*, *cupulis bi-vel tri-linearibus*, *madefactis explanatis*, *disco subconvexo*, *margine fere obliterato.* Siccitate connivens, sed non clausa, est hæc pezizula *rufo-carnea*, extus pilis nigrofuscis apice albescentibus *fasciculatim* obsita."

P. Solenia is not collected near the roots of the stems, but occurs more or less abundantly all along them even to the upper part. I have seen it on stems of *Eupatorium ageratoides* only, never on *E. purpureum* or its variety *maculatum.* The cups, instead of being two or three lines, are less than one-fourth of one line broad. The largest cups that I have seen do not exceed this measurement even when moist. In the moist state the cups become somewhat swollen but they assume no shape that could be called "explanate" or flattened. Even after long soaking the mouth still remains small and contracted, the disk, instead of being "subconvex," is still deeply concave, and to say that the margin was "almost obliterated" would be very far from the truth. The flesh and hymenium are whitish and the hairs are not fasciculate. Thus it appears that our plant differs in almost every respect from the description of *P. Eupatorii;* in habit, habitat, size, shape, color of flesh, etc., agreeing only in being connivent in dryness and in having an external covering of similarly colored hairs. Unfortunately, Schweinitz did not describe the fruit of his species so that the comparison can be carried no farther. But it does not seem necessary. No ordinary degree of variability in the species and no reasonable allowance for mistakes in the description would harmonize so many and so great discrepancies.

HELOTIUM THUJINUM *Pk.*

This is thought by some to be the same as *Peziza cupressina*, and doubtless there is a close resemblance between them. Had the latter plant been placed in the genus Helotium instead of Peziza, I should have regarded them as one species myself.

SPHÆRIA VERBASCICOLA *Schw.*

I have never seen this plant bearing the fruit of a Sphæria, but have seen the perithecia filled with a multitude of small elliptical hyaline spores .00016′—.00018′ long. The species should therefore be considered a Phoma until it is found with the fruit of a Sphæria.

SPHÆRIA SARRACENIA *Schw.*

Fertile specimens of this plant indicate that it belongs to the genus Sphærella.

SPHÆRIA SPINA *Schw.*

This plant, which was formerly reported under the name *Sphæronema Spina*, has recently been characterized by Dr. Berkeley as having very small globose spores. The plant which we had regarded as belonging to this species (Schweinitz gives no description of the spores), has spores quite different and must be described as distinct.

SPHÆRONEMA FRAXINI *n. sp.*

Perithecia nestling in the inner bark, covered by the epidermis which is pierced or ruptured by the long black rigid spiniform ostiola; globule whitish; spores long, slender, curved or flexuous, gradually tapering to a point at each end, generally multinucleate, colorless, .002′-.0025′ long.

Dead branches of ash, *Fraxinus Americana.*

The long rigid ostiola render the branch prickly to the touch. The fungus is sometimes found intermingled with *Tympanis Fraxini* of which it may be a condition.

(6.)

PARASITIC FUNGI OF NEW YORK AND THEIR SUPPORTING PLANTS.

But few species of the first great family of fungi, the HYMENOMYCETES, are inabitants of living plants. A single species and the members of a single anomalous genus comprise all with such a habitat that have hitherto been found within our limits. The species of *Exobasidium* attack and transform the buds and leaves of Ericaceous plants into soft gall-like swellings or excrescences. It is not known that they actually kill the plants they attack.

Fungus.	*Supporting plant.*
Solenia filicina *Pk*	Osmunda cinnamomea.
Exobasidium Azaleæ *Pk*	Azalea nudiflora.
E. Andromedæ *Pk*	Andromeda ligustrina.
E. Cassandræ *Pk*	Cassandra calyculata.

Of the second family, the GASTEROMYCETES, probably no member is strictly an inhabitant of living plants though several species occur on both living and dead plants. *Stemonitis herbatica* has as yet been detected only on living leaves and grass, but I do not think its habitat is thus limited.

The third family, the CONIOMYCETES, doubtless furnishes more fungi inimical to living plants than all the others together. All the species of the three orders Pucciniæi, Cæomacei and Æcidiacei find their dwelling place on such plants. They are popularly known by the names Rust, Brand, Smut and Cluster cups. Many of them have a dual form but usually both forms occur on the same plant. In such cases only the second or principal form is given. In *Phragmidium* the spores have a permanent pedicel and two to ten septa according to the species. The color of the spores is blackish-brown or black. They grow on the stems or leaves. In the earlier condition the spores are simple and yellow or orange. These early forms constituted the genus Lecythea.

Phragmidium speciosum *Fr*	Rose stems.
P. mucronatum *Lk*	Rose leaves.
P. gracile *Grev*	Rubus odoratus.
P. obtusum *Lk*	Potentilla Canadensis.
Triphragmium clavellosum *Berk*	Aralia nudicaulis.

In *Puccinia* the spores have a permanent pedicel and a single transverse septum. They grow in dense sori or masses of a rusty-brown, blackish-brown or black color. These masses are usually dot-like and are scattered uniformly over the leaves or are collected in clusters on more or less discolored spots. The earlier forms of the species have the spores simple and were formerly grouped in the genus Trichobasis.

Puccinia pulchella *Pk*	Ribes prostratum.
P. Prunorum *Lk*	Prunus serotina.
P. Anemones *Pers*	Anemone nemorosa. Thalictrum dioicum. T. Cornuti.
P. solida *Schw*	Anemone Virginiana. A. Pennsylvanica.
P. Calthæ *Lk*	Caltha palustris.
P. aculeata *Schw*	Podophyllum peltatum.
P. Violarum *Lk*	Violet leaves.
P. Lychnidearum *Lk*	Dianthus leaves.
P. Mariæ-Wilsoni *Clinton*	Claytonia Caroliniana.
P. Noli-tangeris *Cd*	Impatiens fulva.
P. Pyrolæ *Ck*	Polygala paucifolia.
P. Waldsteiniæ *Curt*	Waldsteinia fragarioides.
P. tripustulata *Pk*	Rubus villosus.
P. Peckiana *Howe*	R. occidentalis. R. strigosus.
P. curtipes *Howe*	Saxifraga Pennsylvanica.
P. spreta *Pk*	Tiarella cordifolia.
P. Circææ *Pers*	Circæa alpina. C. Lutetiana.
P. bullaria *Lk*	Sanicle stems.

Puccinia Umbelliferarum *DC.*	Archangelica atropurpurea.
P. Cryptotæniæ *Pk*	Cryptotænia Canadensis.
P. Osmorrhizæ *C. & P.*	Osmorrhiza brevistylis.
	O. longistylis.
P. porphyrogenita *Curt.*	Cornus Canadensis.
P. Galiorum *Lk*	Galium triflorum.
P. Asteris *Schw*	Aster macrophyllus.
	A. cordifolius.
P. purpurascens *C. & P*	A. acuminatus.
P. Gerardii *Pk*	A. simplex.
P. Virgaureæ *Lib*	Solidago altissima.
P. Xanthii *Schw*	Xanthium Strumarium.
P. Helianthi *Schw*	Helianthus divaricatus.
P. investita *Schw*	Gnaphalium polycephalum.
P. Cirsii *Lasch*	Cirsium lanceolatum.
	C. arvense.
P. variabilis *Grev*	Taraxacum Dens-leonis.
P. Lobeliæ *Ger*	Lobelia syphilitica.
P. Dayi *Clinton*	Lysimachia ciliata.
P. Clintonii *Pk*	Pedicularis Canadensis.
P. Menthæ *Pers*	Mentha Canadensis.
	Monarda fistulosa.
	Hedeoma pulegioides.
P. Physostegiæ *P. & C.*	Physostegia Virginiana.
P. Convolvuli *B. & C*	Calystegia Sepium.
P. Gentianæ *Strauss*	Gentiana Andrewsii.
P. amphibii *Fckl*	Polygonum amphibium.
	P. Pennsylvanicum.
	P. Virginianum.
P. Smilacis *Schw*	Smilax rotundifolia.
P. Veratri *Niessl*	Veratrum viride.
P. mesomajalis *B. & C.*	Clintonia borealis.
P. obtecta *Pk*	Scirpus validus.
	S. pungens.
P. angustata *Pk*	S. Eriophorum.
	S. sylvaticum.
P. striola *Lk*	Carex crinita.
P. caricina *DC*	C. stricta.
P. Sorghi *Schw*	Zea Mays.
P. arundinacea *Hedw*	Phragmites communis.
P. Graminis *Pers*	Grasses and cereals.
P. coronata *Cd*	Avena sativa.
P. linearis *Pk*	Grasses.

In *Gymnosporangium* and *Podisoma* the spores are pedicellate and uniseptate as in Puccinia, but their color is a yellowish-orange when moist, and the mass is then much swollen and tremelloid or gelatinous. The species of Podisoma form those globose excrescences on the Juniper that are known as "*Cedar apples.*"

Gymnosporangium Juniperi *Lk.*	Juniperus Virginiana.
G. clavipes *C. & P*	" "
Podisoma macropus *Schw*	" "
P. fuscum *Duby*	" "

The species of *Uromyces* resemble those of Puccinia in every respect, except that the spores are simple.

Uromyces triquetrus *Ck*	Hypericum perforatum. H. mutilum. Elodes Virginica.
U. Claytoniæ *C. & P*	Claytonia Caroliniana.
U. appendiculosus *Lev*	Pisum sativum.
U. apiculosus *Lev*	Trifolium repens.
U. Phaseoli *Strauss*	Phaseolus diversifolius.
U. Lespedezæ *Schw*	Lespedeza leaves.
U. solidus *B. & C*	Desmodium leaves.
U. Limonii *Lev*	Statice Limonium.
U. Polygoni *Fckl*	Polygonum erectum.
U. Euphorbiæ *C. & P*	Euphorbia maculata. E. hypericifolia.
U. Peltandræ *Howe*	Peltandra Virginica. Arisæma triphyllum.
U. pyriformis *Ck*	Acorus Calamus.
U. Sparganii *C. & P*	Sparganium eurycarpum.
U. Howei *Pk*	Asclepias cornuti.
U. Lilii *Clinton*	Lilium Canadense.
U. Junci *Schw*	Juncus effusus.
U. Caricis *Pk*	Carex stricta.
U. Graminum *Ck*	Brizopyrum spicatum.
Pileolaria brevipes *B. & R*	Rhus Toxicodendron.
Ravenelia glandulæformis *B. & C*	Tephrosia Virginiana.

In *Ustilago* the spores are simple, without permanent pedicels and more or less globose in form. They are black or blackish-brown and form dusty smutty masses, most often in the ovaries or floral organs. They thus destroy the seeds of the host plant and interfere with its propagation.

Ustilago utriculosa *Tul*	Polygonum Pennsylvanicum.
U. Candollei *Tul*	P. sagittatum.
U. Erythronii *Clinton*	Erythronium Americanum.
U. Junci *Schw*	Juncus tenuis.
U. Montagnei *Tul*	Rhynchospora alba.
U. Mont. v. major *Desm*	R. glomerata.
U. urceolorum *Tul*	Carex Pennsylvanica. C. umbellata.
U. Maydis *Cd*	Zea Mays.
U. longissima *Tul*	Glyceria aquatica.
U. neglecta *Niessl*	Setaria glauca.
U. Syntherismæ *Schw*	Cenchrus tribuloides.

Ustilago Carbo *Tul*	Triticum vulgare. Avena sativa.
Urocystis pompholygodes *Schl*	Hepatica acutiloba. Anemone Pennsylvanica.
U. occulta *Preuss*	Grass leaves.
Geminella foliicola *Schroet*	Carex Pennsylvanica.
Protomyces Menyanthis *DeB*	Menyanthes trifoliata.
P. Erythronii *Pk*	Erythronium Americanum.
Coleosporium ochraceum *Bon*	Agrimonia Eupatoria.

In *Melampsora* as in Phragmidium the earlier state was referred to the genus Lecythea. The mature Melampsora is seldom developed before the supporting leaf has fallen.

Melampsora salicina *Lev*	Willow leaves.
M. populina *Lev*	Poplar leaves.

Many of the species of *Trichobasis* are now known to be earlier forms of species of Puccinia. The following have not yet been traced to their later state.

Trichobasis Pyrolæ *Berk*	Pyrola rotundifolia. P. secunda.
T. Iridicola *Pk*	Iris versicolor.

In *Uredo* the spores are simple, usually globose and collected in yellow or orange-colored masses which are mostly small and dot-like. One species, *U. luminata*, is very detrimental to raspberry and blackberry plants.

Uredo Caryophyllacearum *Johnst*	Caryophyllaceæ.
U. luminata *Schw*	Rubus villosus. R. Canadensis. R. occidentalis. R. strigosus.
U. effusa *Strauss*	Rose leaves.
U. Solidaginis *Schw*	Solidago and Aster leaves.
U. pustulata *Pers*	Epilobium hirsutum. E. angustifolium.
U. Vacciniorum *Pers*	Vaccinium corymbosum.
U. Azaleæ *Schw*	Azalea nudiflora.
U. Ledicola *Pk*	Ledum latifolium.
U. Empetri *DC*	Empetrum nigrum.
U. Smilacis *Schw*	Lilium Canadense.
U. Filicum *Desm*	Cystopteris fragilis.
U. Aspidiotus *Pk*	Phegopteris Dryopteris.
U. Peckii *Thum*	Amphicarpæ monoica.

In *Cystopus* the spores are white, hence these fungi are sometimes called white rusts.

Cystopus candidus *Lev*	Capsella Bursa-pastoris. Sisymbrium officinale. Lepidium Virginicum. Dentaria diphylla etc.
C. cubicus *Str*	Tragopogon porrifolius.
C. Portulacæ *DC*	Portulaca oleracea.
C. spinulosus *DeB*	Cirsium arvense.
C. Bliti *Biv*	Amarantus retroflexus.

The Æcidiacei or Cluster-cup fungi consist essentially of small cup-shaped or cylindrical receptacles which contain the mostly yellow or orange-colored simple spores. These cups are sometimes scattered over the leaves but they are more frequently clustered together on discolored spots.

In *Rœstelia* they are lacerated and the spores brownish, except in R. aurantiaca in which they are orange.

In *Æcidium* the cups are scolloped or toothed on the margin.

In *Peridermium* they rupture irregularly and occur only on Coniferæ.

Rœstelia lacerata *Sow*	Amelanchier Canadensis. Cratægus (various species).
R. cornuta *Tul*	Amelanchier Canadensis. Pyrus Americana.
R. aurantiaca *Pk*	Amelanchier Canadensis. Cratægus (various species).
Æcidium clematitatum *Schw*	Clematis Virginiana.
Æ. quadrifidum *DC*	Anemone nemorosa.
Æ. Ranunculi *Schw*	Ranunculus abortivus.
Æ. Ranunculacearum *DC*	Ranunculaceæ.
Æ. Thalictri *Grev*	"
Æ. Calthæ *Grev*	Caltha palustris.
Æ. Berberidis *Pers*	Berberis vulgaris.
Æ. podophyllatum *Schw*	Podophyllum peltatum.
Æ. Violæ *Schum*	Viola pubescens.
Æ. Mariæ-Wilsoni *Pk*	V. cucullata.
Æ. hypericatum *Schw*	Hypericum mutilum.
Æ. claytoniatum *Schw*	Claytonia Caroliniana.
Æ. Geranii *DC*	Geranium maculatum.
Æ. impatientatum *Schw*	Impatiens pallida.
Æ. crassum *Pers*	Rhamnus catharticus.
Æ. Orobi *DC*	Trifolium repens.
Æ. album *Clinton*	Vicia Americana.
Æ. Grossulariæ *DC*	Ribes leaves.
Æ. Epilobii *DC*	Œnothera biennis.
Æ. Œnotheræ *Pk*	" "

Æcidium Nesææ *Ger*	Nesæa verticillata.
Æ. Osmorrhizæ *Pk*	Osmorrhiza brevistylis.
Æ. sambuciatum *Schw*	Sambucus Canadensis.
Æ. houstoniatum *Schw*	Houstonia longifolia. H. cærulea.
Æ. Compositarum *Mart*	Compositæ.
Æ. asteratum *Schw*	Aster cordifolius.
Æ. erigerontatum *Schw*	Erigeron annuum. E. bellidifolium.
Æ. tracheliifoliatum *Schw*	Helianthus divaricatus.
Æ. gnaphaliatum *Schw*	Gnaphalium polycephalum.
Æ. tenue *Schw*	Eupatorium ageratoides.
Æ. statices *Desm*	Statice Limonium.
Æ. lysimachiatum *Lk*	Lysimachia quadrifolia.
Æ. Chelonis *Ger*	Chelone glabra.
Æ. penstemoniatum *Schw*	Penstemon pubescens.
Æ. Gerardiæ *Pk*	Gerardia quercifolia.
Æ. Menthæ *DC*	Labiatæ.
Æ. Lycopi *Ger*	Lycopus Europæus.
Æ. Hydrophylli *Pk*	Hydrophyllum Canadense.
Æ. dubium *Clinton*	Calystegia Sepium.
Æ. Fraxini *Schw*	Fraxinus Americana.
Æ. Allenii *Clinton*	Shepherdia Canadensis.
Æ. pustulatum *Curt*	Comandra umbellata.
Æ. hydnoideum *B. & C*	Dirca palustris.
Æ. Euphorbiæ *Pers*	Euphorbia hypericifolia.
Æ. Urticæ *DC*	Urtica dioica.
Æ. Convallariæ *Schum*	Lilium Canadense.
Æ. myricatum *Schw*	Myrica cerifera.
Æ. dracontiatum *Schw*	Arisæma Dracontium. A. triphyllum.
Æ. aroidatum *Schw*	Peltandra Virginica.
Æ. Iridis *Ger*	Iris versicolor.
Æ. macrosporum *Pk*	Smilax rotundifolia.
Æ. uvulariatum *Schw*	Uvularia sessilifolia.
Peridermium Cerebrum *Pk*	Pinus rigida.
P. columnare *A. & S*	Abies Canadensis.
P. elatinum *A. & S*	A. balsamea.
P. balsameum *Pk*	A. "
P. decolorans *Pk*	A. nigra.
Graphiola Phœnicis *Poit*	Phœnix dissectifolia.

The remaining Coniomycetes that inhabit living plants belong chiefly to the genus *Septoria*. Most of these occur on dry or discolored spots on the leaves.

Phoma Mariæ *Clinton*	Lonicera flava.
Sphæropsis Wilsoni *Clinton*	L. "
Hendersonia Peckii *Clinton*	L. "
H. Mariæ *Clinton*	L. "

Melasmia alnea *Lev*	Alnus serrulata.
Asteroma Rosæ *DC*................	Rose leaves.
Septoria Coptidis *B. & C*	Coptis trifolia.
S. Rhoidis *B. & C*..............	Rhus typhina.
S. Toxicodendri *Curt*	R. Toxicodendron.
S. ampelina *B. & C*..........	Vitis æstivalis.
S. destruens *Desm*	Malva rotundifolia.
S. sanguinea *Desm*.............	Prunus serotina.
S. cerasina *Pk*.................	P. "
S. Hippocastani *B. & Br*.......	Æsculus Hippocastanum.
S. acerina *Pk*	Acer Pennsylvanica.
S. Polygalæ *P. & C*	Polygala paucifolia.
S. emaculata *P. & C*...........	Lathyrus palustris.
S. Rubi *B. & C*	Rubus Canadensis.
S. Œnotheræ *B. & C*	Œnothera biennis.
S. maculosa *Ger*...............	Cuphea viscosissima.
S. sambucina *Pk*	Sambucus pubens.
S. Erigerontis *Pk*..............	Erigeron annuum.
S. Nabali *B. & C*	Nabalus albus.
S. Lobeliæ *Pk*	Lobelia spicata.
S. difformis *C. & P*............	Vaccinium Pennsylvanicum.
S. Kalmicola *Schw*	Kalmia latifolia.
S. Verbenæ *D. & R*...........	Verbena hastata.
S. Verbascicola *B. & C*	Verbascum Blattaria.
S. Scrophulariæ *Pk*............	Scrophularia nodosa.
S. Wilsoni *Clinton*.............	Chelone glabra.
S. Polygonorum *Desm*	Polygonum Persicaria.
S. Ulmi *Kze*	Ulmus Americana.
S. ochroleuca *B. & C*	Castanea vesca.
S. viride tingens *Curt*	Allium tricoccum.
S. mirabilis *Pk*.................	Onoclea sensibilis.
Vermicularia concentrica *P. & C*...	Trillium erythrocarpum. Viola rotundifolia.
Pestalozzia Guepini *Desm*	Camellia Japonica.
P. Mariæ *Clinton*...............	Rhododendron maximum.
Coryneum triseptatum *Pk*	R. maximum.

The fourth family, the HYPHOMYCETES, molds or filamentous fungi, contains comparatively few noxious species but among these few are some of the most pernicious foes of our cultivated plants. In the genus *Peronospora* we find such baneful pests as the potato mold, spinach mold, lettuce mold and onion mold. *Oidium monilioides* Lk. which occurs on grass leaves and *Oidium leucoconium* Desm. which attacks rose leaves are regarded as conditions respectively of *Erysiphe graminis* and *Sphœrotheca pannosa*, the second form of which has not yet been detected with us.

Cercospora Callæ *P. & C.*	Calla palustris.
Peronospora pygmæa *Ung*	Anemone Pennsylvanica.
P. parasitica *Pers*	Cardamine rhomboidea.
P. Geranii *Pk*	Geranium maculatum.
P. obliqua *Ck*	Rumex crispus.
P. effusa *Grev*	Chenopodium album.
Ramularia Nemopanthis *C. & P.*	Nemopanthes Canadensis.

In the last family, the Ascomycetes, we find a few groups, such as the Perisporiacei or mildews and the species of Rhytisma, inhabiting, for the most part, living leaves. But by far the greater part of this vast family find their dwelling-place on decaying substances.

In the *Perisporiacei* a white webby film usually appears on the leaf, and sometimes, as in the pea mildew, this involves the whole plant.

Sphærotheca Castagnei *Lev*	Spiræa opulifolia. Poterium Canadense. Agrimonia Eupatoria. Geum album. Bidens connata. Erechtithes hieracifolia. Taraxacum Dens-leonis. Brunella vulgaris.
S. pruinosa *C. & P*	Rhus glabra.
Phyllactinia guttata *Lev*	Magnolia acuminata. Liriodendron Tulipifera. Ribes Cynosbati. Celastrus scandens. Cornus florida. C. paniculata. C. stolonifera. C. circinata. Cratægus coccinea. C. Crus-galli. Corylus Americana. Castanea vesca. Fagus ferruginea. Carpinus Americana. Fraxinus Americana. Alnus serrulata. Asclepias Cornuti.
Uncinula adunca *Lev*	Salix cordata. S. discolor. Populus balsamifera.
U. circinata *C. & P*	Acer spicatum. A. rubrum. A. Pennsylvanicum.
U. luculenta *Howe*	Populus heterophylla.

Uncinula macrospora *Pk*...........	Ulmus Americana.
U. flexuosa *Pk*	Æsculus Hippocastanum.
U. Ampelopsidis *Pk*	Ampelopsis quinquefolia.
U. Clintonii *Pk*................	Tilia Americana.
U. spiralis *B. & C*	Vitis æstivalis.
U. geniculata *Ger*	Morus rubra.
U. parvula *C. & P*.............	Celtis occidentalis.
Podosphæra Kunzei *Lev*...........	Prunus Cerasus. P. Virginiana. Spiræa tomentosa. S. salicifolia. Cratægus coccinea.
P. biuncinata *C. & P*...........	Hamamelis Virginiana.
Microsphæra Menispermi *Howe*	Menispermum Canadense.
M. Russellii *Clinton*............	Oxalis stricta.
M. diffusa *C. & P*..............	Desmodium Canadense.
M. holosericea *Lev*	Astragalus Cooperi.
M. pulchra *C. & P*	Cornus alternifolia.
M. Dubyi *Lev*	Lonicera parviflora.
M. Symphoricarpi *Howe*........	Symphoricarpus racemosus.
M. Van Bruntiana *Ger*..........	Sambucus Canadensis.
M. Viburni *Schw*	Viburnum Lentago. V. dentatum.
M. Friesii *Lev*	Syringa vulgaris.
M. Fr. v. Castaneæ *C. & P*.. ...	Castanea vesca.
M. Fr. v. Vaccinii *C. & P*... ...	Vaccinium corymbosum.
M. Vaccinii *Pk*.................	V. vacillans.
M. Platani *Howe*	Platanus occidentalis.
M. extensa *C. & P*............	Quercus rubra. Q. alba.
M. abbreviata *Pk*	Q. bicolor.
M. pencillata *Lev*	Fagus ferruginea. Corylus rostrata.
M. Alni *Tul*	Alnus serrulata. A. incana.
M. densissima *Schw*	Quercus tinctoria.

The last species I have seen on dead leaves only, but it probably attacks them when living.

Erysiphe communis *Schl*	Ranunculus acris. R. abortivus. Thalictrum Cornuti. T. anemonoides.
E. Martii *Lk*	Pisum sativum. Amphicarpæa monoica. Baptisia tinctoria. Lupinus perennis.
E. Euphorbiæ*Pk*	Euphorbia hypericifolia.

Erysiphe lamprocarpa *Lev*	Artemisia trifida. Inula Helenium. Aster (various species). Solidago (various species). Phlox paniculata. Verbena hastata. Chelone glabra. Stachys aspera. Galeopsis tetrahit. Hydrophyllum Canadense. Scutellaria lateriflora.

The species of *Rhytisma*, and of *Dothidea* in part, form black blotches or protuberances on the leaves. Frequently they do not perfect their fruit till after the leaf has fallen. *R. Solidaginis* Schw. and *R. Asteris* Schw. are only insect galls, and of *R. Monogramma* B. & C., I have seen no good specimens.

Peziza Dehnii *Rabh*	Potentilla argentea.
Epichloe typhina *Berk*	Carex stems.
Rhytisma acerinum *Fr*	Acer saccharinum. A. rubrum.
R. punctatum *Fr*	A. spicatum. A. Pennsylvanicum.
R. Blakei *Curt*	Rubus hispidus.
R. Andromedæ *Fr*	Andromeda polifolia.
R. decolorans *Schw*	A. ligustrina.
R. Prini *Schw*	Prinus verticillatus.
R. Canadensis *Schw*	Nemopanthes Canadensis.
R. salicinum *Fr*	Salix discolor. S. humilis. S. Cutleri.
Hypoderma lineare *Pk*	Pinus Strobus.
Dothidea Ulmi *Fr*	Ulmus Americana.
D. Lespedezæ *Schw*	Lespedeza capitata.
D. Trifolii *Fr*	Trifolium repens.
D. Dalibardæ *Pk*	Dalibarda repens.
D. Graminis *Fr*	Grass leaves.
D. vorax *B. & C*	" "
D. Pteridis *Fr*	Pteris aquilina.
Melogramma superficialis *P. & C*	Pyrus Americana.
Diatrype anomala *Pk*	Corylus stems.
Sphæria morbosa *Schw*	Prunus Pennsylvanica. P. Virginiana. P. Cerasus. P. domestica.
S. Collinsii *Schw*	Amelanchier Canadensis.
S. fimbriata *Pers*	Carpinus Americana.
S. Coryli *Batsch*	Corylus leaves.

Venturia pulchella *C. & P*	Cassandra calyculata.
V. compacta *Pk*	Vaccinium macrocarpum.
V. Kalmiæ *Pk*	Kalmia glauca.
Stigmatea Robertiani *Fr*	Geranium Robertianum.

In closing this report, grateful acknowledgments are rendered to those botanists whose names appear in the preceding pages, for their kind aid and coöperation in the investigation of our flora, and for their generous contributions of specimens. When no name is added to the station or stations herein given, the plant has been found therein by the writer. Dates signify the time when the specimens were collected.

Respectfully submitted.

CHAS. H. PECK.

ALBANY, *January* 11, 1876.

EXPLANATION OF PLATES.

EXPLANATION OF PLATE I.

AGARICUS PUBESCENTIPES Peck.

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Fig. 1. A small plant.
Fig. 2. A plant of medium size, showing the lamellæ.
Fig. 3. Four spores × 400.

CHONDRIODERMA MICHELII Lib.

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Fig. 4. Four plants attached to a piece of grass leaf.
Fig. 5. Two plants enlarged, one showing the upper, the other the under surface of the flattened peridium.
Fig. 6. Four spores × 400.

MELANCONIUM PALLIDUM Peck.

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Fig. 7. Piece of a branch bearing the fungus; the epidermis removed from one end.
Fig. 8. Six spores × 400.

CLASTERISPORIUM UNCINATUM Clinton.

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Fig. 9. Piece of a leaf bearing the fungus.
Fig. 10. Three spores × 400.

USTILAGO MONTAGNEI Tul. var. *MAJOR Desm.*

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Fig. 11. Upper part of a plant, with the heads affected by the fungus.
Fig. 12. Five spores × 400.

PEZIZA IMPERIALIS Peck.

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Fig. 13. A small plant.
Fig. 14. A larger plant.
Fig. 15. A paraphysis and an ascus containing spores × 400.

GEOGLOSSUM VELUTIPES Peck.

Page 65, 28th Report.

Fig. 16. Two plants of ordinary size.
Fig. 17. A single hair × 400.
Fig. 18. Two paraphyses and an ascus containing spores × 400.
Fig. 19. Three spores × 400.

GEOGLOSSUM NIGRITUM Pers.

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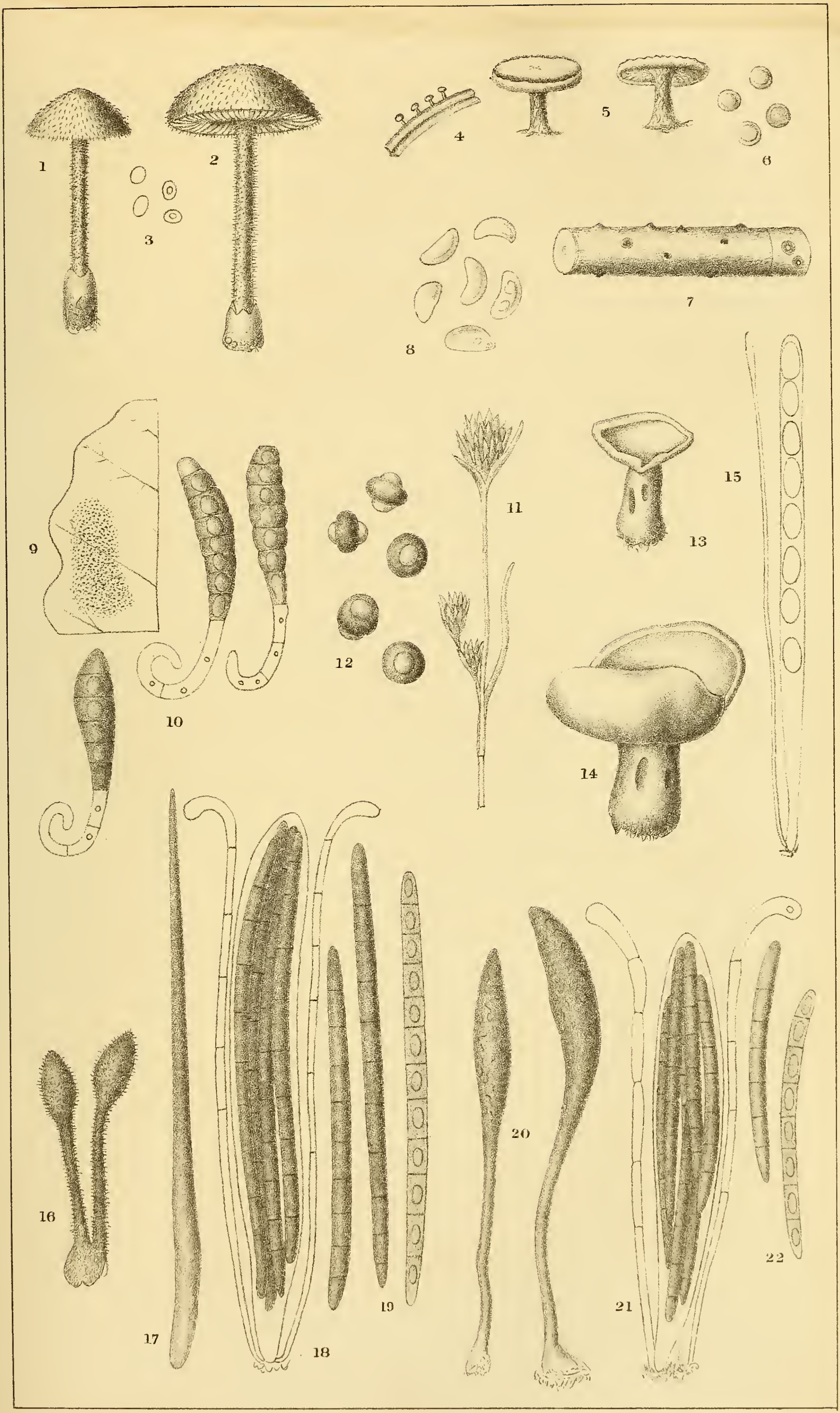
Fig. 20. Two plants of ordinary size.
Fig. 21. Two paraphyses and an ascus containing spores × 400
Fig. 22. Two spores × 400.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EXPLANATION OF PLATE II.

Hygrophorus speciosus Peck.

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Fig. 1. A small plant, with the pileus not fully expanded.
Fig. 2. A plant of ordinary size, with the pileus expanded.
Fig. 3. Vertical section of a pileus.
Fig. 4. Transverse section of a stem.
Fig. 5. Four spores × 400.

Peckia Clintonii Peck.

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Fig. 6. A leaf bearing the fungus.
Fig. 7. A perithecium and fragment of leaf enlarged.
Fig. 8. Three strings of spores × 400.
Fig. 9. Six spores × 400.

Peziza bronca Peck.

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Fig. 10. A plant of ordinary size.
Fig. 11. A paraphysis and an ascus containing spores × 400.
Fig. 12. Three spores × 400.

Lycoperdon constellatum Fr.

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Fig. 13. A small plant; part of the spines removed, to show the reticulated surface.
Fig. 14. Five spores × 400.

Sphærella colorata Peck.

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Fig. 15. A leaf bearing the fungus.
Fig. 16. Two asci containing spores × 400.
Fig. 17. Four spores × 400.

Helminthosporium episphæricum Cooke & Peck.

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Fig. 18. Piece of a branch bearing the fungus.
Fig. 19. Two flocci × 400.
Fig. 20. Two spores × 400.

Valsa cinctula Cooke & Peck.

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Fig. 21. Piece of a branch bearing the fungus.
Fig. 22. A single pustule enlarged.
Fig. 23. An ascus containing spores × 400.
Fig. 24. Four spores × 400.

Puccinia Physostegiæ Peck & Clinton.

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Fig. 25. A leaf bearing the fungus.
Fig. 26. Two spores × 400.

Lith. of Weed, Parsons & Co. Albany. N.Y.

THIRTIETH ANNUAL REPORT

ON THE

New York State Museum of Natural History

BY THE

REGENTS OF THE UNIVERSITY

OF THE

STATE OF NEW YORK.

TRANSMITTED TO THE LEGISLATURE APRIL 13, 1877.

JEROME B. PARMENTER, STATE PRINTER.
1878.

STATE OF NEW YORK.

No. 63.

IN SENATE,

April 13, 1877.

THIRTIETH ANNUAL REPORT

ON THE

STATE MUSEUM OF NATURAL HISTORY, BY THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK.

UNIVERSITY OF THE STATE OF NEW YORK:
OFFICE OF THE REGENTS,
ALBANY, *April* 13, 1877.

To the Hon. WILLIAM DORSHEIMER, *President of the Senate:*

SIR.—I have the honor to transmit the Thirtieth Annual Report on the State Museum of Natural History, by the Regents of the University.

I remain, very respectfully,

Your obedient servant.

JOHN V. L. PRUYN,

Chancellor of the University.

REPORT.

To the Honorable the Legislature of the State of New York:

The Regents of the University, as Trustees of the State Museum of Natural History, respectfully submit this their Thirtieth Annual Report.

The reports of the Director and Botanist hereto appended show the progress of the Museum for the last year and its present condition.

Some valuable additions, especially to the Zoölogical collections, have been made. The Mineralogical Department has been re-arranged, the specimens labeled and the collections are well exhibited for the purpose of study.

The minerals of the State are not fully represented and the specimens are not all of the best kinds. The attention of the Director will be given to this subject, and it is hoped that better specimens, of every mineral in the State, will be placed on the shelves of the Museum.

Every part of the Museum is greatly crowded, and scientific arrangement is in some cases necessarily sacrificed to make room for additions. It is respectfully submitted to the Legislature whether some means should not be devised to provide proper accommodations for the growth of the Museum which is consequent on its prosperity.

The work of the botanist has been prosecuted zealously and successfully. A small appropriation is needed to meet the expenses of the botanist in the field.

All of which is respectfully submitted.

By order of the trustees.

JOHN V. L. PRUYN,
Chancellor of the University.

S. B. WOOLWORTH,
Secretary.

ALBANY, *April* 12, 1877.

REPORT

ON THE

STATE MUSEUM OF NATURAL HISTORY.

1877.

CONTENTS.

REPORT OF THE DIRECTOR.

ALBANY, *January* 9, 1877.

To the Honorable the Board of Regents of the University of the State of New York:

GENTLEMEN.— I have the honor to present herewith the Annual Report on the State Museum of Natural History, embracing a statement of the condition of the collections in the several departments, the additions made thereto, and the work done in the institution during the past year, together with special communications.

I am able to report that the collections are in good order and condition, and much progress has been made in the better arrangements of some departments, as will be seen in the statements following. But I am constrained to repeat, what I have so often said before, that a want of space for a proper arrangement of the increasing material in nearly every department becomes more and more embarrassing.

With the liberality always characterizing the Legislature of our State, it last year made the necessary appropriation to secure the purchase of the rhinoceros and giraffe referred to in my preceding report, and to provide for the mounting of the skin and skeleton of the former, and the skin of the latter. The two mounted skins have already been placed in the Museum.

In reference to my special communication of last year, the secretary of the board and the committee on the State Museum, have authorized a change in the arrangement of material upon the upper floor of the Museum, by which the large case, formerly devoted to ethnological and historical collections, has been vacated of these collections, and adapted for the reception of the mounted skins of two specimens of walrus, the rhinoceros and giraffe, the skeleton of the rhinoceros and other objects. The enclosing of an area in the center of the east end of the room, by glass, to correspond with the adjacent cases, has also been authorized by the commissioners of the land office; and thus adequate room has been furnished for the present wants of the Zoölogical collection.

This change will however preclude the full arrangement of the ethnological and historical collections, as the cases which have been or can be vacated will not accommodate the entire collection. A re-arrangement of a part of this however, as hereafter stated, will, in some degree obviate the want of space on the third floor.

Owing to the occupancy of the Agricultural Hall, by the Census Department, since the early part of 1876, no work of actual distribution of duplicate material has been made since January last, but the catalogues were completed as far as the material had been arranged. The collections of fossils have been arranged preparatory to such distribution whenever time and opportunity shall be afforded.

A statement in detail of the additions to the Museum collections will be found appended.

To the Zoölogical Department there have been eight contributors.

To the Botanical Department, fifteen.

To the Geological, Palæontological and Mineralogical Departments, fifteen.

In Archæology and Ethnology, seven.

To the Library, six individuals and seven societies and departments have contributed.

The additions to the Library consist of twenty-two bound volumes (including seven volumes bound for the Museum during the year), twenty-four serials and thirteen pamphlets.

THE GENERAL AND SPECIAL WORK OF THE MUSEUM, during the past year, may be enumerated under the following heads:

In the *Botanical* Department a special report will be presented by Mr. Peck.

In the *Zoölogical* Department, the arrangement of the Molluscan collections has been completed, and the objects named in the list of additions have been properly named and noted. A contribution to the Insect fauna of thirty-seven species is almost the only donation of the kind to the Museum collections.

In the *Geological* and *Palæontological* Departments no collections have been made in the field, but a large number of specimens from collections previously made have been prepared, by careful cleansing, cutting and polishing, or by removing the matrix with acid. These have been prepared for study and illustration in the *Palæontology of New York*, and will form a large and valuable addition to the present arranged collection.

The enlarged figures of characteristic fossils of the formations have been completed during the early part of the year, but owing to the occupation of that floor of the Museum, they have not all been arranged in their places at this date.

An appropriation made by the Legislature provided means for the purchase of a collection of fossils belonging to Mr. C. Callaway, formerly an assistant in the Museum. The collection consists of 800 species represented by 1,100 specimens of British (including a few Italian) fossils, representing the several formations from the lower Palæozoic to the Tertiary inclusive. This will add nearly *six hundred species* not before in the Museum collections. These specimens have been mounted on wooden tablets and labeled, preparatory to incorporation in the series of British and European fossils, whenever some additional table-case room can be provided for their arrangement.

Arrangement of the Mineralogical Collections.

In regard to the *Mineralogical* department, I have heretofore communicated to you the progress made towards a final and satisfactory arrangement of the material in our possession, and I now have the satisfaction to report that the long needed work of the re-arrangement of this collection is virtually completed. During the early part of the year, Mr. C. T. Sheldon, temporarily engaged in the Museum, was employed in the work of copying the labels and placing on the shelves that portion of the collection which had passed under the examination of Prof. Chester and Prof. Root of Hamilton College. In September last the services of Dr. R. Fritz-Gaertner were engaged, and since that time he has been mostly occupied in work upon the Mineralogical collections, for which his knowledge of chemistry and mineralogy has especially qualified him. Both the New York and the General collections have been mounted on wooden tablets ; the specimens numbered, and the number recorded on the labels attached to the tablets. In the New York collection, 1,508 labeled tablets have been arranged. The General collection occupies cases on a portion of the south wall, and the entire west wall of the second floor of the Museum, and will number about 2,000 tablets. In the New York collection, the arrangement adopted by Dr. Beck, in his report on the Mineralogy of the State, has been retained, that it might not conflict seriously with the catalogues which have been published in the annual reports. The General collection has been arranged in accordance with Dana's System of Mineralogy.

In order to facilitate the study of the collections, conspicuous cards, upon which is written the *mineral composition* of each species, have been placed upon the shelves at the left of the first specimen of each, thus serving to show the commencement of each series and the extent of its representation. Subsequent to the arrangement of the general collection, the surplus material has been placed in thirty drawers, as duplicates for distribution and exchange. There have also been selected rock specimens, filling twenty drawers, intended for incorporation in a Lithological series, which is much needed in the Museum, and which it is proposed to arrange.

It may, perhaps, be proper to state in this place, that the New York collection of minerals, as it has existed in the State Museum since its arrangement in the new building in 1857, was made up of the original collections of Dr. Beck, and of the minerals from northern New York which were first arranged by Dr. Emmons as county collections, representing the ores and minerals of the second geological district. This incorporation of the two collections was never made satisfactory to mineralogists nor to any one having a general knowledge of the subject. Species were duplicated, and specimens which had been collected for their geological interest were incorporated in what was intended to be a strictly mineralogical collection. Donations were made from various sources, and these minerals, though extra-limital, were added to the New York collection. In this condition it was found by the present director, and it has always been in contemplation that a proper and scientific disposition should be made of the whole.

Since that time the State has purchased two collections containing minerals, the Simms and Gebhard, and numerous donations have been made. Notably among the latter was the collection of the late Dr. Jeremiah Van Rensselaer, which has added greatly to the extra-limital species. In order to preserve, in each of the departments of the Museum, the evidences of its origin in the *Geological survey of the State*, the director has, to the best of his ability and the means at his disposal, taken care that the original collection of Dr. Beck shall remain, with many additions as representing the mineralogy of the State, according to the intention of that author.

In order, however, to utilize and exhibit the specimens derived from purchase and many donations, the General collection of minerals has been organized, and is now presented in its arranged condition, and disposed in such a manner as to render it accessible and useful to all students in Mineralogy. This collection is still very incomplete, but this plan of double arrangement will permit the incorporation of any specimens or collections which may be acquired, from within or beyond the limits of the State of New York. The arrangement is satisfactory and instructive, and I would beg leave to invite the Committee of the Board of Regents, having charge of the Museum, to examine the Mineralogical collection.

Section preparation of Fossils and Rocks.

In the progress of the Museum work, it has been frequently necessary to cut and polish specimens of fossils, in order to study the organic structure, and to present them in a proper manner for investigation and for arrangement in the collections. Until the past year this work was done at the marble-cutting establishments which afforded proper facilities. This mode, however, became too expensive and uncertain as to time, and the requirements of the subjects also demanded that more delicate and perfect adaptations should be at command. It became, therefore, necessary that we should have the means at hand within the Museum building.

In the first place, an ordinary turning lathe, operated by a treadle, was adapted to the requirements of such work, but this was found unsatisfactory, and the labor of cutting large specimens too severe. At the present time, a small steam boiler and the necessary machinery have been adapted to the lathe.

Some time has necessarily been lost in experimenting, and much time has been required in adapting the machinery to the work; but the difficulties seem now to be essentially overcome. Much good work has been done and is now in progress, and is being rapidly accomplished.

I need scarcely speak of the importance and even necessity of such an apparatus in connection with a Museum like that of the State of New York. The study of the microscopic structure of rocks and fossils has, within a few years, become an essential part of the science, and facilities of this kind are required.

Already I have the satisfaction of presenting to you the introductory parts of two papers, by assistants in the Museum, the initiation and completion of which have been and will be greatly dependent upon the study of the microscopic structure of the subjects under investigation. One of these papers is upon the Lithology of the Adirondacks, a subject of great interest and importance to us in New York; and by means of which we may be able to learn the real constitution of our crystalline rocks and to compare with results of similar studies in Europe, where they are now made with great perfection by aid of the microscope.

The other paper is upon the microscopic structure of some examples among the fossil sponges — Petrospongia. The commencement of this paper and the work now in progress at the Museum give promise of a valuable contribution to our knowledge of the intimate structure and relations of these fossil forms. This work absolutely requires the means of cutting, grinding and polishing sections of the fossils.

I hope that the Committee on the State Museum will take the opportunity to satisfy themselves in regard to this additional element of progress in the Museum work.

Arrangement of a Collection of Aboriginal Stone Implements.

The increasing interest manifested in Archæological subjects has lent additional value to the aboriginal remains, which, at a comparatively recent period, abounded in many parts of the country.

The Museum has, for some time, possessed numerous very interesting aboriginal stone implements. In the removal of the

"Historical and Ethnological collection" before referred to, that portion comprising the stone and terra-cotta implements has been withdrawn and arranged as a separate collection in a range of table-cases at the east end of the second floor. The following is the series as displayed in the several cases : Pestles, gouges, axes, hand-axes or chisels, amulets, miscellaneous objects in stone, knives, stone and terra-cotta pipes and fragments, pottery, lances and arrow-heads.

The pestles are illustrated by a fine series, varying in size from five to twenty-three inches in length. Among the axes (over 100 in number), are examples showing much skill in workmanship. The arrow-heads have been grouped so as to show the several materials from which they were made, as quartz, chert, porphyry, obsidian, sandstone, shale, etc. The various forms were doubtless adapted to the purposes for which they were intended, whether for warfare or game of different kinds, ranging from the simple unnotched conical head, to the delicately wrought and artistic barbed form. One example illustrates a form rarely seen, of a beveling of the opposite sides, by means of which rotation is imparted in its flight. Although, from want of case-room, but a portion of this collection is displayed, it very deservingly commands the notice of the visitors of the Museum.

Distribution of Duplicate Fossils and Minerals.

The work of selection, preparation and labeling the duplicates of fossils and minerals of the Museum (the greater portion of which were from the Simms, Gebhard and Van Rensselaer collections), was continued during the month of January, with the entire force of the Museum. But while the work was still only half completed, it became necessary to vacate the room for the occupancy of the Census Bureau.

The distribution of the duplicate collections to the several institutions authorized to receive them, by legislative enactments and by direction of the Board of Regents, has been continued during the year. Collections have been sent to the following institutions:

Rensselaer Polytechnic Institute of Troy, N. Y.

Cornell University, Ithaca.

Syracuse University, Syracuse.

Long Island Historical Society, Brooklyn, L. I.
American Museum of Natural History, New York.
State Normal and Training School, Buffalo.
State Normal and Training School, Geneseo.
State Normal and Training School, Fredonia.
State Normal and Training School, Oswego.
State Normal and Training School, Albany.

In the above collections there are contained, in the aggregate, 2,242 specimens of fossils, 1,172 of minerals, and a total of 3,414.

These are labeled with systematic name, locality when known, together with the rock formation of the fossils.

In presenting my report it is not possible, nor do I regard it as desirable, that all the details of Museum work shall be stated. I would beg leave to ask the attention of the Board of Regents to the evidences of progress in the way of accession and improvement in the condition and arrangement of the collections in the Museum ; and also to the large collections of fossils in process of preparation, at my private working rooms, for arranging in the Museum, or preparatory to distribution, in continuation of what has been already done.

At the present time, the work of the Museum and the study of its collections, with a view to maintain and advance its reputation as a scientific and educational institution, is going on in a much more satisfactory manner than for a long time past. I will conclude by asking your committee, charged with the affairs of the Museum, to give the necessary time to inform themselves fully of every thing connected with its objects and workings, that they may, if necessary or desirable, give such directions as will carry out their views of the proper ordering of the institution.

I am very respectfully,
Your obedient servant.
JAMES HALL,
Director.

ADDITIONS TO THE STATE MUSEUM

DURING THE YEAR 1876.

I. ZOÖLOGICAL.

I. By Donation.

A green snake — *Cyclophis vernalis* (De Kay), found beneath timber, in July, coiled around five of her eggs, From —— ?

An albino rat, from W. C. Johnson, Newburyport, Mass.

A barred owl — *Syrnium nebulosum* (Forst.), taken in Watervliet, Albany county, N. Y., Oct. 26th. From Thomas H. Ham, Albany, N. Y.

A night heron — *Nyctiardea Gardeni* (Gmel.) = Ardea discors of DeKay. From M. B. Planck, M. D., Schenectady, N. Y.

A Cecropia moth — *Samia Cecropia* (Linn.), from S. B. Woolworth, LL. D., Albany, N. Y.

A Cecropia moth, from William Russell, Albany, N. Y.

Nineteen species of Mollusca collected at Peconic Bay, L. I. (17), and (2) at Lake Minisink, L. I., by George R. Howell, N. Y. State Library.

Ensatella Americana (Gould).
Mya arenaria Linn.
Mactra solidissima Chemn.
Venus mercenaria Linn.
Lævicardium Mortoni Conr.
Astarte castanea Say.
Anodonta fluviatilis Dill.
Mytilus edulis (Linn.).
Pecten irradians Lam.
Anomia glabra Verrill.
Ranella caudata Say.
Pandora trilineata Say.
Buccinum plicosum Menke.
Nassa obsoleta Say.
Busycon carica (Gmel.).
Lunatia triseriata Say.
Crepidula fornicata Linn.
Crepidula plana Say.
Melampus bidentata Say.

Insects, collected at Stuyvesant Falls, Columbia county, N. Y., as follows:

Hymenoptera:

Tremex columba (Linn.).

Lepidoptera:

Papilio Troilus Linn.
Argynnis Cybele Fabr.
Argynnis Atlantis Edw.
Argynnis Bellona Fabr.
Phyciodes tharos (Drury).
Grapta interrogationis (Fabr.)
Vanessa Antiopa (Linn.).
Pyrameis Atalanta (Linn.).
Limenitis Ursula (Fabr.).
Satyrus Alope (Fabr.).
Neonympha Eurytris (Fabr.).
Sesia Thysbe (Fabr.).
Darapsa Myron (Cram.).
Deilephila lineata (Fabr.).
Ceratomia Amyntor (Hübn.).
Macrosila Carolina (Linn.).
Sphinx chersis (Hübn.).
Samia Cecropia (Linn.).
Telea Polyphemus (Linn.).
Anisota senatoria (Sm.-Abb.).
Catocala ultronia (Hübn.).
Ennomos magnaria (Linn.).
Hemerophila unitaria Hr.-Sch.

Coleoptera:

Cicendela sexguttata (Fabr.).
Alaus oculatus (Linn.).
Monohammus titillator Harr.
Clytus pictus Harr.
Clytus speciosus Say.
Cetonia Inda Linn.

Hemiptera:

Belostoma Americanum Leidy.
Cicada canicularis Harr.

Orthoptera:

Platyphyllum concavum Say.
Diapheromera femorata (Say).

Neuroptera:

Æschna heros Fabr.
Libellula trimaculata De Geer.
Agrion —— sp. ?

From JAMES J. CLOW, Stuyvesant Falls, N. Y.

II. BY PURCHASE.

An intestinal worm — *Ascaris lumbricoides* Linn., from a faucet of the city water-works, at J. Redmond's, 105 Beaver street, Albany.

A mounted skin of a rhinoceros — *Rhinoceros Indicus*, and a mounted skin of a giraffe. The animals were obtained from Forepaugh's Menagerie, and mounted for the Museum by Prof. Ward of Rochester.

II. BOTANICAL.

I. BY DONATION.

One hundred and twenty species of Fungi. From M. C. COOKE, London, England.

Three hundred and sixty-one specimens, representing 281 species of Fungi. From CHARLES B. PLOWRIGHT, M. D., Lynn, England.

Twenty-one species of Fungi and one flowering plant. From H. A. WARNE, Oneida, N. Y.

Ten species of Fungi. From W. R. GERARD, New York city.

Forty species of Fungi, some new to science. From Hon. G. W. CLINTON, Buffalo, N. Y.

Eleven species of Fungi. From C. C. FROST, Brattleborough, Vt.

Three species of flowering plants. From E. L. MILLER, Wading River, N. Y.

Thirty-three species of Fungi. From J. B. ELLIS, Newfield, N. J.

A new species of fungus on fir-cones. From W. C. STEVENSON, Philadelphia, Pa.

Two species of pine. From Prof. J. W. CHICKERING, Washington, D. C.

Specimens of *Pinus Tœda* L. From W. M. CANBY, Wilmington, Del.

Specimens of *Chenopodium leptophyllum* Nutt. From F. W. HALL, New Haven, Conn.

Specimens of *Laurus nobilis* L., and specimens of rose and elm wood. From C. DEVOL, M. D., Albany, N. Y.

Specimens of four species of sumac wood and of *Celastrus scandens* L. From W. W. HILL, Albany, N. Y.

Elongated fibrous roots of elm, taken from a well. From GEORGE J. SHARPE, East Greenbush, N. Y.

II. BY COLLECTION.

One hundred and thirty-three species of Fungi, and three species of flowering plants. By the Botanist, CHARLES H. PECK.

III. GEOLOGICAL, PALÆONTOLOGICAL AND MINERALOGICAL.

A concretionary form of Chert in Limestone. From Rev. RICHARD DECKER, Saugerties, N. Y.

A clay concretion of interesting form: West Albany, N. Y. From JOHN EINZIG, Albany, N. Y.

Silver ore from a mine, at Whittingham Center, Vt. From CYRUS TEMPLE, M. D., Sadawga Springs, Whittingham, Vt.

Crystals of Selenite: Guilderland, Albany county, N. Y. From E. SCHOOLCRAFT, Guilderland.

Slickensides, from Hudson River Shales: Greenbush, N. Y. From E. J. GENET, Greenbush.

Block of Granite with glaciated surface: Quarry of A. GRACIE KING, near Garrison's, Putnam county, N. Y. Collection of the Director.

Block of Grey Granite (6½ inches cube), showing rock fracture, fine dressing, a polished and a glaciated surface. (No. 165 in Economic Coll.)

Slab of Grey Granite (48 × 39 × 3 inches, average meas.), with glaciated surface. (No. 166 in Economic Coll.)

Slab of Grey Granite (54 × 40 × 4 inches, av. meas.), with glaciated surface. (No. 167 in Economic Coll.) The above three specimens are from the Quarries near Garrison's, N. Y. From J. HOWARD ELLERS.

Block of Grey Granite (14 × 10 × 5 inches), having imbedded a block of Gneiss (8 × by 5½ × inches). From quarries at Westerly, R. I. (No. 168 in Economic Coll.) From GEORGE T. BATTERSON, Hartford, Conn.

A water-worn piece of Corniferous Limestone taken from beneath a clay-bed in Rensselaerville, N. Y. From CORTLIN HUGHES.

Favosites Gothlandica in Corniferous Limestone: Coeymans, N. Y. From C. M. TOMPKINS.

Fifty-six specimens of Fossils from the Guelph Formation at Elora, Ontario. From DAVID BOYLE, Elora.

Three species of fossils, *Strophodonta hybrida* Hall, *Gypidula læviuscula* Hall, and *Paracyclas Sabini* White, from the Chemung (1st and 3d) and Hamilton Groups of Iowa. From B. F. HOYT, Iowa City, Iowa.

Tip of the tusk and a tooth of the Cohoes Mastodon. From the University of Wisconsin, through Prof. ROLAND D. IRVING, Madison, Wis. (in exchange for Museum Reports).

Eighteen examples of fossils from the Coralline beds of the Hamilton age, at Iowa City, Iowa, among which are the following: *Acervularia Davidsoni* (two polished), *Favosites Gothlandica* (one polished), *Idiostroma Gordiaceum* and *Coenostromya* sp. ? From C. W. IRISH, Iowa City, in return for State Museum Reports.

Five specimens of Cinnabar, one of Quartz, and several fragments of Calcite. From W. CHURCH. Donated in 1868, and not previously credited.

IV. ARCHÆOLOGICAL, ETC.

An Indian stone implement: Rotterdam, Schenectady, N. Y. From ROBERT SCHERMERHORN.

A flint arrow-head. From WILLIAM SCHOONMAKER, Cedar Hill, N. Y.

Indian tomahawk (French origin), taken from twenty feet below the surface of the ground, in Grangerville, Saratoga county, N. Y. From FRANK E. GRIFFIN, Albany, N. Y.

Indian arrow-heads of shale.

A wooden needle, in use about the year 1780, for weaving harness for hand-looms. From GEORGE W. BROWER, Schenectady, N. Y.

An ancient fire-tongs, uncovered by a land-slide in Swan street, Albany, in 1874. From JOHN J. NEWMAN, Albany, N. Y.

A piece of the "council tree" at Schaghticoke, N. Y. From CHARLES DEVOL, M. D., Albany, N. Y.

An iron spike, seven inches long, from Commodore Perry's flag ship, St. Lawrence. Procured at Erie, Pa. From Prof. JAMES HALL, Albany, N. Y.

V. TO THE LIBRARY.

Catalogue of the Pleistocene Vertebrata, from the neighborhood of Ilford, Essex, in the collection of Sir Antonio Brady, Kt., J. P., F. G. S., etc. By William Davies, with an introduction by Sir Antonio Brady. London, 1874. Pamph., 8 vo., pp. xxviii+75. From SIR ANTONIO BRADY.

Entomological Notes:—V. By S. H. Scudder. Boston, 1876. Pamph., 8vo., pp. 72.

Extract from Psyche. Synonyptical Tables for determining N. A. Insects. Orthoptera. By S. H. Scudder. Cambridge, June, 1876. Pamph., 8vo., pp. 3.

A Cosmopolitan Butterfly. By S. H. Scudder. Cambridge, 1876. Pamph., 8vo., pp. 14.

Extracts from Bulletins of the Geological and Geographical Survey of the Territories. Vol. II, No. 3: Synopsis of North American Earwigs.—List of Orthoptera collected in Colorado and the neighboring territories in 1875.—Notice of a collection of Butterflies made in Colorado and Utah in 1875. By S. H. Scudder. Washington, June, 1876. Pamph., 8vo., pp. 249–270. From the AUTHOR.

Transactions of the Kansas Academy of Science for 1874. Topeka, 1875. Pamph., 8vo., pp. 31.

Transactions of the Kansas Academy of Science. Topeka, 1875. Vol. IV. Pamph., 8vo., pp. 62.

A Catalogue of the Birds of Kansas, contributed to the Kansas Academy of Science. By F. H. Snow. November, 1875. Pamph., 8vo., pp. 14. From EDWIN A. POPENOE.

Auditor of Accounts' Annual Report of the Receipts and Expenditures of the City of Boston and the County of Suffolk, for the Year 1875–76. Boston, 1876. From ALFRED T. TURNER, Auditor.

Popular Science: Addressed to the American Association for the Advancement of Science. By Mrs. LINCOLN PHELPS. Pamph., 8vo., pp. 12. Baltimore, 1869. From the AUTHOR.

Proceedings of the Portland Society of Natural History. Vol. I. Portland, 1862, 1869. 8vo.

Journal of the Portland Society of Natural History. Vol. I, Pt. I. Portland, 1864. 8vo. From the SOCIETY.

Fossil Orthoptera from the Rocky Mountain Tertiaries. By Samuel H. Scudder. Washington, Feb. 8, 1876. Pamph., 8vo., pp.

Fossil Coleoptera from the Rocky Mountain Tertiaries. By Samuel H. Scudder. Washington, March 21, 1876. Pamph., 8vo.

Report on the Geological Map of Massachusetts, prepared by W. O. Crosby. Boston, 1876. Pamph., 8vo., pp. 52.

From the BOSTON SOCIETY OF NATURAL HISTORY.

Proceedings of the Davenport Academy of Natural Sciences. Vol. I. 1867–1876. Davenport, Iowa. 8vo., pp. 284, plates 36. From the ACADEMY.

Public Libraries in the United States of America, Special Report: Department of the Interior, Bureau of Education. Part I. Washington, 1876. 8vo. pp. 1187. From the DEPARTMENT OF THE INTERIOR.

Laws of the State of New York, passed at the Ninety-first, Ninety-second and Ninety-eighth Sessions of the Legislature for the Years 1868, 1869 and 1875. 5 vols., 8vo.

Fifty-seventh Annual Report of the Trustees of the New York State Library for the Year 1874. Albany, 1875. 8vo., pp. 218.

Eighty-fourth–Eighty-seventh Annual Reports of the Regents of the University of the State of New York. Albany, 1871–1874. 4 vols., 8vo. From the REGENTS OF THE UNIVERSITY.

DEPARTMENT OF THE INTERIOR.

Bulletin of the United States National Museum, No. 1. Check list of North American Batrachia and Reptilia. By Edward D. Cope. Washington, 1875. Pamph., 8vo., pp. 100.

Bulletin —— No. 2. Contributions to the Natural History of Kerguelen Island. By J. H. Kidder, M. D. Washington, 1875. Pamph., 8vo., pp. 51.

Bulletin —— No. 3. Contributions to the Natural History of Kerguelen Island. By J. H. Kidder, M. D. Washington, 1876. Pamph., 8vo., pp. 122.

Bulletin —— No. 4. Birds of South-western Mexico collected by Francis E. Sumichrast. Prepared by George N. Lawrence. Washington, 1876. Pamph., 8vo., pp. 56.

Bulletin —— No. 5. Catalogue of the Fishes of the Bermudas. By G. Brown Goode. Washington, 1876. Pamph., 8vo., pp. 82.

Bulletin —— No. 6. Classification to Illustrate the Animal Resources of the United States. By G. Brown Goode. Washington, 1876. Pamph., 8vo., pp. 126.

UNITED STATES GEOLOGICAL SURVEY OF THE TERRITORIES.

Miscellaneous Publications, No. 2. Meteorological Observations during the Year 1872, in Utah, Idaho and Montana. By Henry Garnett. Washington, 1873. Pamph., 8vo., pp. 120.

Miscellaneous Publications, No. 4. Synopsis of the Flora of Colorado. By Thomas C. Porter and John M. Coulter. Washington, March, 1874. Pamph., 8vo., pp. 180.

Miscellaneous Publications, No. 5. Descriptive Catalogue of the Photographs of the U. S. Geological Survey of the Territories. Washington, 1875. Pamph., 8vo., pp. 81.

Bulletin ——. Vol. II. Washington, 1876 (issued in 4 Nos.). 8vo., pp. 392.

Bulletin ——. Vol. I (Nos. 1, 5 and 6 of Second Series). Washington, 1875 and 1876. Pamph., 8vo., pp. 48, 231–414, 415–499 + xiii.

Office of Indian Affairs. The Mineral Wealth, Climate and Rainfall and Natural Resources of the Black Hills of Dakota. Washington, 1876. 8vo., pp. 71.

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REPORT OF THE BOTANIST.

S. B. Woolworth, LL. D., *Secretary of the Board of Regents of the University:*

Sir.—Since the date of my last report, specimens of one hundred and sixty-five species of plants have been mounted and placed in the Herbarium, of which one hundred and thirty were not before represented therein. A list of these is marked (1).

Specimens have been collected in the counties of Albany, Essex, Greene, Hamilton, Otsego, Rensselaer and Saratoga. These represent *one hundred and thirty-two* species new to the Herbarium, one hundred and twenty-nine of which are fungi. Of these, sixty-nine are regarded as new or previously undescribed species. A list of plants collected is marked (2).

Specimens of thirty-six New York species, new to the Herbarium and not among my collections of the past season, have been furnished by correspondents. These added to those collected make the whole number of additions *one hundred and sixty-eight.* There are besides a considerable number of extra-limital contributions. A list of the contributors and their contributions is marked (3).

New species with their descriptions and previously unreported species are given in a section marked (4). New stations of rare plants, remarks and observations are given in a section marked (5).

While on a collecting trip in the Adirondack region, in July and August, my attention was repeatedly arrested by the extensive ravages of the spruce-destroying beetle, *Hylurgus rufipennis* Kirby, of which a partial account was given in the twenty-eighth report. The green slopes of Mt. Emmons, commonly called Blue Mountain, and of several mountains to the north of it had their beauty, and their value too, greatly impaired by the abundant intermixture of the brown tops of dead spruces. The destruction was also visible along the road between Newcomb and Long Lake, and on the mountain slopes far to the north of this road. Again, on the trail from Adirondack to Calamity Pond, there was sad evidence that the little destroyer had invaded also the forests of Essex county. From what I have seen at Lake Pleasant, in the southern part, and in the vicinity of Long Lake, in the northern part, and from information concerning the Cedar river region, in the central part of Hamilton county, there is reason to believe that much of the spruce timber of this county has already been invaded by the beetle. How much farther this destructive work has extended, or will extend, it is impossible to say. But one thing is certain, it is still in progress.

For the purpose of gaining more knowledge of the insect, I cut down, at South Pond, a tree that had recently been attacked by it. It was about twenty inches in diameter at the base; the foliage was still fresh and green, and there was nothing, except the perforations in the bark, to indicate that it was at all affected. The bark peeled from the trunk without much difficulty, the sap wood was perfectly sound, and the heart wood also, except a small portion in which there was a slight appearance of incipient decay. Longitudinal furrows, varying from one to six inches in length, were found under the bark, and each furrow was occupied by one or two beetles. The furrows are excavated from below upwards. In the short ones but one beetle was found, and but one perforation communicating with the external air. In the longer ones two beetles (probably the two sexes), were usually found, and from two to four perforations afforded means of ingress and egress. The lowest perforation, which is the one by which the beetle first enters and commences its furrow, is often found closed or "blocked up" by the dust and debris thrown down by the excavator in the progress of the work. The second perforation is generally one or two inches above the first. I failed to discover whether it is made by the second beetle for the purpose of ingress or by the first beetle. The third and fourth perforations are in a nearly direct line above the other two and are probably made from within outwardly, but for what purpose is uncertain. In one instance the two beetles were found at work making these perforations, boring through from the inner surface of the bark. In one instance the third was less than half an inch above the second, so that there would seem to be no particular necessity for it.

The eggs of the insect are deposited along both sides of the upper part of the furrow. They lie close together, almost or quite in contact with each other. When the larvæ emerge from the eggs they begin to feed upon the soft cambium and to work their way under the bark at right angles to the main furrow. They are, at first, so minute and work so close together that they make no distinct furrows but seem rather to devour entirely a very thin layer of the cambium. But as they increase in size they begin gradually to form distinct furrows and to take directions more divergent from each other and from their original course. In this way colonies from contiguous furrows at length run together and in time the whole trunk is surrounded by their multitudinous pathways, and the death of the tree is accomplished. Great care is taken by the parent beetles to keep *their* furrows separate. No instance was observed in which they ran together. In one instance the course of a furrow was changed to avoid running into the lateral furrows of a colony of larvæ just above. No furrows were found in the tree more than ten or twelve feet from its base, thus indicating that the attacks are made upon the lower part of the trunk. The attacks are not made simultaneously. Some of the furrows in this tree were scarcely more than an inch long, and evidently had been just commenced. Others were fully excavated and contained eggs, and in others still the larvæ had hatched and commenced their work, but in none were they fully grown. In another tree, a few rods distant from the first, the attack had evidently been made earlier in the season, for the larvæ were farther advanced in size and the bark, on one side of the tree was well loosened, though, strange to say, the other side of the trunk was comparatively unharmed. I was unable to discover why, in this instance, the attack was limited to one side of the trunk. It is pretty evident, therefore, that the trees are attacked all along during the months of June and July and possibly as late as August. I suspect, also, that the parent beetle, after having established a colony in one place may emerge from her furrow to repeat the operation in another place, either in the same trunk or in a different one, but this I was not able to ascertain definitely.

A whitish fungus, *Polyporus volvatus* Pk., scarcely larger than a hickory nut, occurs in considerable abundance on the trunks of spruces killed by this beetle. The mycelium of the fungus grows beneath the bark, and the external plant is connected with it through the perforations made by the insect. Hence this fungus becomes a conspicuous indicator of the track of the beetle and tells the tale of its destructive power.

(1.)

PLANTS MOUNTED.

Not new to the Herbarium.

Nuphar Kalmiana *Pursh.*
Xanthoxylum Americanum
Ceanothus Americanus *L.*
Melilotus officinalis *Willd.*
M. alba *Lam.*
Desmodium acuminatum *DC.*
Aster puniceus *L.*
Solidago gigantea *Ait.*
Taraxacum Dens-leonis *Desf.*
Azalea viscosa *L.*
Nemopanthes Canadensis *DC.*
Allium vineale *L.*
Scirpus maritimus *L.*
Oryzopsis Canadensis *Torr.*
Agrostis scabra *Willd.*
Agaricus cæsareus *Scop.*
A. granulosus *Batsch.*
A. mollis *Schæff.*
A. vulgaris *Pers.*
A. Orcella *Bull.*
Cantharellus cinnabarinus
Merulius bellus *B. & C.*
Tremellodon gelatinosum *Pers.*
Thelephora caryophyllea *Fr.*
Clavaria Botrytis *Pers.*
Solenia ochracea *Hoffm.*
Tremella Fungicola *Pk.*
Lycoperdon pusillum *Fr.*
Phoma Verbascicola *Schw.*
Nemaspora Russellii *B. & C.*
Melanconium bicolor *Nees.*
Cladosporium Herbarum *Lk.*
Helotium rugipes *Pk.*
Diatrype prominens *Howe.*
Valsa nivea *Fr.*

New to the Herbarium.

Omphalaria pulvinata *Nyl.*
Agaricus Peckii *Howe.*
A. transmutans *Pk.*
A. sapidus *Kalchb.*
A. tremulus *Schæff.*
A. abundans *Pk.*
A. citrinellus *Pers.*
A. Stylobates *Pers.*
A. pubescentipes *Pk.*
A. pruinatipes *Pk.*
A. teneroides *Pk.*
A. placomyces *Pk.*
A. squalidellus *Pk.*
A. elongatipes *Pk.*
A. atomatoides *Pk.*
A. incertus *Pk.*
Coprinus pulchrifolius *Pk.*
C. plumbeus *Pk.*
Cortinarius splendidus *Pk.*
C. sphagnophilus *Pk.*
C. robustus *Pk.*
Gomphidius rhodoxanthus

Hygrophorus speciosus *Pk.*
Lactarius subpurpureus *Pk.*
L. parvus *Pk.*
Marasmius spongiosus *B & C.*
Boletus badius *Fr.*
B. parasiticus *Bull.*
B. Russellii *Frost.*
B. Peckii *Frost.*
B. nigrellus *Pk.*
B. Ravenelii *B. & C.*
B. griseus *Frost.*
Corticium sulphureum *Fr.*
Exobasidium Cassandræ *Pk.*
Lycoperdon constellatum *Fr.*
L. coloratum *Pk.*
Chondrioderma Michelii *Lib.*
Lamproderma physaroides
Phoma nebulosum *Berk.*
Cryptosporium Caricis *Cd.*
C. Noveboracense *B. & C.*
Melasmia alnea *Lev.*
Peckia Clintonii *Pk.*
P. Sarraceniæ *P. & C.*
Vermicularia concentrica
Excipula leucotricha *Pk.*
Septoria cerasina *Pk.*
S. Polygalæ *P. & C.*
S. emaculata *P. & C.*
S. difformis *C. & P.*
S. Ulmi *Kze.*
Discella Kalmiæ *Pk.*
D. Platani *Pk.*
D. macrosperma *Pk.*
Melanconium pallidum *Pk.*
Sporidesmium concinnum
Clasterisporium uncinatum
Puccinia Calthæ *Lk.*
P. Gentianæ *Strauss.*
P. Physostegiæ *P. & C.*
Uromyces Claytoniæ *C. & P.*
Ustilago Candollei *Tul.*
Graphiola Phœnicis *Poir.*
Stilbum vulgare *Tode.*
S. smaragdinum *A. & S.*
Epicoccum neglectum *Desm.*
Ægerita candida *Pers.*
Periconia truncata *C. & P.*
P. corticalis *C. & P.*
Cercospora Callæ *P. & C.*
Helminthosporium oösporum
H. episphæricum *C. & P.*
Polyactis pulvinata *B. & C.*
Ramularia Nemopanthis
Stysanus Stemonitis *Cd.*
Dactylium roseum *Berk.*
Fusisporium phyllogenum
F. parasiticum *Pk.*
Chætomium funicolum *Ck.*
Uncinula geniculata *Ger.*
Peziza imperialis *Pk.*
P. griseo-rosea *Ger.*
P. bronca *Pk.*
P. longipes *C. & P.*
P. Pinastri *C. & P.*
P. agrostina *Pk.*
P. Thalictri *Pk.*
P. virginella *Ck.*
P. subtilissima *Ck.*
Helotium hydrogenum *Pk.*
Ascobolus ciliatus *Schw.*
A. furfuraceus *Pers.*
Stictis versicolor *Fr.*
S. filicina *Pk.*
Tympanis gyrosa *B. & C.*
Hypocrea Patella *C. & P.*
H. chromosperma *C. & P.*
H. apiculata *C. & P.*
Hypomyces transformans *Pk.*
Melogramma superficialis *Pk.*
Dothidea filicina *Fr.*
Diatrype Smilacicola *Schw.*
D. Cephalanthi *Schw.*

Valsa Linderæ *Pk.*
V. Fraxinicola *C. & P.*
V. cinctula *C. & P.*
V. tumidula *C. & P.*
V. trichispora *C. & P.*
V. leptasca *P. & C.*
Sphæria cæsariata *C. & P.*
S. exilis *A. & S.*
S. spermoides *Hoffm.*
S. salebrosa *C. & P.*
S. recessa *C. & P.*
S. obducens *Fr.*
Sphæria obtusissima *B. & C.*
S. interstitialis *C. & P.*
S. squalidula *C. & P.*
S. Fimeti *Pers.*
S. spiculosa *Pers.*
S. ceanothina *Pk.*
S. melanassa *Pk.*
S. fulgida *C. & P.*
S. minutella *Pk.*
S. culmifraga *Desm.*
S. Collinsii *Schw.*
Sphærella colorata *Pk.*

(2.)

PLANTS COLLECTED.

Trifolium hybridum *L.*
Lonicera Tartarica *L.*
Crepis aurantiaca *L.*
Agaricus striatifolius *Pk.*
A. apertus *Pk.*
A. peltigerinus *Pk.*
A. flavidellus *Pk.*
A. striatulus *Fr.*
A. subareolatus *Pk.*
A. conigenoides *Ellis.*
A. delicatellus *Pk.*
A. odorifer *Pk.*
A. longistriatus *Pk.*
A. ophiopus *Pk.*
A. angustipes *Pk.*
A. indecens *Pk.*
A. contrarius *Pk.*
A. umbonatescens *Pk.*
A. lacrymabundus *Fr.*
A. Candolleanus *Fr.*
A. limophilus *Pk.*
A. arenulinus *Pk.*
A. polytrichophilus *Pk.*
A. graciloides *Pk.*
Cortinarius craticius *Fr.*
C. regularis *Pk.*
Marasmius præacutus *Ellis.*
Panus torulosus *Fr.*
Boletus viscosus *Frost.*
Polyporus osseus *Kalchbr.*
P. dualis *Pk.*
P. nidulans *Fr.*
P. fragans *Pk.*
P. albellus *Pk.*
P. connatus *Weinm.*
Hydnum Weinmanni *Fr.*
Irpex obliquus *Fr.*
I. fuscoviolaceus *Fr.*
I. sinuosus *Fr.*
Radulum orbiculare *Fr.*
Phlebia merismoides *Fr.*
Grandinia rudis *Pk.*
Thelephora speciosa *Fr.*
Hymenochæte spreta *Pk.*
H. agglutinans *Ellis.*
Corticium quercinum *Fr.*
C. lacteum *Fr.*
C. Sambuci *Fr.*

Corticium Martianum *B. & C.*
C. suffocatum *Pk.*
Cyphella griseopallida *Weinm.*
Clavaria typhuloides *Pk.*
Pistillaria coccinea *Cd.*
Tremella intumescens *Sow.*
Næmatelia cerebriformis *Ellis.*
Dacrymyces minor *Pk.*
Bovista pila *B. & C.*
Amaurochæte atra *A. & S.*
Physarum luteolum *Pk.*
P. albicans *Pk.*
Diachæa splendens *Pk.*
Trichia fallax *Pers.*
Clathroptychium rugulosum
Nidularia pulvinata *Schw.*
Leptrostroma lineare *Pk.*
Sphæronema Robinæ *B. & C.*
S. aurantiacum *Pk.*
Sphæropsis minima *B. & C.*
Acrospermum graminum *Lib.*
Excipula lanuginosa *Pk.*
Discella Canadensis *Pk.*
D. arida *Pk.*
Melanconium intermedium *Pk.*
Torula curvata *Pk.*
Melampsora Epilobii *Fckl.*
Uredo Cassandræ *P. & C.*
Puccinia orbicula *P. & C.*
Helminthosporium Absinthii
Cladosporium nodulosum *Cd.*
Ramularia brunnea *Pk.*
Cercospora Symplocarpi *Pk.*
C. leptosperma *Pk.*
C. Ampelopsidis *Pk.*
C. Chenopodii *Fckl.*
Peronospora alta *Fckl.*
P. infestans *De By.*
Dactylium sublutescens *Pk.*
Oidium albipes *Pk.*
O. fasciculatum *Berk.*
Capillaria Sphæriæ-typhinæ
Menispora ciliata *Cd.*
Fusisporium rimosum *Pk.*
Zygodesmus pannosus *B. & C.*
Z. rubiginosus *Pk.*
Morchella deliciosa *Fr.*
Peziza Warnei *Pk.*
P. deligata *Pk.*
P. myricacea *Pk.*
P. bicolor *Bull.*
P. sulphurella *Pk.*
P. distincta *Pk.*
P. capitata *Pk.*
P. chamæleontina *Pk.*
P. Polygoni *Rehm.*
Helotium caricinellum *Pk.*
H. bryogenum *Pk.*
Dermatea carpinus *Fr.*
D. inclusa *Pk.*
Stictis cylindricarpa *Pk.*
Ascobolus viridis *Curr.*
A. crenulatus *Karst.*
Tympanis turbinata *Schw.*
Glonium simulans *Ger.*
Hypoderma Desmazierii *Duby.*
Hypomyces ochraceus *Tul.*
Hypoxylon suborbiculare *Pk.*
Dothidea Caricis *Fr.*
D. Osmundæ *P. & C.*
D. episphæria *Pk.*
Diatrype ferruginea *Fr.*
Valsa Juglandicola *Schw.*
V. innumerabilis *Pk.*
Lophiostoma obtectum *Pk.*
Sphærella Vaccinii *Ck.*
S. Impatientis *P. & C.*
Sphæria exercitalis *Pk.*
S. sphærellula *Pk.*
S. Clasterium *B. & C.*
S. viridella *Pk.*
S. scapophila *Pk.*
Pyrenophora phæocomes *Fr.*

(3.)

CONTRIBUTORS AND THEIR CONTRIBUTIONS.

M. C. COOKE, London, England.

Leptostroma juncinum *Fr.*
L. filicinum *Fr.*
Leptothyrium Ribis *Lib.*
L. Fragariæ *Lib.*
L. Juglandis *Lib.*
Dinemasporium Herbarum *Ck.*
Aposphæria acuta *Berk.*
A. complanata *Berk.*
Septoria Ulmi *Kze.*
S. Convolvuli *Desm.*
S. Clematidis *Desm.*
S. Viburni *West.*
S. Gei *Desm.*
S. Hederæ *Desm.*
S. Oxyacanthæ *Kze.*
S. Castanæcola *Lasch.*
S. Astragali *Desm.*
S. Ficariæ *Duby.*
S. Hydrocotyles *Duby.*
S. Pyricola *Desm.*
S. Chelidonii *Desm.*
S. Œgopodii *Desm.*
Phyllosticta vulgaris *Desm.*
P. Atriplicis *Desm.*
Phoma Samarorum *Desm.*
Ceuthospora phacidioides *Grev.*
Asteroma Rosæ *DC.*
Xenodochus carbonarius *Sch.*
Aregma mucronatum *Fr.*
A. obtusatum *Fr.*
A. acuminatum *Fr.*
A. bulbosum *Fr.*
Triphragmium Ulmariæ *Lk.*
Puccinia Saniculæ *Grev.*
P. bullaria *Lk.*
P. Anemones *Pers.*
Puccinia Nolitangeris *Cd.*
P. Violarum *Lk.*
P. Lychnidearum *Lk.*
P. pulverulenta *Grev.*
P. Circææ *Grev.*
P. Prunorum *Lk.*
P. Polygonorum *Lk.*
P. Primula *Grev.*
P. Glechomatis *DC.*
P. Menthæ *Pers.*
P. Comp. v. Centauræ *Schl.*
P. " serratulæ *Schl.*
P. Syngenesiarum *Lk.*
P. Umbelliferarum *Lk.*
P. Apii *Cd.*
P. Vincæ *Berk.*
P. Umbilici *Guep.*
P. Graminis *Pers.*
P. Veronicarum *DC.*
P. Mœhringii *Fckl.*
P. difformis *Kze.*
P. Scorodoniæ *Lk.*
P. Tanaceti *DC.*
P. Buxi *DC.*
Uromyces Iridis *Lev.*
U. Polygoni *Lev.*
U. intrusus *Lev.*
U. Ulmariæ *Lev.*
U. concentricus *Lev.*
Trichobasis Senecionis *Berk.*
T. Labiatarum *Lev.*
T. Cichoracearum *Lev.*
T. Hydrocotyles *Ck.*
T. Betæ *Lev.*
T. Fabæ *Lev.*
T. Galii *Lev.*

Trichobasis Parnassiæ *Ck.*
T. caricina *Berk.*
T. Petroselini *Berk.*
T. fallens *Ck.*
T. Rumicum *DC.*
T. Geranii *Berk.*
T. Umbellatarum *Lev.*
Tilletia caries *Tul.*
Urocystis pompholygodes *Lev.*
Ustilago segetum *Ditm.*
U. Salvei *Berk.*
U. longissima *Tul.*
U. utriculosa *Tul.*
Lecythea gyrosa *Lev.*
L. Euphorbiæ *Lev.*
L. Valerianæ *Lev.*
Uredo confluens *DC.*
U. Circææ *A. & S.*
U. pustulata *Pers.*
U. Caryophyllacearum
Coleosporium Sonchi *Lev.*
C. Tussilaginis *Lev.*
C. ochraceum *Bon.*
C. Rhinanthacearum.
Cystopus candidus *Lev.*
C. spinulosus *De By.*
Melampsora salicina *Lev.*
M. populina *Lev.*
M. Tremulæ *Tul.*
Roestelia cornuta *Tul.*
Æcidium crassum *Pers.*
Æ. Euphorbiæ *Pers.*
Æ. Epilobii *DC.*
Æ. leucospermum *DC.*
Æ. Grossulariæ *DC.*
Æ. Comp. v. Tussilaginis.
Æ. " Lampsanæ.
Æ. " Bellidis.
Æ. Saniculæ *Carm.*
Æ. Allii *Grev.*
Æ. Valerianacearum *Duby.*
Æ. rubellum *Pers.*
Æ. Berberidis *Pers.*
Æ. Periclymeni *DC.*
Æ. Ranunculacearum *DC.*
Æ. Tragopogonis *Pers.*
Peronospora infestans *De By.*
P. parasitica *Cd.*
Microsphæra comata *Lev.*
Erysiphe Linkii *Lev.*
E. tortilis *Lev.*

C. B. PLOWRIGHT, M. D., Lynn, England.

Agaricus muscarius *L.*
A. granulosus *Batsch.*
A. ustalis *Fr.*
A. cyathiformis *Bull.*
A. galericulatus *Scop.*
A. fascicularis *Huds.*
A. virginicus *Jacq.*
Cantharellus cibarius *Fr.*
Marasmius oreades *Fr.*
Panus stypticus *Fr.*
Polyporus perennis *Fr.*
P. squamosus *Fr.*
P. adustus *Fr.*
P. hirsutus *Fr.*
P. versicolor *Fr.*
Dædalea unicolor *Fr.*
D. quercina *Fr.*
Trametes Pini *Fr.*
T. suaveolens *Fr.*
Merulius lacrymans *Fr.*

Hydnum repandum *L.*
Fistulina hepatica *Fr.*
Craterellus flavescens.
Hymenochæte rubiginosa *Lev.*
Corticium quercinum *Fr.*
C. comedens *Fr.*
C. Sambuci *Fr.*
C. incarnatum *Fr.*
Clavaria flava *Pers.*
Scleroderma vulgare *Fr.*
Lycoperdon cælatum *Bull.*
Lycogala epidendrum *Fr.*
Spumaria alba *DC.*
Diderma vernicosum *Pers.*
Didymium farinaceum *Fr.*
Arcyria punicea *Pers.*
Cyathus striatus *Hoffm.*
C. Crucibulum *Pers.*
Sphærobolus stellatus *Tode.*
Leptostroma litigiosum *Desm.*
Cryptosporium Neesii *Cd.*
Phoma subordinarium *Desm.*
P. errabundum *Desm.*
P. complanatum *Desm.*
P. longissimum *Pers.*
P. Samarorum *Desm.*
Diplodia Ligustri *Awd.*
D. Fraxini *Fr.*
D. melæna *Lev.*
D. Coryli *Fckl.*
D. Syringæ *Awd.*
D. Mori *Awd.*
D. Juglandis *Fr.*
Hendersonia Rosæ *Awd.*
H. Rubi *Awd.*
H. Corni *Fckl.*
Vermicularia Dematium *Fr.*
Melasmia alnea *Lev.*
M. acerina *Lev.*
Piggotia astroidea *Berk.*
Septoria Hederæ *Desm.*
Septoria quercina *Desm.*
S. Aceris *B. & Br.*
S. Oxyacanthæ *Kze.*
S. Ulmi *Fr.*
S. Anemones *Fckl.*
S. Stellariæ *West.*
S. Astragali *Lasch.*
S. Castanæcola *Desm.*
S. Ficariæ *Desm.*
S. Fraxini *Desm.*
S. Ægopodii *Desm.*
S. Hepaticæ *Desm.*
S. Convolvuli *Desm.*
S. Tiliæ *Desm.*
S. Urticæ *Desm.*
Phyllosticta Cornicola *Rbh.*
P. Primulæcola *Desm.*
P. Symphoricarpi *West.*
Depazea populina *Fckl.*
D. Vincetoxici *Schub.*
D. Frondicola *Fr.*
D. Œnotheræ *Lasch.*
D. juglandina *Fr.*
D. cruenta *Fr.*
D. Æsculicola *Fr.*
Darluca filum *Cast.*
Ascochyta Polygoni *Rbh.*
A. Ebuli *Fckl.*
A. Rubi *Lasch.*
Asteroma Rosæ *DC.*
A. Ulmi *Kl.*
A. Hoffmani *Kze.*
Discella carbonacea *B. & Br.*
Stilbospora angustata *Pers.*
Stegonosporium cellulosum *Cd.*
Libertella betulina *Desm.*
Melanconium Juglandis *Kze.*
M. sphærospermum *Lk.*
M. bicolor *Nees.*
M. macrospermum *Tul.*
Coryneum pulvinatum *Kze.*

Coryneum disciforme *Kze.*
Bispora monilioides *Cd.*
Cytispora elegans *Ces.*
C. populina *Fr.*
Synchytrium Succisæ *De By.*
S. Anemones *Wor.*
Puccinia Tanaceti *DC.*
P. Hieracii *Mart.*
P. Prunorum *Lk.*
P. Menthæ *Pers.*
P. coronata *Cd.*
P. obtegens *Tul.*
P. Lampsanæ *Fckl.*
P. Bardanæ *Cd.*
P. Cirsii *Lasch.*
P. Luzulæ *Lib.*
P. Caricis *Fckl.*
P. Ægopodii *Lk.*
P. Glechomæ *DC.*
P. Compositarum *Schl.*
P. Syngenesiarum.
P. Malvacearum *Mont.*
P. Straminis *Fckl.*
P. Asparagi *DC.*
P. arundinacea *Hedw.*
P. Brachypodii *Fckl.*
P. Graminis *Pers.*
P. Amphibii *Fckl.*
Phragmidium Tormentillæ *Cd.*
P. apiculatum *Rbh.*
P. incrassatum *Lk.*
Uromyces Ficariæ *Lev.*
U. Polygoni *Fckl.*
U. Viciæ *Fckl.*
U. Trifolii *Fckl.*
U apiculatus *Lev.*
U. Betæ *Kuhn.*
U. scutellatus *Kl.*
Ustilago Carbo *Tul.*
U. longissima *Tul.*
U. hypodytes *Fr.*

Uredo Filicum *Desm.*
U. Vacciniorum *Pers.*
U. arundinacea *Rbh.*
Coleosporium Compositarum
C. Campanulacearum *Fr.*
C. Senecionis *Fr.*
C. ochraceum *Bon.*
Melampsora Lini *Desm.*
M. Tremulæ *Tul.*
M. Epilobii *Fckl.*
M. salicina *Lev.*
M. acerina *Lev.*
M. betulina *Tul.*
M. Euphorbiæ *Cast.*
Æcidium Violæ *Schum.*
Æ. Xylostei *Wallr.*
Æ. Compositarum *Mart.*
Æ. Berberidis *Pers.*
Æ. Convallariæ *Schum.*
Æ. Tussilaginis *Pers.*
Æ. Thesii *Desv.*
Æ. Ranunculacearum *DC.*
Æ. rubellum *Pers.*
Æ. elongatum *Lk.*
Æ. leucospermum *DC.*
Æ. Epilobii *DC.*
Æ. Urticæ *DC.*
Æ. Behenis *DC.*
Æ. Euphorbiæ *Pers.*
Rœstelia cornuta *Tul.*
Cystopus candidus *Lev.*
Ceratium hydnoides *A. & S.*
Cladosporium graminum *Lk.*
C. Fumago *Lk.*
Helminthosporium Tiliæ *Fr.*
H. arundinaceum *Cd.*
Oidium Tuckeri *Berk.*
O. fructigenum *Fr.*
Fusarium nervisequum *Fckl.*
Ramularia Urticæ *Ces.*
Peronospora nivea *Ung.*

Peronospora Alsinearum *DeBy*
P. grisea *De By.*
P. pygmæa *Ung.*
P. parasitica *Pers.*
P. gangliformis *Berk.*
Pilobolus crystallinus *Tode.*
Sphærotheca pannosa *Lev.*
S. Castagnei *Lev.*
Microsphæra Grossulariæ *Lev.*
M. holosericea *Lev.*
M. Berberidis *Lev.*
M. penicillata *Lev.*
Erysiphe Martii *Lev.*
E. Linkii *Lev.*
E. communis *Schl.*
Uncinula adunca *Lev.*
U. bicornis *Lev.*
U. Wallrothii *Lev.*
Podosphæra Kunzei *Lev.*
Phyllactinia guttata *Lev.*
Morchella esculenta *Pers.*
Leotia lubrica *Pers.*
Spathularia flavida *Pers.*
Peziza badia *Pers.*
P. aurantia *Fr.*
P. leporina *Batsch.*
P. cinerea *Batsch.*
P. Solani *Pers.*
P. atrata *Fr.*
P. fusca *Pers.*
P. fusarioides *Berk.*
Pseudopeziza Trifolii *Bernh.*
Helotium herbarum *Pers.*
Lachnella corticalis *Pers.*
Cenangium Cerasi *Fr.*
C. ferruginosum *Fr.*
Phacidium coronatum *Fr.*
P. minutissimum *Awd.*
P. Medicaginis *Lasch.*
Hysterium Pinastri *Fr.*
H. virgultorum *DC.*
Colpoma quercinum.
Dichæna strobilina *Fr.*
Rhytisma salicinum *Fr.*
R. acerinum *Fr.*
R. punctatum *Pers.*
Epichloe typhina *Berk.*
Nectria Peziza *Fr.*
N. pulicaris *Fr.*
N. ephisphæria *Fr.*
Xylaria Hypoxylon *Grev.*
X. polymorpha *Grev.*
Hypoxylon fuscum *Fr.*
Ustulina vulgaris *Tul.*
Eutypa flavovirens *Tul.*
Melogramma ferrugineum *Nke.*
Polystigma fulvum *DC.*
P. rubrum *DC.*
Dothidea Ulmi *Fr.*
D. Heraclei *Fckl.*
D. graminis *Pers.*
D. Junci *Fr.*
D. Ribesia *Fr.*
Diatrype stigma *Fr.*
D. favacea *Fr.*
D. disciformis *Fr.*
D. bullata *Fr.*
Valsa suffusa *Tul.*
V. salicina *Fr.*
V. nivea *Fr.*
V. stellulata *Fr.*
Cucurbitaria Spartii *De Not.*
C. Berberidis *Gr.*
C. Laburni *Fr.*
Massaria inquinans *Tode.*
M. pupula *Tul.*
Stegia Ilicis *Fr.*
Sphæria aquila *Fr.*
S. spermoides *Hoffm.*
S. pulvispyrius *Pers.*
S. coniformis *Fr.*
S. clara *Awd.*

Sphæria rubella *Pers.*
S. Herbarum *Pers.*
S. pilifera *Fr.*
S. obducens *Fr.*
S. Carduorum *Wallr.*
S. vulgaris *Ces.*
Isothea pustula *Berk.*
Sphærella ignobilis *Awd.*
Sphærella Cookeana *Awd.*
S. Populi *Awd.*
S. microspora *Awd.*
Venturia ditricha *Fr.*
Rophographus filicinus *Fckl.*
Exoascus Populi *Thum.*
Calyptospora Gœppertiana

Hon. G. W. CLINTON, Buffalo, N. Y.

Polyporus obducens *Fr.*
P. callosus *Fr.*
P. farinellus *Fr.*
Corticium Martianum *B. & C.*
C. cæruleum *Fr.*
Dacrymyces minor *Pk.*
Perichæna irregularis *B. & C.*
Phoma strobilinum *P. & C.*
P. stercorarium *P. & C.*
Sphæropsis Syringæ *P. & C.*
S. Pennsylvanica *B. & C.*
Sphæronema Robiniæ *B. & C.*
Diplodia thujina *P. & C.*
Melanconium intermedium
Septonema dichænoides *P. & C.*
Puccinia orbicula *P. & C.*
P. Hydrophylli *P. & C.*
Uredo Cassandræ *P. & C.*
Trichobasis Fabæ *Lev.*
Æcidium Saniculæ *Carm.*
Cladosporium depressum
Verticillium pulvereum *P. & C.*
Trichoderma viride *Pers.*
Oidium fasciculatum *Berk.*
Polyactis cana *Berk.*
Peziza vulpina *Ck.*
P. maculincola *Schw.*
P. macrospora *Fckl.*
Patellaria lignyota *Fr.*
Hysterium Rimincola *Schw.*
H. truncatulum *C. & P.*
Dothidea Osmundæ *P. & C.*
Valsa Juglandicola *Schw.*
Cucurbitaria Berberidis *Gr.*
Sphæria Clintonii *Pk.*
S. onosmodina *P. & C.*
S. Herbarum *Pers.*
Sphærella Impatientis *P. & C*

C. C. FROST, Brattleborough, Vt.

Marasmius erythropus *Fr.*
M. archyropus *Fr.*
Boletus viscosus *Frost.*
B. salmonicolor *Frost.*
Næmatelia nucleata *Fr.*
Endobotrya elegans *B. & C.*
Ceratium porioides *A. & S.*
Phymatospora leucosperma
Peziza Acetabulum *L.*
Patellaria lignyota *Fr.*
Sphæria scoriadea *Fr.*

E. S. MILLER, Wading River, N. Y.

Quercus obtusiloba *Mx.*
Q. monticola *Mx.*
Carya tomentosa *Nutt.*

H. A. WARNE, Oneida, N. Y.

Viola Selkirkii *Pursh.*
Agaricus naucinoides *Pk.*
A. personatus *Fr.*
A. æruginosus *Fr.*
Paxillus porosus *Berk.*
Polyporous medullapanis *Fr.*
Hydnum chrysodon *B. & C.*
Grandinia virescens *Pk.*
Stereum rugosum *Fr.*
Clavaria amethystina *Bull.*
Guepinia helvelloides *DC*
Erysiphe Liriodendri *Schw.*
Morchella bispora *Sor.*
M. semilibera *DC.*
M. deliciosa *Fr.*
Verpa digitaliformis *Pers.*
Peziza sulcata *Pers.*
P. Warnei *Pk.*
Ascobolus crenulatus *Karst.*
Patellaria leptosperma *Pk.*
Sphæria xestothele *B. & C.*
Discosia rugulosa *B. & C.*

W. R. GERARD, New York, N. Y.

Ostropa cinerea *Duby.*
Hysterium prælongum *Schw.*
H. curvatum *Fr.*
H. Rousselii *De Not.*
H. aquilinum *Schum.*
Hysterium parvulum *Ger.*
H. australe *Duby.*
H. ellipticum *DC.*
Hypoderma nervisequum *Fr.*
Glonium simulans *Ger.*

J. B. ELLIS, Newfield, N. J.

Corticium fumigatum *Thum.*
C. rubrocanum *Thum.*
Microthyrium Smilacis *Not.*
Phoma consors *C. & E.*
Sphæropsis Sumachi *Schw.*
Melanconium Ramulorum *Cd.*
Stilbum atrocephalum *Ellis.*
Septosporium velutinum *C. & E.*
Aspergillus pulvinatus *B. & C.*
Chætomium elatum *Kze.*
Peziza raphidospora *Ellis.*
P. macrospora *Fckl.*
P. lachnoderma *Berk.*
P. virginella *Ck.*
P. mycogena *Ellis.*
P. Kalmiæ *Pk.*
Dermatea carnea *C. & E.*
Dermatea tetraspora *Ellis.*
Stictis leucaspis *Ellis.*
Triblidium minor *Ck.*
Diatrype Hystrix *Tode.*
D. fibritecta *C. & E.*
D. collariata *C. & E.*
D. dryophila *Curr.*
Dothidea excavata *C. & E.*
Valsa rufescens *Schw.*
V. aculeans *Schw.*
V. Liquidamberis *Schw.*
V. albofusca *C. & E.*
Sphæria pachyascus *C. & E.*
S. viscosa *C. & E.*
S. Radicum *Schw.*
S. goniostoma *Schw.*

Prof. J. W. CHICKERING, Washington, D. C.

Pinus mitis *Mx.*
Pinus inops *Ait.*

W. M. CANBY, Wilmington, Del.

Pinus Tæda *L.*

F. W. HALL, New Haven, Ct.

Chenopodium leptophyllum *Nutt.*

C. DEVOL, M. D., Albany, N. Y.

Laurus nobilis *L.*

Specimens of wood of .... { Rosa Indica. | Ulmus racemosa?

W. W. HILL, Albany, N. Y.

Specimens of wood of:

Rhus venenata *DC.*
R. typhina *L.*
R. glabra *L.*
Rhus radicans *L.*
Celastrus scandens *L.*

(4.)

SPECIES NOT BEFORE REPORTED.

TRIFOLIUM HYBRIDUM *L.*

Portage. *G. W. Clinton.* North Greenbush. Perhaps not yet fully established.

LONICERA TARTARICA *L.*

I find this shrub growing on the railroad bank, one mile south of Greenbush.

CREPIS AURANTIACA *L.*

Well established in fields and meadows. Sandlake. July.

AGARICUS (TRICHOLOMA) STRIATIFOLIUS *n. sp.*

Pileus dry, convex or expanded, nearly smooth, somewhat shining, often obscurely dotted or squamulose with innate fibrils, grayish or grayish-brown, sometimes tinged with red; lamellæ rather close, rounded behind, transversely striated or venose, white; stem slightly thickened at the base, hollow, white; spores subglobose or broadly elliptical, .00016′*–.0002′ long; odor decided and peculiar, flesh white.

Plant gregarious, 2′ high, pileus 2′–2.5′ broad, stem 3″–5″ thick.

* One accent signifies inch or inches; two accents signify line or lines.

Ground in woods. Mechanicsville. October.

The striated appearance of the lamellæ is due to the presence of small transverse vein-like elevations. The stem is almost chalky-white. The odor is quite perceptible and peculiar.

AGARICUS (CLITOCYBE) APERTUS *n. sp.*

Pileus convex, then expanded or centrally depressed, often irregular, whitish with a lilac tinge and often one or two darker zones, shining; lamellæ close, adnate or slightly decurrent, whitish, often with a faint pinkish tinge; stem short, equal or narrowed toward the base, solid, whitish; odor farinaceous, taste unpleasant.

Plant gregarious or cæspitose, 1′–2′ high, pileus about 1′ broad, stem 1″ thick.

Grassy ground in pastures and along highways. Maryland, Otsego county. September.

In the dried specimens the lamellæ often assume a pale cinnamon hue.

AGARICUS (CLITOCYBE) FLAVIDELLUS *n. sp.*

Pileus thin, convex, then expanded or centrally depressed, often irregular, hygrophanous, glabrous; lamellæ narrow, crowded, adnate or subdecurrent; stem equal, glabrous, hollow.

Plant gregarious, about 2′ high, pileus 1′ broad, stem 1.5″–2″ thick.

Wet swampy ground. Maryland. September.

The whole plant has a uniform dirty yellowish hue when fresh. The pileus becomes whitish in drying.

AGARICUS (CLITOCYBE) PELTIGERINUS *n. sp.*

Pileus nearly plane, smooth, umbilicate, hygrophanous, brown, striatulate on the margin when moist, whitish or pale-gray when dry; lamellæ rather distant, sometimes branched, venose-connected, decurrent, a little paler than the moist pileus; stem nearly equal, rather firm, solid, smooth, paler than the pileus, often with a minute white tomentum toward the base; spores elliptical, .0003′ long, with a slight apiculus at the base.

Plant 6″–10″ high, pileus 2″–5″ broad, stem less than 1″ thick.

On decaying Peltigera. Oneida. *H. A. Warne.* North Greenbush. May.

A small species remarkable for its peculiar habitat. Sometimes the stems of two or three plants are united at the base, thus manifesting a tendency to become cæspitose.

AGARICUS (COLLYBIA) CONIGENOIDES *Ellis.*

Buried pine cones. West Albany. October.

The pileus in our specimens is fuscous, being darker than in the type. It seems to be near *A. semihærens* B. & C., if not indeed the same species.

AGARICUS (COLLYBIA) DELICATELLUS *n. sp.*

Snowy-white throughout, smooth, subcæspitose; pileus convex or broadly campanulate, submembranaceous, slightly thicker on the disk; lamellæ narrow, close, emarginate; stem slender, equal, hollow, slightly white-villous at the base.

Plant 1′ high, pileus 2″–3″ broad, stem .5″ thick.

Among fallen leaves. North Greenbush. September.

From the character of the lamellæ it is evidently a Collybia but the substance is rather tender.

AGARICUS (MYCENA) ODORIFER *n. sp.*

Pileus thin, hemispherical, convex or expanded, smooth, white, the disk slightly tinged with brown; lamellæ subarcuate, adnate or subdecurrent, somewhat crenulate on the edge, white; stem tough, equal, viscid, smooth, whitish or pale-brownish, white-villous at the base; spores narrowly elliptical, .0002′ long; odor strong, subalkaline, for a long time persistent.

Plant 1′–1.5′ high, pileus 3″–4″ broad.

Mossy ground. Adirondack Mts. July.

Apparently near *A clavicularis* Fr., but smaller and easily known by its decided and peculiar odor which is retained by the dried specimens for a long time.

AGARICUS (PLEUROTUS) SUBAREOLATUS *n. sp.*

Pileus compact, convex, marginate behind, whitish tinged with brown and pink, usually cracking in small maculiform areas; lamellæ rather broad and loose, decurrent, whitish, becoming tinged with yellow in drying; stem eccentric, subvertical, short, curved, firm, solid, sometimes compressed, white; spores white, oblong, .0005′–.0006′ in length.

Pileus 3′–4′ broad.

Trunks of elm trees. Bethlehem. October.

Apparently related to *A. pulvinatus* Pers.

AGARICUS STRIATULUS *Fr.*

Decaying trunks of pine. North Greenbush. October. Buffalo. *Clinton.*

AGARICUS (PLUTEUS) LONGISTRIATUS *n. sp.*

Pileus thin, convex, then expanded, dry, striate to the disk, cinereous, the disk darker and minutely roughened with hairs or squamules ; lamellæ broad, at length ventricose, free, white, then flesh-colored ; stem equal, glabrous, white ; spores orbicular, .0003′ in diameter.

Plant 2′ high, pileus 1′–1.5′ broad, stem 1″ thick.

Decaying wood. Albany. July.

AGARICUS (PHOLIOTA) ANGUSTIPES *n. sp.*

Pileus hemispherical, then convex or expanded, at first brown, then fading to ochraceous-brown or subalutaceous and becoming minutely squamulose with appressed dot-like scales ; lamellæ narrowed outwardly, emarginate, whitish or dull cream color ; stem stuffed, tapering downward, whitish or cinereous, roughened with darker scales which at first form a crenate annulus at the upper part ; spores brownish-ferruginous, subelliptical, .0003′ long, .00018′ broad ; flesh white.

Plant cæspitose, 2′–3′ high, pileus 1.5′–2.5′ broad, stem 2″–3″ thick.

In pastures about old stumps. Schenevus, Otsego county. September.

The pileus is sometimes irregular from being crowded in its growth. The taste is unpleasant and the scales of the stem are somewhat evanescent.

AGARICUS (PHOLIOTA) INDECENS *n. sp.*

Pileus convex, then expanded or centrally depressed, smooth, rather brittle, hygrophanous, pale-fuscous and usually striatulate on the margin when moist, alutaceous inclining to ochraceous when dry ; lamellæ close, emarginate with a decurrent tooth, pale-brown, becoming cinnamon-brown ; stem equal or slightly tapering upward, silky-fibrillose, hollow, annulate, pallid, the thin membranaceous annulus sometimes evanescent; spores unequally elliptical, .0005′–.0006′ long, .00025′–.0003′ broad.

Plant gregarious or cæspitose, 1′–2′ high, pileus 1′–2′ broad, stem 1″–2″ thick.

Ground in bushy pastures. North Greenbush. September.

It resembles somewhat *A. Aggericola* Pk., but it is smaller, paler, not viscid and has longer spores. The edge of the lamellæ is sometimes eroded.

AGARICUS (NAUCORIA) CONTRARIUS *n. sp.*

Pileus thin, convex, then plane or centrally depressed, sometimes umbilicate and striate on the margin, glabrous, alutaceous; lamellæ loose, adnate, very broad behind, becoming ventricose and subtriangular, ochraceous; stem equal, hollow, reddish or reddish-brown, adorned with a few silky-fibrils and minute fragments of the white floccose veil; spores yellow, elliptical, .0003′ long, .0002′ broad.

Plant gregarious or subcæspitose, about 1′ high, pileus 6″–10″ broad.

Grassy ground in pastures. Schenevus and West Albany. September.

The color of the pileus fades a little with age, but the bright color of the lamellæ is retained longer. There is usually an abundant white mycelium at the base of the stem. Often minute fragments of the floccose veil may be seen on the margin of the young pileus.

AGARICUS (STROPHARIA) UMBONATESCENS *n. sp.*

Pileus at first conical, subacute, then expanded and umbonate, smooth, viscid, yellow, the umbo inclining to reddish; lamellæ plane, broad, at length ventricose, blackish-brown with a slight olivaceous tint; stem equal, slender, hollow, generally a little paler than the pileus; spores purplish-brown, almost black, .0006′–.0007′ long, .0004′ broad.

Plant 3′–4′ high, pileus 6″–12″ broad.

Dung in pastures. Schenevus. September.

This is evidently closely allied to *A. stercorarius* and *A. semiglobatus* with which it has probably been confounded, but the pileus in our plant is so peculiar in form that I am constrained to regard it as a distinct species. The viscid pellicle of the pileus is separable. When old it sometimes cracks into areas.

AGARICUS LACRYMABUNDUS *Fr.*

Bushy pastures. Bethlehem. October.

Our specimens do not agree in all respects with the published description of the species. The pileus is sometimes wholly destitute of scales and sometimes densely clothed with hairy erect ones. The species is manifestly variable.

AGARICUS CANDOLLEANUS *Fr.*

Ground and buried chips. North Greenbush and Greig. September and October.

AGARICUS (PSILOCYBE) LIMOPHILUS *n. sp.*

Pileus thin, convex, then expanded, fragile, atomaceous, radiately rugulose, whitish, often splitting on the margin and sometimes cracking into areas; lamellæ rather broad, loose, whitish or pallid, then purplish brown; stem equal, striate and slightly mealy at the top, hollow, short, white; spores elliptical, .0004′–.0005′ long, .0002′–.00025′ broad.

Muddy alluvial soil under willows. Green Island. September.

It is related to *A. incertus* Pk., but the veil is less developed, the lamellæ are more distant and the spores are larger.

AGARICUS (PSILOCYBE) ARENULINUS *n. sp.*

Pileus convex, then expanded, plane or centrally depressed, glabrous, hygrophanous, dark livid-brown and coarsely striatulate when moist, livid-white when dry; lamellæ close, cinnamon-brown, becoming darker with age; stem slightly tapering upward, hollow, whitish; spores subelliptical, .0004′ long.

Plant 1.5′–2.5′ high, pileus 6″–16″ broad, stem 1″ thick.

Sandy soil. West Albany. September.

When moist the pileus has a peculiar radiate appearance as if distantly striate. Large individuals have the margin of the pileus uneven and irregularly striate. A mass of sand usually adheres to the base of the stem.

AGARICUS (PSATHYRA) POLYTRICHOPHILUS *n. sp.*

Pileus thin, convex or subcampanulate, glabrous rather fragile, sometimes with a slight umbo, hygrophanous, striatulate and brown when moist, dull ochraceous or buff when dry, somewhat shining; lamellæ plane and adnate or slightly arcuate and decurrent, broad, subdistant, colored almost like the pileus; stem slender, equal, subflexuous, slightly whitish-fibrillose, especially toward the base, mealy at the top, concolorous, containing a whitish pith; spores purple-brown, subelliptical, .0003′ long, .0002′ broad.

Plant gregarious, odorous, 1′–2′ high, pileus 2″–5″ broad.

Ground among Polytrichum. Oneida. *Warne.* West Albany. May.

AGARICUS (PSATHYRELLA) GRACILOIDES *n. sp.* (Plate 1, figs. 1–4.)

Pileus thin, conical or campanulate, glabrous, hygrophanous, brown and striatulate when moist, whitish and subrugulose when dry; lamellæ ascending, rather broad, subdistant, brown, becoming blackish-brown, the edge whitish; stem long, straight, fragile, hollow, smooth, white; spores blackish, elliptical, .0006′–.00065′ long, .0003′–.00033′ broad.

Plant gregarious, 4′–6′ high, pileus 1′ broad, stem 1″ thick.

Ground in an old door yard. Maryland. September.

This is allied to *A. gracilis* Fr., but the edge of the lamellæ is not rosy. When drying the moisture leaves the disk of the pileus first, the margin last. When dry the plant bears some resemblance to large forms of *A. tener*. Under a lens the texture of the surface of the pileus is seen to be composed of matted fibrils.

CORTINARIUS (PHLEGMACIUM) OPHIOPUS *n. sp.*

Pileus firm, convex or subcampanulate, then expanded, sometimes irregular, viscid, reddish-yellow, smooth, the paler margin sometimes roughened by adhering patches of the whitish veil; lamellæ close, often eroded on the edge, brownish-cinnamon; stem stout, equal, solid, usually much bent or variously curved, at first shaggy-scaly from the subconcentrically arranged fragments of the copious veil, white or yellowish; flesh white; spores unequally elliptical, .00045′–.0005′ long, .00025′–.0003′ broad, usually containing a single nucleus.

Plant 4′–6′ high, pileus 2′–4′ broad, stem 4″–6″ thick.

Among fallen leaves in woods. Maryland. September.

The long crooked stem is a noticeable feature of the species.

CORTINARIUS CRATICIUS *Fr.*

Low grounds. Center. October.

CORTINARIUS (HYDROCYBE) REGULARIS *n. sp.*

Pileus convex or expanded, glabrous, hygrophanous, watery-brown when moist, reddish-ochraceous when dry, often slightly radiate-rugulose; flesh whitish, becoming white when dry; lamellæ close, slightly violaceous when young; stem long, nearly straight, stuffed, slightly tapering upward, silky-fibrillose, white; spores elliptical, .0004′ long, .0003′ broad.

Plant gregarious, 3′–5′ high, pileus 1′–2′ broad, stem 1″–2″ thick.

Sphagnous marsh. Center. October.

The plant has a very regular symmetrical appearance, whence the specific name.

MARASMIUS PRÆACUTUS *Ellis.*

Trunks of dead alder trees. Mechanicsville. October.

The lamellæ are sometimes quite distant and rounded behind. The stem which is remarkable for its thickness and peculiar shape and which constitutes the chief part of the young plant is pulverulent under a lens.

PANUS TORULOSUS *Fr.*

Oak stumps. Greenbush. May.

BOLETUS VISCOSUS *Frost.*

Light sandy soil about pine woods. Center. October.

POLYPORUS OSSEUS *Kalchbr.*

Old stumps in woods. Guilderland. October.

Very rare. The pores in our specimens are a little larger than in an authentic specimen received from *Dr. Kalchbrenner.*

POLYPORUS (ANODERMEI) DUALIS *n. sp.*

Pileus dimidiate, sessile or sometimes produced behind into a stem-like base, convex or nearly plane above, somewhat uneven, rarely with a slight zonate appearance, single or cæspitosely imbricating, two to four inches broad, nearly as long, tawny or tawny-ferruginous, the margin sometimes paler ; flesh concolorous, the upper stratum of a soft spongy-tomentose texture, the lower firm and fibrous ; pores minute, unequal, more or less angular, with thin dissepiments, whitish and denticulate on the edge, about equal in length to the thickness of the flesh of the pileus, dark ferruginous with a whitish or silvery reflection.

Dead trunks of spruce trees. Adirondack Mts. Also at the base of pine trunks. West Albany. August and September.

The species is remarkable for the twofold character of the substance of the pileus, the upper half being of a soft tomentose nature, velvety to the touch and readily impressed by the finger nail, the lower half of a much firmer fibrous texture, smooth and subshining when cut or fractured. The plants are quite variable in size, shape and thickness of the margin which in some is quite thin, in others very obtuse In the latter the pores near the margin are often much enlarged or elongated so that the dissepiments appear like lamellæ. The species is related to *P. cuticularis* Fr., but I have not found it with any appearance of a cuticle nor of a blackish color, nor with a fimbriated margin — characters said to belong to that species. Besides, that species is attributed to deciduous trees while our plant has thus far occurred on coniferous trees only.

POLYPORUS NIDULANS *Fr.*

Dead oak and birch branches lying on the ground. Sandlake, North Greenbush and Adirondack Mts.

Our specimens are not villous and are fragrant when fresh, not when dry. This would indicate that they should be referred to *P. rutilans*, but the unequal pores forbid such a reference. It is surprising how few of our fungi agree accurately with the descriptions of published species. Either we have many more species peculiar to this country than has been supposed, or else many species have been very imperfectly described.

POLYPORUS (ANODERMEI) FRAGRANS *n. sp.*

Fragrant; pileus fleshy, tough, effuso-reflexed, imbricating, one to two inches long, two to four broad, rather thin but sometimes thickened at the base, velvety to the touch and clothed with a minute innate tomentum, pale reddish-grey or alutaceous, the thin margin concolorous and sometimes a little roughened, often sterile beneath; flesh slightly fibrous, zonate, concolorous; pores minute, unequal angular, about one line long, the dissepiments thin, acute, toothed or lacerated, whitish, becoming darker with age and blackish-stained when bruised.

Decaying trunks of elm trees. Bethlehem. October.

This species is closely related to *P. adustus* and *P. fumosus*, from which it is readily separated by the unequal pores. Its odor when fresh is very decided and quite agreeable, being not much unlike that of dry Seneca grass. The species has been collected in Vermont also by *Mr. A. P. Morgan.*

POLYPORUS (PLACODERMEI) ALBELLUS *n. sp.*

Pileus thick, sessile, convex or subungulate, subsolitary, two to four inches broad, one to one and a half thick, fleshy, rather soft, the adnate cuticle very thin, smooth or sometimes slightly roughened by a slight strigose tomentum, especially toward the margin, whitish tinged more or less with fuscous; flesh pure white, odor acidulous; pores nearly plain, minute, subrotund, about two lines long, white inclining to yellowish, the dissepiments thin, acute; spores minute, cylindrical, curved, white, .00016′–.0002′ long.

Decaying trunks and branches of birch trees. Helderberg Mts. October.

This species appears to be related to *P. paradoxus*, but the texture is manifestly firmer than in that and softer than in *P. betulinus*.

POLYPORUS CONNATUS *Weinm.*

Trunks of maple trees, *Acer saccharinum.* Sandlake. October.

POLYPORUS (INODERMEI) BALSAMEUS *n. sp.*

Pileus rather thin, corky, plain, about one inch broad, sessile or spuriously stipitate, slightly and unequally villose-tomentose, pale-brown marked with lighter concentric zones; flesh white; pores short, minute, subrotund, the thin dissepiments acute, denticulate, white.

Trunks of balsam trees, *Abies balsamea.* Adirondack Mts. August.

The villosity is so slight that it may be easily overlooked. It is not uniformly distributed over the whole surface but occurs in zones or patches. The species is apparently allied to *P. zonatus.*

POLYPORUS OBDUCENS *Pers.*

Decaying wood. Buffalo. June. *Clinton.*

POLYPORUS CALLOSUS *Fr.*

Decaying wood. Buffalo. December. *Clinton.*

POLYPORUS FARINELLUS *Fr.*

Decaying wood. Alexandria Bay. July. *Clinton.*

HYDNUM WEINMANNI *Fr.*

Decaying wood. Bethlehem. October.

IRPEX SINUOSUS *Fr.*

Dead branches lying on the ground. Wynantskill, Rensselaer county. November.

IRPEX FUSCOVIOLACEUS *Fr.*

Decaying trunks of spruce, *Abies nigra.* Adirondack Mts. July.

Our specimens are not "silky," as required by the description, but villose or tomentose-villose as in *Polyporus hirsutus* and *P. abietinus*, the latter of which this species closely resembles. The hymenium, however, is coarser, more highly colored and lamellated to such an extent that young specimens might easily be taken for a Lenzites.

IRPEX OBLIQUUS *Fr.*

On dead oak and alder trees. North Greenbush, Center and Sandlake. October and November.

At first it looks more like a small white orbicular resupinate Polyporus than an Irpex. Very common.

RADULUM ORBICULARE *Fr.*

Decaying wood and bark of deciduous trees. Slingerlands and Mechanicsville. October.

PHLEBIA MERISMOIDES *Fr.*

Decaying wood. Indian Lake. October.

This species is apparently very close to *P. radiata.* Our specimens are referred to it because of their pale color and more strigose margin.

GRANDINIA VIRESCENS *n. sp.*

Effused, thin, separable from the matrix, soft, greenish, becoming darker with age; granules minute, hemispherical, not crowded; spores broadly elliptical or suborbicular, .0002′ long.

Decaying wood. Oneida. *Warne.* September.

Remarkable for its beautiful color.

GRANDINIA RUDIS *n. sp.*

Effused, thin, soft, pulverulent-tomentose, tawny-brown, the hymenium at length granulose; spores globose, rough, .0003′-.0004′ in diameter.

Decaying wood and ground in deep shaded places. North Greenbush. October.

It is allied to *G. coriaria* Pk. in texture and in the character of the spores, but it differs in color and habit. The whole plant is of one uniform hue.

THELEPHORA SPECIOSA *Fr.*

Providence, Saratoga county. August.

But a single specimen was found and in it the tips of the branches are not fimbriate; otherwise the characters are well shown.

HYMENOCHÆTE AGGLUTINANS *Ellis.*

Trunks and branches of living alder trees. Sandlake and Adirondack Mts. July and November.

HYMENOCHÆTE SPRETA *n. sp.*

Effused, adnate, somewhat uneven, thick, ferruginous, beset with rather long slender acute setæ, at length cracking into frustulate-areolæ.

Decorticated wood. Helderberg Mts. October.

This quite closely resembles some forms of *H. corrugata*, but its bright color and thicker substance, which shrinks more in drying so that the matrix is revealed through the chinks, and the areas become as it were frustules, indicate a distinct species.

The setæ are more slender and more sharp-pointed than in *H. corrugata.*

CORTICIUM QUERCINUM *Pers.*

Dead oak branches. Greenbush. September.

The specimens are a little paler than in the type, but this is probably due to lack of age.

CORTICIUM LACTEUM *Fr.*

Decaying wood. Slingerlands. October.

CORTICIUM SAMBUCI *Fr.*

Dead stems of elder, *Sambucus Canadensis.* Mechanicsville. October.

CORTICIUM CÆRULEUM *Fr.*

Decaying wood. Buffalo. November. *Clinton.*

CORTICIUM MARTIANUM *B. & C.*

Decaying wood. Buffalo. *Clinton.* Mechanicsville. October.

It is not without some hesitation that our specimens are referred to this species, for, though they agree very well with specimens published under this name by *Mr. H. W. Ravenel* and with those distributed by the late *Dr. Curtis*, they do not well agree with the published description of the species. In color they are bright red inclining to cinnabar, the surface often suffused with a slight bloom or pruinosity. The margin on smooth surfaces is obscurely radiately wrinkled, giving the idea of a Phlebia, and this illusion is further sustained by the hymenium in the dried specimens becoming radiately rimose. The substance when fresh is blood red within, and the mycelium is of a beautiful yellow color and penetrates the matrix. It is sometimes confluent, forming patches several inches in extent.

CORTICIUM SUFFOCATUM *n. sp.*

Effused, indeterminate ; subiculum whitish or pale tawny, composed of intricate webby filaments ; hymenium tawny-brown, of a smooth waxy appearance when moist, dusted by the spores and more or less rimose when dry, revealing the paler subiculum through the chinks ; spores elliptical, colored, .0004 long, .0003′ broad.

Under surface of pine and hemlock wood lying on the ground. Sandlake and Bethlehem. November.

CYPHELLA GRISEOPALLIDA *Weinm.*

Bark and twigs lying on the ground. Sandlake. November.

The cups are sometimes furnished with very short stems.

CLAVARIA TYPHULOIDES *n. sp.* (Plate II, figs. 12–14.)

Very small, about two lines high, rather tough, scattered or gregarious, clavate, white, the stem slightly pruinose, gradually swelling into the obtuse glabrous subcompressed solid club; spores oblong-elliptical, .0002'–.0003' long, with an oblique point at the base.

Dead stems of *Epilobium angustifolium*. Adirondack. August.

This belongs to the section *Holocoryne*, and is apparently allied to *C. uncialis*, but its much smaller size and usually compressed club will serve to distinguish it. When dry the white color is well retained and the hymenium has a subpellucid appearance and is of a firmer texture than the center of the club.

CLAVARIA AMETHYSTINA *Bull.*

Ground. Oneida. July. *Warne.*

PISTILLARIA COCCINEA *Cd.*

Dead leaves and petioles of tansy, *Tanacetum vulgare.* Sandlake. June.

TREMELLA INTUMESCENS *Sow.*

Dead alder branches. Sandlake. November.

NÆMATELIA CEREBRIFORMIS *Ellis in litt.*

Dead branches of water-beech, *Carpinus Americana.* Albany. September.

Mr. Ellis sends this under the above name. It appears to differ from *N. encephala* in being lighter colored and in having the nucleus of a softer texture.

DACRYMYCES MINOR *n. sp.*

Small, subglobose, scattered or rarely a few crowded together, dingy ochraceous with a slight olivaceous tint; spores oblong, curved, with a slight oblique apiculus at one end, simple, then uniseptate, finally triseptate, .0005'–.0006' long, .0002' broad.

Decaying wood. Buffalo, *Clinton.* Sandlake. November.

The plants are scarcely half a line in diameter.

BOVISTA PILA *B. & C.*

Ground in grassy places. Oneida. *Warne.* Sandlake and Albany.

Our specimens appear to belong to this species but I have never seen them with bits of grass adhering to the peridium, and the spores vary in color from dingy-olivaceous, at first, to purplish brown when old.

LYCOPERDON SACCATUM *Fr.*

Ground. Sandlake and Center. Autumn.

AMAUROCHÆTE ATRA *A. & S.*

Trunks of pine trees. Adirondack Mts. August.

PHYSARUM LUTEOLUM *n. sp.* (Plate II, figs. 15–18.)

Peridium small, closely gregarious, sessile, yellowish inclining to tawny, rupturing irregularly; flocci abundant, yellowish-white; spores globose, purplish-brown, .0004′ in diameter.

Living leaves of *Cornus Canadensis.* Adirondack Mts. July.

PHYSARUM ALBICANS *n. sp.* (Plate II, figs. 5–8.)

Peridium whitish, fugacious, except at the base, externally mealy with lime granules, globose, as well as the more persistent whitish capillitium; stem white, tapering upwards, sometimes connate at the base, slightly penetrating; spores globose, purplish-brown, .00033′ in diameter.

Bark and mosses. Adirondack Mts. July.

The fragments of the base of the peridium sometimes remain just below the capillitium, surrounding the stem like a calyx or collar. The stem is even and generally longer than the peridium which it penetrates. After the spores have fallen the whitish color of the capillitium becomes apparent. It then resembles a small globose tuft of wool. The plants grew on the branches and mosses of a standing dead birch tree. *Didymium subroseum* is apparently the same species with a pinkish tinge to the peridium.

DIACHÆA SPLENDENS *n. sp.* (Plate II, figs. 1–4.)

Peridium steel-blue or violaceous, delicate, globose, subpersistent, rupturing irregularly; flocci delicate, colored; stem white, slightly penetrating; spores black in the mass, globose, rough, .0003′–.0004′ in diameter.

Fallen leaves and twigs. North Greenbush. October.

This is a very pretty and distinct species. The globose peridia and rough spores make it easily recognized. It is near *D. elegans* in color, but at once distinguished from it by its globose peridium.

TRICHIA FALLAX *Pers.*

Decaying wood. Oneida. *Warne.* Portville. September.

PERICHÆNA IRREGULARIS *B. & C.*

Bark of decaying sticks. "The Plains." October. *Clinton.*

CLATHROPTYCHIUM RUGULOSUM *Wallr.*

Trunks of poplars. Adirondack Mts. July.
The young plant has a bright flesh-color or orange hue.

NIDULARIA PULVINATA *Schw.*

Old fence boards lying on the ground. Greenbush. October.

LEPTOSTROMA LINEARE *n. sp.*

Perithecia flattened, thin, subangular, at first covered by the epidermis, striated, generally with a sharp elevation or ridge along the center, mostly seriately placed, black; spores slender, oblong, curved, colorless, .0003′–.0004′ long.

Dead stems of *Actæa spicata.* Helderberg Mts. May.

PHOMA STROBILINUM *Peck & Clinton n. sp.*

Perithecia minute, scattered, erumpent, black; spores elliptical or subovate, colorless, .0003′ long.

Cones of *Pinus Strobus.* Buffalo. December. *Clinton.*

PHOMA STERCORARIUM *P. & C.*

Perithecia membranaceous, minute, scattered, black; spores large, elliptical, .0005′–.0006′ long.

Goose dung. Portage. November. *Clinton.*
It is highly probable that this is a nonascigerous state of some dung Sphæria. As a Phoma it is remarkable for the large size of the spores.

SPHÆRONEMA ROBINIÆ *B. & C.*

Dead twigs of basswood, *Tilia Americana*, Buffalo. *Clinton.* Catskill Mts. June.

SPHÆRONEMA AURANTIACUM *n. sp.* (Plate II, figs. 9–11.)

Perithecia small, erumpent, hemispherical or subconical, sometimes with a slight papilliform ostiolum, orange; spores oblong-elliptical, colorless, .0003′–.0004′ long, oozing out and forming a whitish or pale cream-colored globule.

Dead bark of *Cornus alternifolia.* Bethlehem. May.
The species is remarkable for its orange-colored perithecia.

SPHÆROPSIS PENNSYLVANICA *B. & C.*

Dead branches of ash trees. Buffalo. February. *Clinton.*

SPHÆROPSIS MINIMA *B. & C.*

Living leaves of red maple, *Acer rubrum.* North Greenbush. June.

The perithecia are epiphyllous, the spores are obovate or subangular and are involved in mucus. The brownish spots frequently have a darker border.

SPHÆROPSIS SYRINGÆ *P. & C. n. sp.*

Perithecia small, scattered, erumpent, black; spores oblong or elliptical, colored, .0008′–.001′ long, .0004 broad.

Dead lilac twigs. Buffalo. January. *Clinton.*
Perhaps this is only a form of *Diplodia Syringæ* Awd.

DIPLODIA THUJINA *P. & C.*

Perithecia subhemispherical or elliptical, rugulose or substriate, black; spores oblong-elliptical, slightly constricted, colored, .0007′–.0009′ long.

Wood and bark of *Thuja occidentalis.* Buffalo. May. *Clinton.*
The form on bark has the perithecia erumpent and closely surrounded by the epidermis. In the other the perithecia are nearly free and often elliptical in shape.

ACROSPERMUM GRAMINUM *Lib.*

Dead stems of grass, *Calamagrostis Canadensis.* West Albany. June.

EXCIPULA LANUGINOSA *n. sp.* (Plate I, figs. 14–18.)

Perithecia small, yellowish or orange, numerous, almost concealed by the long, soft, wooly, dingy-white or pinkish-white hairs; spores oblong, colorless, .0003′–.00035′ long.

Dead stems of melilot. Bethlehem. September.
The species is remarkable for its long, pale, wooly hairs and its light-colored perithecia. These are sometimes so crowded together that they appear to form a continuous fleecy stratum. A relationship with the genus Trichoderma is indicated.

DISCELLA CANADENSIS *n. sp.*

Pustules very small, perithecia obsolete or wholly wanting; spores oozing out in a black mass or in tendrils, oblong or oblong-ovate, .0008′–.001′ long, at first pale, then colored, some of them becoming uniseptate.

Dead branches of *Amelanchier Canadensis.* Center. June.
The subequal hyaline sporophores sometimes remain attached to the young spores. The species approaches the genus Melanconium.

DISCELLA ARIDA *n. sp.*

Perithecia seated on rather large arid grayish spots, minute, flattened, pezizæform, black, at first covered by the epidermis, then forming a ring by the falling away of the center; spores oblong or lanceolate, simple, then uniseptate, colorless, .00035′–.0005′ long.

Living or languishing leaves of *Cassandra calyculata.* Adirondack Mts. August.

The plant might at first sight be taken for a minute black Peziza. The spots usually occur on the apical half or on the margin of the leaf, but sometimes the whole leaf is discolored.

MELANCONIUM INTERMEDIUM *n. sp.*

Spores very irregular, subglobose, ovate, elliptical or oblong, black, about .001′ long.

Dead hickory branches. Buffalo. *Clinton.* Greenbush.

This species is intermediate between *M. oblongum* and *M. magnum*, the spores being larger than in the former, smaller than in the latter.

TORULA CURVATA *n. sp.*

Flocci tufted, elongated, curved or flexuous, here and there slightly constricted, multiseptate, the cells mostly broader than long, the tufts forming an effused black patch.

Dead branches of *Myrica Gale.* Adirondack Mts. August.

SEPTONEMA DICHÆNOIDES *P. & C. n. sp.*

Tufts of flocci minute, clustered in small suborbicular or elliptical patches, black; flocci .0003′–.0004′ thick, at length breaking up into simple or one to two-septate oblong-elliptical spores.

Living alder bark. Olean. May. *Clinton.*

The patches resemble those of *Dichæna faginea.* The species appears to be intermediate between Septonema and Torula.

PUCCINIA ORBICULA *P. & C.*

Uredo form. Spots small, orbicular, yellowish, sometimes tinged with purple; sori circinating, tawny-ochraceous; spores subglobose, .0008′–.001′ in diameter.

Puccinia form. Sori blackish-brown, circinating, often arranged in a single circle on the margin of the spot; spores broadly elliptical, rough, .0013′–.0015′ long, .0008′–.001′ broad.

Petioles and under surface of leaves of Nabalus. Buffalo. *Clinton.* Also on Solidago leaves. Center. May.

The beautiful tawny-ochraceous color of the Uredo form and the circinating sori are noticeable features.

PUCCINIA HYDROPHYLLI *P. & C. n. sp.*

Spots yellow or greenish-yellow; sori small, clustered, sometimes confluent, blackish-brown; spores loose, elliptical, rough, slightly constricted, .001′ long, .0007′–.0008′ broad; pedicel very short, hyaline.

Lower surface of living leaves of *Hydrophyllum Virginianum.* Buffalo. May. *Clinton.*

Related to *P. Menthæ* from which the different habit and very short pedicel will separate it.

UREDO CASSANDRÆ *P. & C. n. sp.*

Spots small, irregular, yellowish or chestnut; sori generally crowded together in small clusters, somewhat angular or irregular, surrounded by the remains of the ruptured epidermis; spores yellow, elliptical ovate or subglobose, roughened, .0008′–.001′ long.

Lower surface of living leaves of *Cassandra calyculata.* Center and Sandlake. June. Machias. *Clinton.*

MELAMPSORA EPILOBII *Fckl.*

Leaves of *Epilobium angustifolium.* Newcomb, Essex county. August.

ÆCIDIUM SANICULÆ *Carm.*

Leaves of Sanicle. Buffalo. *Clinton.*

CLADOSPORIUM DEPRESSUM *B. & Br.* (Plate I, figs. 22–24.)

Living leaves of *Archangelica atropurpurea.* Buffalo. June. *Clinton.*

The spores bear some resemblance to Puccinia spores.

HELMINTHOSPORIUM ABSINTHII *n. sp.* (Plate II, figs. 28–30.)

Flocci forming effused dark-olivaceous or brown patches or minute tufts, simple, septate, colored, subflexuous, irregular or knotty above; spores oblong-clavate, very unequal in length, .001′–.004′ long, one to five-septate, paler than the flocci.

Living leaves of wormwood, *Artemisia Absinthium.* Adirondack, Essex county. August.

On the upper surface of the leaves the flocci form minute tufts, so small as to be easily overlooked. On the lower surface they are more abundant and form effused velvety patches which are quite conspicuous. The spores are extremely abundant, but they fall away so easily that it is difficult to find them in place.

MACROSPORIUM SARCINULA *Berk.*

Decaying squashes. Buffalo. December. *Clinton.*

CLADOSPORIUM NODULOSUM *Cd.*

Dead leaves of sedges. Albany. June.

RAMULARIA BRUNNEA *n. sp.*

Spots brown, unequal, suborbicular, sometimes confluent; flocci occupying the larger spots and giving them an ashy tint, epiphyllous, fasciculate, short, delicate; spores cylindrical, colorless, very unequal in length, .0005′–.0015′ long, .00016′ broad.

Living leaves of colts-foot, *Tussilago Farfara.*

The large fertile spots are intermingled with smaller irregular sterile darker-colored ones.

CERCOSPORA SYMPLOCARPI *Pk.* (Thumen's Myc. Univ. No. 669.)

Spots definite, brown, suborbicular; flocci very short, colored, tufted; spores very long, narrow, three to five-septate, paler than the flocci, .003′–.005′ long.

Living leaves of Skunk Cabbage, *Symplocarpus fœtidus.*

West Albany and Center. June and July.

CERCOSPORA LEPTOSPERMA *n. sp.*

Flocci tufted, short, hyaline, seated on pale-greenish angular spots; spores colorless, very slender, subfiliform, slightly thicker toward the base where there are usually one or two obscure septa, .003′ long.

Living leaves of sarsaparilla, *Aralia nudicaulis.* Albany.

CERCOSPORA AMPELOPSIDIS *n. sp.*

Spots suborbicular, reddish-brown with a darker margin; flocci hypophyllous, rather long, flexuous, colored, septate; spores slightly colored, subcylindrical, at first simple, then one to three-septate, .001′–.0013′ long.

Living leaves of woodbine, *Ampelopsis quinquefolia.* Bethlehem. July.

CERCOSPORA CHENOPODII *Fckl.*

Living leaves of *Chenopodium album.* West Albany. July.

PERONOSPORA ALTA *Fckl.*

Living leaves of plantain, *Plantago major.* Albany. July. This is sometimes regarded as a form of *P. effusa.*

PERONOSPORA INFESTANS *De By.*

Living leaves of potato vines. Adirondack. August.

This fungus, for a long time considered the cause of the potato disease, has, until recently, baffled all efforts to trace its life-history. But at last Mr. W. G. Smith, an earnest botanist, a most careful observer and skillful experimenter, has succeeded in tracing this history through the yearly cycle. He has found and kept alive through the winter, the hibernating or resting spores of the fungus and caused these to reproduce the pestilent potato fungus. His discovery is so important that I cannot do better than to quote his concluding remarks on the subject, a full account of which is given in the *Gardeners' Chronicle:*

"For more than thirty years our potato crops have been systematically destroyed by two virulent fungi, viz., Peronospora infestans and Fusisporium Solani; these two parasites almost invariably work in company with each other, they suddenly appear for a few weeks, destroy our crops and vanish for ten or twelve months then reappear and repeat the work of destruction. I claim for my work that it is new, and that it has proved how both these fungi hide and sleep through eleven months of the year. As I have kept the resting-spores of both parasites alive artificially in decayed potato leaves in water, in moist air, and in expressed diluted juice of horse dung, it conclusively proves to me that the resting-spores hibernate naturally in the same manner. The seat of danger from both parasites is clearly in dung heaps, ditch sides and decaying potato plants.

"Any method of destroying the resting-spores of these pests, or of warding off or mitigating their attacks, obviously depends in a great measure upon a full knowledge of their life-history. That life-history I have endeavored, to the best of my ability, to watch and describe for the *Gardeners' Chronicle*, and I am content to let the observations stand on their own merits. Sensibly conducted and extensive field experiments might probably teach some valuable lessons, but it is difficult, if not impossible, for any single individual, whether farmer or botanist, to institute and carry out such experiments."

VERTICILLIUM PULVEREUM *P. & C. n. sp.*

Effused, pulverent, dark or snuff-brown; flocci colored, the lower branches alternate, the upper opposite or verticillate, ultimate branchlets short, cylindrical, obtuse; spores abundant, broadly elliptical or subglobose, colored, .00025′–.0003′ long, .0002′–.00025′ broad.

Decaying wood. Alden. November. *Clinton.*
It forms thin dusty patches on the surface of the wood.

POLYACTIS CANA *Berk.*
Decaying cabbage leaves. Buffalo. March. *Clinton.*

TRICHODERMA VIRIDE *Pers.*
Decaying wood. Alden. November. *Clinton.*

DACTYLIUM SUBLUTESCENS *n. sp.*
Tufts pulvinate, sometimes confluent, pinkish-yellow or cream-colored; flocci erect, simple or sparingly and obscurely septate; spores apical, oblong or obovate, uniseptate, .0008′–.0014′ long, sometimes with a blunt point at the base.

Dead branches of alder and poplar trees. Albany and North Greenbush. September.
The species is apparently related to *D. obovatum* Berk. At first sight the tufts appear to be erumpent, but upon closer inspection they are seen to grow upon some effete erumpent Sphæria. In some instances white tufts of more slender branched flocci were associated with the others. Perhaps these are sterile flocci of the same plant.

OIDIUM FASCICULATUM *Berk.*
Decaying oranges and lemons. Buffalo. December. *Clinton.* Albany. July.

OIDIUM ALBIPES *n. sp.*
Flocci forming short white stems supporting subglobose heads of a grayish-brown color, sometimes tinged with green; spores oblong-ovate or lanceolate, pale, .00033′ long, with a slight apiculus at the smaller end.

Decaying wood. Bethlehem. June.

CAPILLARIA SPHÆRIÆ–TYPHINÆ *Cd.*
Parasitic on *Epichloe typhina.* Greenbush. July.

MENISPORA CILIATA *Cd.*
Our specimens do not agree well with the description of this species. The flocci are not "olive-brown" and the spores are cylindrical rather than "fusiform," but as they exhibit the bristle at the extremities of the spores, and agree essentially

with European specimens distributed under this name, it seems best thus to refer them.

ZYGODESMUS PANNOSUS *B. & C.*

Decaying wood lying on the ground. North Greenbush. October.

ZYGODESMUS RUBIGINOSUS *n. sp.*

Effused, indeterminate, bright-rubiginous, not granulated, the patches paler toward the margin; spores globose, rough, .0003′ in diameter.

Decaying wood. Greenbush. October.

This resembles *Z. hydnoideus* B. & C. in color, but the absence of a granulated surface and the smaller spores will separate it.

FUSISPORIUM RIMOSUM *n. sp.*

Effused, bright orange or red, at length cracking and revealing through the chinks the white substratum; flocci slender, simple or sparingly branched; spores long, acute at each end, one to three-septate, .0008′–.0018′ long.

Cut ends of corn stalks. Center. October.

The bright color is retained in the dried specimens. In this respect and in the firmer substance and rimose character it differs from its allies.

ERYSIPHE LIRIODENDRI *Schw.*

Leaves of the tulip tree, *Liriodendron Tulipifera.* Oneida. September. *Warne.*

MORCHELLA BISPORA *Sor.*

Ground among fallen leaves in ravines. Oneida. *Warne.*

The remarkable feature about this species is that there are but two spores in an ascus.

MORCHELLA SEMILIBERA *DC.*

Ground. Oneida. May. *Warne.*

MORCHELLA DELICIOSA *Fr.*

Ground in open fields. Oneida. *Warne.* West Albany. May and June.

This species has a firmer substance, paler color, smoother stem and smaller spores than *M. esculenta.* It is also generally smaller in size and has a more cylindrical pileus, which is sometimes curved.

VERPA DIGITALIFORMIS *Pers.*

Ground. Oneida. May. *Warne.*

PEZIZA SULCATA *Pers.*

Ground. Oneida. *Warne.*

The spores in the specimens are smooth and uninucleate but this may be due to the immaturity of the specimens.

PEZIZA (COCHLEATÆ) WARNEI *n. sp.* (Plate I, figs. 19–21.)

Cups large, 1′–1.5′ broad, at length expanded with the margin often wavy or irregular, externally whitish or pallid, usually lacunose at the narrowed stem-like base; disk brown or ochraceous-brown; asci cylindrical; spores uniseriate, oblong-elliptical, with a short acute point at each end and slightly rough when mature, .001′–.0014′ long, mostly trinucleate, the central nucleus largest.

Hemlock stumps. Oneida. *Warne.* Helderberg Mts. May.

This seems to approach *P. semitosta* B. & C., in some respects, but it differs in its external characters, habitat and spores. Dedicated to *Mr. H. A. Warne.*

PEZIZA BICOLOR *Bull.*

Dead branches of *Myrica Gale.* Adirondack Mts. August.

PEZIZA (DASYSCYPHÆ) MYRICACEA *n. sp.*

Cups small, .02′–.03′ broad when dry, sessile or with a very short stem, tawny-brown or subcervine, densely hairy, expanded when moist and revealing the whitish disk; asci subcylindrical, about .0016′ long; paraphyses as broad as the asci and much longer, tapering above to a sharp point; spores minute, spermatoid.

Dead stems and branches of *Myrica Gale.* Adirondack Mts. August.

The species is related to *P. brunneola* Desm., but is larger and has different hairs. These are very long, not septate nor thickened at the tips. They appear minutely rough under the microscope. When dry, they, with the incurved margin, wholly conceal the disk from view. The spores in our specimens do not seem to be well developed.

PEZIZA (DASYSCYPHÆ) SULPHURELLA *n. sp.*

Pale yellow throughout; cups minute, numerous, stipitate, closed when dry, hairy, the hairs septate, rough, capitate;

asci cylindrical; spores oblong or cylindrical, .0003′ long; paraphyses longer than the asci, tapering above to a point.

Dead stems of *Myrica Gale*. Adirondack Mts. August.

This differs from *P. brunneola* in color and in having a hairy stem. The plant is much smaller than *P. myricacea*.

PEZIZA (DASYSCYPHÆ) CAPITATA *Pk.* (Thumen's Myc. Univ. No. 813.)

Cups minute, sessile, subglobose and usually closed when dry, open when moist, white, clothed with septate capitate white hairs, hymenium whitish inclining to yellow; asci cylindrical, .0012′ long; spores straight, acicular, .0002′-.0003′ long; paraphyses longer than the asci, pointed at the extremities.

Fallen oak leaves. Bethlehem. June.

The specific name has reference to the capitate hairs. These spring directly from the cellular substance of the cup. The base of the hairs is enlarged and distinctly septate. The sessile cups and white color separate this from the next preceding species.

PEZIZA (DASYSCYPHÆ) DISTINCTA *n. sp.* (Plate 1, figs. 9-13.)

Cups small, .03′-.05′ broad, sessile or attached by a mere point, externally blackish, the margin tomentose-hairy, pale-tawny, or olivaceous, the disk pinkish-red when moist, orange when dry; asci clavate, often containing but four spores; spores oblong-fusiform, straight or curved, .0008′-.001′ long.

Dead stems of *Andropogon furcatus*. Center. October.

When dry the margin is inflexed and the cups are then often hysteriiform, the tomentose hairs of the margin concealing the disk and giving the chink an olivaceous or tawny hue.

PEZIZA MACULINCOLA *Schw.*

Decorticated wood. Buffalo. March. *Clinton.*

This is regarded by some as synonymous with *P. flammea* A. & S. *Mr. W. C. Stevenson, Jr.*, to whom I am indebted for many acts of kindness in comparing specimens with the types in Schweinitz's Herbarium, considers the two, as therein represented, to be distinct.

PEZIZA VULPINA *Ck.*

Decaying wood. Buffalo. *Clinton.*

PEZIZA (DASYSCYPHÆ) CHAMÆLEONTINA *n. sp.*

Cups minute, .006′-.015′ broad, at first globose, then expanded with the disk nearly plane, scarcely furfuraceous, white, changing to yellow when bruised, then to pinkish or red, stem short; asci clavate, .001′–.0014′ long; spores crowded, oblong-ovate or subclavate, .0002′ long.

Under surface of hemlock wood lying on the ground. Sandlake. November.

The changes in color, when bruised, is an interesting character. The species is related to *P. hyalina* and perhaps more closely to *P. aspidiicola*, and is therefore placed among the Dasyscyphæ, although there is scarcely any appearance of hairiness on the cups.

PEZIZA (HUMARIA) DELIGATA *n. sp.*

Cups minute, gregarious, sessile, with radiating hyaline fibrils at the base, at first subglobose, then open with the disk nearly plane, brick-red; asci broad, oblong or subcylindrical; spores biseriate, elliptical, smooth, .0006′–.00075′ long.

Dead stems of herbs lying on the ground. Bethlehem. September.

The cups sometimes have a thick tumid margin. In some respects the species resembles *P. hæmastigma.* It appears to belong to the subgenus Humaria, but the habitat is unusual.

PEZIZA POLYGONI *Rehm.*

Dead stems of Polygonum. Albany. July.

PEZIZA MACROSPORA *Fckl.*

Decaying wood. Buffalo. November. *Clinton.*

HELOTIUM CARICINELLUM *n. sp.* (Plate 1, figs. 5–8.)

Small, .02′–.03′ broad, scattered, sessile, reddish or ochraceous-brown when moist, black or blackish when dry, the disk plane or slightly concave; asci clavate; spores crowded, oblong, obtuse, uniseptate, colorless, .0008′–.001′ long.

Dead leaves of *Carex utriculata.* Adirondack. August.

This is a true Helotium as is shown by the cups being open from the first, and yet it is apparently related to *Peziza lacustris.*

HELOTIUM BRYOGENUM *n. sp.*

Cups minute, substipitate, scattered, pallid or yellowish-white and expanded when moist, livid-red or subviolaceous and concave with a tumid margin when dry; spores subfusiform, sometimes curved, .0006′–.0007′ long.

Mosses, *Hypnum delicatulum.* Maryland. September.

DERMATEA CARPINEA *Fr.*

Dead branches of Carpinus. Buffalo. *Clinton.* Albany. October.

DERMATEA INCLUSA *n. sp.*

Minute, scattered, erumpent, sessile, closely surrounded by the ruptured epidermis, margined, the margin mealy or furfuraceous, the disk plane or concave, subochraceous; asci broad, oblong-cylindrical; spores large, biseriate or crowded, oblong-elliptical, sometimes slightly curved, simple, colorless, .0011′–.0014′ long.

Dead trunks of willows. Maryland. September.

The cups scarcely rise above the ruptured epidermis that invests them. When moistened or crushed on the slide of the microscope the substance appears to be of a rhubarb color. The species therefore has some little relationship to *Patellaria rhabarbarina.* The spores sometimes contain a single large nucleus, sometimes three or four small ones and sometimes a mass of granular endochrome.

PATELLARIA LEPTOSPERMA *n. sp.*

Black, stipitate; receptacle plane, the margin narrow or obliterated, about one line broad, externally subscabrous; stem about one line high, scabrous, often longitudinally wrinkled when dry; asci cylindrical or clavate; spores biseriate, slender, elongated, cylindrical, multinucleate or obscurely multiseptate, .0016′–.003′ long; paraphyses very slender, filiform, capitate.

Dead bark of maple, *Acer saccharinum.* Oneida. *Warne.* Buffalo. *Clinton.*

The number of the nuclei is from ten to sixteen.

PATELLARIA LIGNYOTA *Fr.*

Decaying wood. Angola. May. *Clinton.*

TYMPANIS TURBINATA *Schw.*

Dead stems of bush honeysuckle, *Diervilla trifida.* Center. May.

ASCOBOLUS VIRIDIS *Curr.*

Alluvial soil. Albany. June.

ASCOBOLUS CRENULATUS *Karst.*

Cow dung. Oneida. *Warne.* Helderberg Mts. May.

STICTIS (PROPOLIS) CYLINDRICARPA *n. sp.*

Immersed, minute, erumpent, closely surrounded by the ruptured epidermis, the whitish margin toothed or laciniated, the disk plane, greenish-olivaceous; spores crowded, cylindrical, straight or curved, obtuse, colorless, .0007′–.0008′ long, .00015′ broad, sometimes obscurely two to three septate.

Dead bark of willows. Maryland. September.

This occurred in company with *Dermatea inclusa*. Its relationship is with *Stictis versicolor*, of which it may yet prove to be a minute variety.

HYSTERIUM AUSTRALE *Duby*.

Dead grape-vines. Poughkeepsie. *W. R. Gerard*.

HYSTERIUM TRUNCATULUM *C. & P.*

Decaying wood. Buffalo. *Clinton*.

The spores are of the same character as those of *Hysterium pulicare*, differing only in their larger size.

HYSTERIUM ELLIPTICUM *DC.*

Hickory bark. Poughkeepsie. *Gerard*.

HYSTERIUM THUIARUM *C. & P.*

Bark of *Thuja occidentalis*. New Baltimore. *E. C. Howe, M. D.*

HYSTERIUM (GLONIUM) PARVULUM *Ger.*

Decaying wood. Poughkeepsie. *Gerard*.

HYSTERIUM (GLONIUM) SIMULANS *Ger.*

Decaying wood. Poughkeepsie. *Gerard*. North Greenbush.

HYPODERMA DESMAZIERII *Duby*.

Fallen pine leaves. Poughkeepsie. *Gerard*. Sandlake. July.

HYPOMYCES OCHRACEUS *Tul.*

Decaying Polyporus. Helderberg Mts. May.

HYPOXYLON SUBORBICULARE *n. sp.*

Stroma thin, flattened, erumpent, suborbicular, surrounded by the ruptured epidermis, growing from the inner bark, purplish-brown, then black, the surface slightly uneven as if areolate-rimose; perithecia monostichous, subglobose; ostiola sunken, perforate, sometimes whitish ; spores unequally elliptical, colored, .0004′-.0005′ long.

Maple bark, *Acer saccharinum*. Sandlake. November.

This species is apparently allied to *H. Laschii* Nke., and approaches in some respects species of Nummularia.

DOTHIDEA RIMINCOLA *Schw.*

Dead twigs of *Diervilla trifida*. Buffalo. *Clinton*.

I fail to see why Schweinitz referred this fungus to the genus Hysterium since there is no chink or linear opening in any of the specimens that have come under my inspection.

DOTHIDEA EPISPHÆRIA *n. sp.*

Stroma small, slightly prominent, scattered or subconfluent, often irregular, carbonaceous, black ; nuclei numerous, white within ; spores crowded or biseriate, lanceolate or subfusiform, colorless, .0006′-.0007′ long.

Effete *Diatrype stigma*. Maryland. September.

The spores may possibly be uniseptate when fully mature. Those examined are not clearly septate.

DOTHIDEA CARICIS *Fr.*

Dead leaves of *Carex Pennsylvanica*. West Albany. June.

DOTHIDEA OSMUNDÆ *P. & C. n. sp.*

Minute, linear, innate, erumpent through a narrow chink, scarcely emergent, black, nuclei whitish ; asci subcylindrical ; spores narrow, oblong, uniseptate, slightly constricted, colorless, .00065′ long, one cell usually a little swollen at the septum.

Dead stems of Osmunda. Buffalo. *Clinton*. Sandlake. June.

Authors do not all agree in the characters they ascribe to the spores of *Dothidea filicina*, one describing them as "elliptical uniseptate," another as "triseptate." Neither of these descriptions will apply to the spores of the species just characterized. The Dothidea which I find on *Pteris aquilina*, the habitat assigned to *D. filicina*, has the spores triseptate.

DIATRYPE FERRUGINEA *Fr.*

Dead branches of birch, *Betula lutea*. Sandlake. August.

VALSA JUGLANDICOLA *Schw.*

Dead hickory branches. Buffalo. December. *Clinton*. West Troy. June.

VALSA (OBVALLATA) INNUMERABILIS *n. sp.*

Pustules small, very numerous, generally crowded and seriately placed; perithecia four to ten, nestling in the inner bark; ostiola short, crowded, quadrisulcate, black; spores crowded, cylindrical, curved, obtuse, slightly colored, .0004′ long.

Dead elm branches. Greenbush. May.

On the smaller twigs the pustules are more scattered and not arranged in lines.

CUCURBITARIA BERBERIDIS *Gr.*

Dead stems of barberry, *Berberis vulgaris*. Buffalo. December. *Clinton.*

LOPHIOSTOMA OBTECTUM *n. sp.*

Perithecia numerous, immersed, slightly elevated, covered by the epidermis which is pierced by the narrow compressed ostiola; asci cylindrical or clavate; spores variable, crowded or biseriate, rarely uniseriate, at first pale, subacute and one to three-septate, then obtuse, oblong or subfusiform, five or six-septate, colored, .001′-.0014′ long, usually constricted at the septa and occasionally with longitudinal septa.

Dead branches of prickly ash, *Xanthoxylum Americanum*. Bethlehem. July.

Apparently allied to *L. bicuspidata* Ck., but I can detect no hyaline beaks at the extremities of the young spores.

SPHÆRIA (VILLOSÆ) CLINTONII *n. sp.* (Plate II, figs. 19-23.)

Perithecia very small, .005′-.006′ broad, subglobose, gregarious, black, clothed with erect, black, bristly hairs; spores fusiform, multinucleate, then five to seven-septate, colorless, .0016′-.0018′ long.

Decaying wood. Alden. November. *Clinton.*

Related to *S. scopula* C. & P., from which it differs in its smaller perithecia, and broader spores with fewer septa.

SPHÆRIA XESTOTHELE *B. & C.*

Birch bark. Oneida. *Warne.*

SPHÆRIA (DENUDATÆ) EXIGUA *C. & P.*

Perithecia subgregarious, small, .013′ broad, globose, sometimes collapsed, smooth, shining, black, papillate; asci clavate or cylindrical; spores elliptical, binucleate, then one to three-septate, hyaline, .0006′-.0007′ long, .0003′ broad.

Decaying wood. Richfield Springs. July. *Clinton.*

SPHÆRIA CLASTERIUM *B. & C.*

Bark of *Spiræa opulifolia.* West Albany. October.

The spores in our specimens as well as in those received from Dr. Curtis are colored, .0005′–.0006′ long, with a long colorless appendage at each end.

A non-ascigerous state occurred in May in the same locality. The perithecia and spores were the same, but I could detect no asci.

SPHÆRIA (OBTECTÆ) SPHÆRELLULA *n. sp.*

Perithecia minute, scattered or seriately placed, covered by the epidermis which is at length ruptured ; asci broad, obtuse, gradually narrowed above, suddenly contracted at the base; spores crowded, fusiform, uniseptate, hyaline, .0005′–.0006′ long.

Dead bleached twigs of striped maple, *Acer Pennsylvanicum.* Catskill Mts. June.

The asci imitate in form those of some species of Sphærella.

SPHÆRIA (CAULICOLÆ) EXERCITALIS *n. sp.*

Perithecia minute, crowded, arranged in long lines, at first covered by the epidermis which at length is ruptured in long chinks ; ostiola prominent, subcylindrical, blunt or subacute; asci-subcylindrical ; spores oblong or subfusiform, quadrinucleate, colorless, .0005′ long.

Dead stems of herbs. Catskill Mts. June.

The species is remarkable for the long lines of perithecia and the prominent ostiola which are suggestive of lines of armed men.

SPHÆRIA (CAULICOLÆ) VIRIDELLA *n. sp.*

Perithecia small, gregarious, seated on a greenish spot, covered by the epidermis which is ruptured by the minute ostiola ; asci cylindrical ; spores oblong-fusiform, sometimes curved, triseptate, greenish, .001′ long, the third cell from the base swollen.

Dead stems of melilot. Bethlehem. September.

The marked feature of the species is the greenish color of the spot and of the spores. The latter resemble those of *S. subconica* C. & P., except in color.

SPHÆRIA (CAULICOLÆ) SCAPOPHILA *n. sp.* (Plate II, figs. 24–27.)

Perithecia minute, subglobose, scattered, covered by the epidermis which is ruptured by the minute perforated ostiola ;

asci cylindrical; spores crowded or biseriate, subcylindrical, yellowish, .001′–.0012′ long, seven-septate, one apical and three basal cells longer than the others.

Dead scapes of the pitcher plant, *Sarracenia purpurea.* Adirondack Mts. August.

SPHÆRIA (CAULICOLÆ) ONOSMODINA *P. & C. n. sp.*

Perithecia numerous, minute, at first covered by the epidermis, then exposed, depressed, black; ostiola pierced; asci cylindrical; spores crowded or biseriate, oblong-elliptical, uniseptate, colorless, .0006′–.0007′ long, the cells usually unequal.

Dead stems of *Onosmodium Carolinianum.* Buffalo. June. *Clinton.*

SPHÆRIA HERBARUM *Pers.*

Dead stems of *Scirpus validus.* Buffalo. June. *Clinton.*

SPHÆRELLA VACCINII *Ck.*

Fallen leaves of *Vaccinium corymbosum.* Center. May.

SPHÆRELLA IMPATIENTIS *P. & C. n. sp.*

Perithecia abundant, minute, black; asci subcylindrical; spores crowded, oblong or lanceolate, uniseptate, usually quadrinucleate, .0005′ long.

Living or languishing leaves of touch-me-not, *Impatiens fulva.* Buffalo. *Clinton.* Adirondack Mts. June to August.

PYRENOPHORA PHÆOCOMES *Fr.*

Dead grass. Sandlake. June.

(5.)

REMARKS AND OBSERVATIONS.

VIOLA SELKIRKII *Pursh.*

Oneida. According to Mr. Warne's observations the flowering period of this plant continues considerably longer than the time indicated in Paine's Catalogue.

DROSERA LONGIFOLIA *L.*

A dwarf form, bearing but a single terminal flower, occurs at Calamity Pond, Adirondack Mts.

RHUS COPALLINA *L.*

Green Island and Center.

RHUS VENENATA *DC.*

Not uncommon in swampy places about Albany. It is generally supposed that the poisonous properties of this plant are to be dreaded only while the tree is living, but several cases have been reported to me in which persons were severely poisoned from using the wood as fuel.

UTRICULARIA RESUPINATA *Green.*

Shallow water along the shores of Lake Jimmy and Lake Sallie, Adirondack Mts. August.

ATRIPLEX PATULA *L.*

This is evidently spreading and becoming quite common about Albany.

PINUS RESINOSA *Ait.*

Portage. *Clinton.* A beautiful grove of young trees of this species occurs at Long Lake, Hamilton county. I have seen it at Center, in Sandlake, on the Catskill and the Helderberg mountains and in several places in the northern counties where it is by no means rare. The cones, so far as I have observed, are not always deciduous after the falling of the seed, nor are they terminal except when quite young, the prolongation of the branch soon rendering them lateral. Frequently two and sometimes three generations of fully developed cones may be seen on a branch at one time. The species may be separated from *Pinus mitis* by the absence of prickles on the cone scales and by the longer leaves which occur only in pairs.

PINUS BANKSIANA *Lambert.*

Having compared southern specimens of *Pinus inops* Ait. with the New York specimens formerly reported as *P. inops*, I am satisfied that the latter should be referred to *P. Banksiana*, notwithstanding the presence of prickles on the cones. In these specimens the cones are one to one inch and a half in length, and the prickles are very short, weak and obscure, and on some of the scales are wanting. In the southern specimens the cones are two inches in length and the prickles are stout and very distinct on all the scales. The leaves in both are of the same length, but less dense in the southern specimens.

It is possible that *P. inops* and also *P. mitis*, which Dr. Torrey reported, on the authority of Michaux, as occurring near Albany, may occur in the southern part of the State or on Long Island. At present we can claim positively only the four species, *P. Strobus*, *P. rigida*, *P. resinosa* and *P. Banksiana*. The last one is not known to me to occur anywhere in the State except in Essex county where it was first detected by *Dr. G. T. Stevens*.

The four New York species may be tabulated in such a way as to be easily identified by any one possessing a branch bearing either leaves or cones ; thus,

LEAVES.

Five leaves in a cluster......	White Pine,	Pinus Strobus *L.*
Three leaves in a cluster.....	Pitch Pine..	Pinus rigida *Mill.*
Two leaves in a cluster, 3-6 inches long...............	Red Pine...	Pinus resinosa *Ait.*
Two leaves in a cluster, 1-2 inches long...............	Scrub Pine..	Pinus Banksiana *Lamb.*

CONES.

Cones cylindrical, scales unarmed ...	Pinus Strobus *L.*
Cones ovate-conical, scales tipped with a stout prickle.....................	Pinus rigida *Mill.*
Cones ovate-conical, scales unarmed..	Pinus resinosa *Ait.*
Cones oblong-conical, usually curved, prickles none or weak.............	Pinus Banksiana *Lamb.*

SPARGANIUM MINIMUM *Bauhin.*

This rare species occurs in a pond near Newcomb, Essex county.

POTAMOGETON NATANS *L.* VAR. PROLIXUS *Koch.*

Lake Sanford, Essex county, with the normal form. The stem is much prolonged beyond the insertion of the peduncle which thus becomes lateral.

SMILAX HISPIDA *Muhl.*

In a large swamp south of Catskill. No fertile plants were found.

ELEOCHARIS ROBBINSII *Oakes.*

Lake Harris and Lake Jimmy, Essex county. At the latter lake it is associated with *Utricularia resupinate* and *Myriophyllum tenellum.* I have recently received these three species from Long Island.

SCIRPUS SUBTERMINALIS *Torr.*

Lake Harris and Lake Jimmy. The former lake affords a variety of water plants, including *Brasenia peltata*, *Nymphæa odorata*, *Nuphar advena*, *N. Kalmiana*, *Potamogeton natans*, *P. Claytonii*, *P. perfoliatus* and *P. pectinatus.*

SCIRPUS PAUCIFLORUS *Light.*

Newcomb. July.

ERIOPHORUM GRACILE *Koch.*

Mud Pond near Long Lake. July.

AGARICUS DETERSIBILIS *Pk.*

I find that this name is preoccupied and must therefore be changed. I would substitute for it *Agaricus erinaceëllus* Pk.

AGARICUS JOHNSONIANUS *Pk.*

This species occurred the past season in the original locality. I had not seen it till then since its discovery in 1869.

AGARICUS (CREPIDOTUS) VERSUTUS *n. sp.*

Pileus at first resupinate, then reflexed, sessile, thin, pure white, covered by a soft downy villosity, the margin incurved; lamellæ rather broad and subdistant, terminating in an eccentric point, rounded behind, pale, then ferruginous; stem none; spores ferruginous-brown, subelliptical, .0004′ long.

Plant gregarious, 4″–10″ broad.

Much decayed half-buried wood, vegetable mold and even rocks.

This plant was reported under the name *A. chimonophilus* B. & Br., but it is evidently a distinct species. It loves very damp shaded places, frequently growing in cavities and on half buried wood, as if avoiding the light. The villosity is of a peculiar soft and delicate character and is easily destroyed by handling the specimens.

CORTINARIUS COMMUNIS *Pk.*

The spores of this plant have a dull brownish tinge, unlike those of true Cortinarii and much like those of some species of Pholiota. I have also found it growing from buried pine chips, another point of affinity with Pholiota. Still, the absence of an annulus and the arachnoid character of the veil seem to forbid its reference to this subgenus.

PANUS DORSALIS *Bosc.*

The form that occurs here does not well agree with the description of the species. It has no stem and is of a buff or pale-yellow color. The cuticle does not break up into "floccose scales," but the pileus is strigose-hairy, especially toward the margin. The spores are of a beautiful fleshy-pink color like the lamellæ of young *Agaricus campestris*. It grows on beech and birch. I have not found it on pine. If the type is accurately described, our plant ought at least to be considered a distinct variety.

PANUS OPERCULATUS *B. & C.*

It is not rare on alder trunks and branches, but the veil or operculum is generally very fugacious, so that it is rarely seen except in very young plants.

LENZITES SEPIARIA VAR. POROSA.

This remarkable variety was detected at Long Lake, in Hamilton county. The whole hymenium is porous so that the plant might easily be taken for a species of Polyporus. All the specimens found on a single pine trunk were of this character.

LENZITES COOKEI *Berk.*

The opinion has somewhere been expressed that *Dædalea confragosa* and *Trametes rubescens* are one species. I am disposed not only to adopt this opinion, but also to add to these synonyms *Lenzites Cookei*, *L. Cratægi*, *L. proxima* and possibly *L. Klotzschii*. Excepting the last one, of which I have seen no diagnosis, the descriptions of these so-called species are all applicable to a single fungus common with us. Neither description covers all the forms of the fungus, each is applicable to one or another of its forms. Indeed, so wonderfully variable and comprehensive is this *L. Cookei*, of which scarcely more than a two-line description was given, that not only does it exhibit all the essential characters of the five species named, but its hymenium, utterly regardless of the generic limitations of the books, assumes the hymenial characters of four genera even, viz.: Lenzites, Dædalea, Trametes and Polyporus. A species so comprehensive in its characters certainly deserves a more extended notice than any yet given to it.

It generally grows singly and stemless, but in rare instances I have seen it clustered and with a stem-like base. When growing upon large trunks, the pileus is nearly semiorbicular ;

but when growing upon small trunks or branches, which seem to be a favorite habitat, and which it partly surrounds or clasps by its base, it becomes somewhat reniform. Sometimes it is quite orbicular, in which case it usually occurs on the under side of a branch to which it is attached by its vertex, or on the upper side to which it is attached by an eccentric or the central point of the hymenium. It is normally and repeatedly zonate and more or less sulcate, with the zones usually quite narrow and not differing very much in color from the general hue of the pileus. Slight radiating rugæ or elevations are generally present, and these, in passing over the furrows, sometimes render the surface rough or scabrous. This roughness is occasionally increased to such an extent that the surface becomes very uneven, especially toward the base. Not very rarely a kind of tough appressed and at length hardened and glabrated tomentum overspreads a part or the whole of the pileus and thus conceals to a greater or less extent the zones and radiations. This coating can sometimes be separated from the pileus in scales or flakes like a kind of crust. It is most often limited to the basal or central portions of the pileus. Its unequal distribution gives a rough and unnatural appearance to the plant. In some specimens the pileus is dull and opaque, in others it is smooth and shining. In size it occurs from half an inch to three and a half inches in diameter. The substance is usually rather thin, sometimes much thinner than the hymenium. The upper surface is plane or slightly convex, though specimens are not wanting in which the pileus is much thickened behind so that it approaches an ungulate form. I have seen it in different individuals both umbonate and depressed at the base, but these are rare and exceptional forms. In color there is considerable diversity, some specimens being whitish, or gray, others having a dark reddish-brown or chestnut color. Between these extremes there is a great variety of intermediate hues, but a kind of pallid wood-color, more or less tinged with rufous or cervine hues, prevails. The thin margin is usually concolorous, but sometimes in pale specimens it is more highly colored than the rest. Occasionally the whole plant assumes a ruddy hue in drying. The substance has a color similar to that of the surface of the pileus, but in dark specimens it is a little paler.

The hymenium varies if possible more than the hymenophore. There are four typical forms which for convenience may be called *lenzitoid*, *dædaleoid*, *trametoid* and *polyporoid*. In the first the dissepiments are lamellæ, here and there forked or dichotomously branched and sometimes slightly anastomosing, especially at the base. Such specimens would be referred to *Lenzites*. In the second the pores are unequal, some of them elongated and flexuous or labyrinthiform. Such specimens belong to *Dædalea*. In the third, rotund and straight elongated pores are intermingled and generally arranged in a radiating manner. These belong to *Trametes*. In the fourth the pores are equal, or nearly so, and rotund or subrotund. So far as the external characters are concerned, these would be referred to the genus *Polyporus*. Specimens representing all these forms are before me as I write, and yet I can only believe that they are all forms of one species. For besides these marked types all kinds of intermediate connecting links occur among the scores of specimens that I have collected from various localities. What shall we say of the generic distinctions that are thus swept away by a single species? In which genus shall we place our protean plant? But its characters are not yet fully recorded. In the fresh growing state the dissepiments are thick obtuse and covered with a whitish pruinosity which gives the hymenium a whitish or cinereous appearance, but with advancing age this pruinosity disappears, the dissepiments become thinner and the color becomes darker, sometimes even darker than the surface of the pileus. They at last become toothed or lacerated and lamellated, so that what at first was *trametoid* often in old age becomes *lenzitoid*. If a horizontal section of such a lenzitoid hymenium be made it will be found that near the hymenophore the hymenium is still trametoid, and that there the dissepiments are still thick and firm and the pores distinct. The surface of the hymenium varies from slightly concave to very convex. Most often it is nearly plane or somewhat sloping or deepened toward the base. Not infrequently it is slightly decurrent at the base.

I have found the plant growing on oak, willow, birches and alders. It matures in autumn.

Such are the prominent characters of this remarkable fungus, which probably includes at least five so-called species. Three of these are described as being, sometimes at least, radiate-rugulose or radiate-striate, and always zonate. Another is described as scabrous and subzonate. These characters are present in our plant. So also are the various modifications of the hymenium which determine the three genera to which these five supposed species have been referred. The texture ascribed to them all is essentially the same and the special features of each are exhibited in one or another of the various forms of our plant. I would therefore group the following as forms of one species so far as can be ascertained from the published descriptions:

Dædalea confragosa Pers. which is represented by forms of our plant having a scabrous somewhat zoned pileus of a reddish-brown color and a dædaleoid hymenium.

Our specimens exhibit these characters combined, except the color which is paler.

Trametes rubescens A. & S. which is represented by forms that assume the ruddy color and have the trametoid hymenium.

We have such specimens.

Lenzites Cratœgi Berk. which is represented by forms having a shining pileus attached by the vertex and having a trameto-lenzitoid hymenium.

Our specimens illustrate this also with the bare exception that the pileus is not shining.

Lenzites Cookei Berk. which is represented by forms with the pileus of a cervine hue and with a trameto-lenzitoid hymenium. Our specimens of course accord with this since we have those from which the types were taken.

Lenzites proxima Berk. should also be added to this list of supposed synonyms. I have a single specimen which accords very well with the description of that plant, but it is really only a form of the same protean fungus with the thin flattened pileus completely overspread by the peculiar tomentum previously described.

Also the form with the polyporoid hymenium agrees remarkably well with a specimen received from Dr. Curtis and labeled by him "*Lenzites Klotzschii* Berk." Of this species I have seen no description.

The form with the purely lenzitoid hymenium coincides to a great extent with the description of *Lenzites tricolor* Fr., but the pileus is not "gibbous at the base" nor "scabrous-tomentose," neither does it agree in color, so that the two are perhaps distinct, though my Curtisian specimens of L. tricolor are clearly a form of this protean fungus.

Another remarkable form which corresponds to no description that I have seen has the pileus plane or depressed above with the hymenium very decurrent and wholly porous. The pileus is sometimes so much reduced that the whole plant appears like a pulvinate mass of pores. The pores are much smaller in this than in any other form that I have seen. The whole plant has a singular deformed appearance utterly unlike any of the other forms, and yet no one familiar with the various aspects of the species would think of separating this from the others.

That my views of the synonymy of the various forms of this plant will prove to be well founded I have no doubt, and that they will in that case render necessary the application of some single name to the species and a recasting or modification of the present characters of the genera Lenzites, Dædalea and Trametes is evident. Doubtless the oldest specific name "*confragosa*" should be retained, no matter in what genus the plant may ultimately be placed, although some such name as "*variabilis*" might be more appropriate and expressive. The other specific names might be retained to designate their respective forms as varieties. Thus the form known as *Trametes rubescens* would become *Dædalea confragosa* var. *rubescens*.

BOLETUS CLINTONIANUS *Pk.*

This rare species, heretofore found in one locality only, was detected the past season at Center, near Albany, where it was growing in company with *Boletus ampliporus*. The recurrence of fungi after long intervals and especially in widely separated localities is an interesting and remarkable feature in these singular plants.

POLYPORUS NIGROPURPURASCENS *Schw.*

A resupinate form was found on elm in Bethlehem. In some of these specimens the hymenium was much paler than is usual in this species. The pores are seated on a thin but tough elastic membrane which is separable from the substance of the pileus.

STEREUM BALSAMEUM *Pk.*

The hymenium in this becomes red or blood-stained where wounded as in *S. sanguinolentum.* Its general color is darker than in that species.

STEREUM PURPUREUM *Fr.*

I find this a very variable plant. One form has the hymenium very pale with only a slight purplish tint. Another has the pileus zoneless and when moist it is darker than when dry.

CORYNEUM CLAVÆSPORUM *Pk.*

This proves to be the same as *Exosporium Tiliæ* Lk. I have never been able to find it with flocci and therefore doubt if it should be referred to the genus Helminthosporium as some authors think.

PUCCINIA HIERACII *Mart.*

Mr. M. Ruger sends specimens of a Puccinia found on leaves of hawkweed, at Woodhaven, L. I., which should perhaps be referred to this species, but I fail to find any good mark of distinction between it and *P. variabilis.*

PUCCINIA AMPHIBII *Fckl.*

This is now regarded as distinct from *P. Polygonorum*, and our specimens of Puccinia on leaves of *P. amphibium* should be referred to it.

USTILAGO URCEOLORUM *Tul.*

This occurs in the Adirondack region on *Carex stricta*, *C. stellulata*, *C. crinita*, *C. utriculata* and *C. oligosperma.*

TRICHOBASIS HOWEI *Pk.*

I would change this name to *Uromyces Howei* Pk. since I find that the pedicels, though very short and obscure, are permanent.

ÆCIDIUM PYROLATUM *Schw.*

This seems to be one of the connecting links between Æcidium and Uredo. Leaves affected by it are more erect than the others and have a pale sickly appearance, so that it is not difficult, in looking at a patch of the round leaved Pyrola, to tell at a glance what leaves are affected by the fungus.

ÆCIDIUM EUPHORBIÆ *Pers.*

This species occurs quite commonly some seasons on *Euphorbia maculata* in company with *Uromyces Euphorbiæ.* The branches whose leaves are affected by it are more erect than the others and more slender in their mode of growth.

NECTRIA PULICARIS *Tul.*

The spores in this species are described in the Handbook of British Fungi as "elliptical or pyriform." In the fungus inhabiting old corn-stalks and referred by some botanists to this species, the spores are oblong-fusiform.

XYLARIA DIGITATA *Grev.*

A Xylaria occurs quite frequently in our woods which has the smooth stem of this species and the short spores of *X. Hypoxylon*, thus ranking intermediate between the two. I am not fully satisfied whether it should be considered a distinct species or a variety of one or the other. The true *X. digitata* is quite rare in our State.

RHYTISMA LINEARE *Pk.*

This should be referred to the genus Hypoderma. It is, however, quite distinct from *H. nervisequum* to which one writer has referred it.

HYSTERIUM CLAVISPORUM *C. & P.*

I have never been able to detect the narrow linear orifice of the genus Hysterium in this species. In my opinion it belongs rather to the genus Dothidea. The same may also be said of *Hysterium Rimincola* Schw.

DOTHIDEA DALIBARDÆ *Pk.*

This rare species has occurred near Mud Pond in Hamilton county.

VALSA RUFESCENS *Schw.*

Mr. J. B. Ellis informs me that the specimens of this plant in the Schweinitzian Herbarium have simple cylindrical spores, .0003′-.0004′ long. This would make it distinct from *V. aculeans* Schw. with which it has sometimes been confused.

SPHÆRIA COLLINSII *Schw.*

This occurs in the Adirondack region on leaves of *Spiræa salicifolia.* The branches in this as in *Amelanchier Canadensis* are swollen and distorted by the fungus.

VENTURIA MACULANS *Pk.*

I am satisfied that this is only a form of *Sphæria ditricha* Fr., a species which has been referred to Sphærella, though in my opinion it is a good Venturia.

The following list of parasitic fungi and their host plants is additional to the one given in the preceding report:

Puccinia orbicula *P. & C.*	inhabits	Solidago arguta *Ait.*
P. Hydrophylli *P. & C.*	"	Hydrophyllum Virginicum *L.*
P. Hieracii *Mart.*	"	Hieracium Canadense *Mx.*
Urocystis pompholygodes *Schl.*	"	Anemone nemorosa *L.*
Ustilago urceolorum *Tul.*	"	Carex stricta *Lam.* C. stellulata *L.* C. crinita *Lam.* C. utriculata *Boott.* C. oligosperma *Mx.*
Melampsora Epilobii *Fckl.*	"	Epilobium angustifolium *L.*
Uredo Cassandræ *P. & C.*	"	Cassandra calyculata *Don.*
Discella arida *Pk.*	"	Cassandra calyculata *Don.*
Sphæropsis minima *B. & C.*	"	Acer rubrum *L.*
Helminthosporium Absinthii *Pk.*	"	Artemisia Absinthium *L.*
Cladosporium depressum *B. & Br.*	"	Archangelica atropurpurea *Hoffm.*
Ramularia brunnea *Pk.*	"	Tussilago Farfara *L.*
Cystopus cubicus *Mart.*	"	Ambrosia artemisiæfolia *L.*
Cercospora Symplocarpi *Pk.*	"	Symplocarpus fœtidus *Salisb.*
C. leptosperma *Pk.*	"	Aralia nudicaulis *L.*
C. Ampelopsidis *Pk.*	"	Ampelopsis quinquefolia *Mx.*
C. Chenopodii *Fckl.*	"	Chenopodium album. *L.*
Peronospora pygmæa *Ung.*	"	Anemone nemorosa *L.* Hepatica triloba *Chaix.*
P. infestans *De By.*	"	Solanum tuberosum *L.*
P. alta *Fckl.*	"	Plantago major *L.*
P. effusa *Grev.*	"	Œnothera biennis *L.*
Erysiphe Liriodendri *Schw.*	"	Liriodendron Tulipifera *L.*
Sphærotheca Castagnei *Lev.*	"	Geranium maculatum *L.*
Epichloe typhina *Berk.*	"	Glyceria nervata *Trin.*
Sphæria Collinsii *Schw.*	"	Spiræa salicifolia *L.*
Sphærella Impatientis *P. & C.*	"	Impatiens fulva *Nutt.*

In closing this report, grateful acknowledgments are rendered to those botanists whose names already appear in the preceding pages for their kind coöperation in the investigation of our flora, and for their generous contributions of specimens.

When no name is added to the station or stations herein given the plant has been found therein by the writer. Dates signify the time when the specimens were collected.

Respectfully submitted.

CHAS. H. PECK.

ALBANY, *January* 6, 1877.

NOTES UPON THE LITHOLOGY OF THE ADIRONDACKS.

By ALBERT R. LEEDS.

It is not the object of the present paper to present a complete lithology of the Adirondacks. This is not possible, during the present very partial state of our knowledge concerning the rocks of this region. A large portion of it still deserves its popular name of "The Wilderness," and the surface rocks of this vast area have not even been carefully collected, while a beginning only has been made in the critical study of those which have. The geological map of this district covers with a uniform expanse of color, and aggregates together under one common name, rocks of many varieties, occurring under many different relationships to one another, and of whose past history and transformations, probably far more diversified and complex than we have hitherto imagined, we know but very little and that imperfectly. It will be a labor of some years, upon the sound basis of an exhaustive topographical survey, to lay down the stratigraphy of this region, to analyze chemically and optically its various rock-formations and assign them their relative place and importance as chapters in the primeval geological history. We shall attempt therefore nothing more than to give: 1st. An outline of what has been done hitherto in this field. 2d. A description of the rocks so far collected by the writer, and whose physical and pyrognostic characters have to a certain extent been determined. 3d. The analyses of some of the most important typical rocks and minerals. 4th. Results of the microscopic study of their rock-sections. 5th. Inferences drawn from the limited range of studies detailed above.

I. Previous Literature.

The principal portion of our previously-acquired knowledge is contained in the Report upon the Geology of the Second District of New York, published by Prof. E. Emmons in the year 1842. He devotes more especial attention to this subject, because, as he states, the hypersthene rock and its varieties, had not been regarded as an American rock, until after the survey of New York was in progress. In using the term Hypersthene Rock, he follows MacCulloch, who had previously applied this name, he says, to the same mass in Scotland. His classification of the varieties of hypersthene rock is as follows:

1. The most common of the varieties is composed wholly of labradorite, though to the eye it appears like a mixed or compound mass, as it has the aspect of being made up of two distinct minerals.

2. Labradorite and hornblende. The hornblende appears usually to take the place of the hypersthene, though not always; for sometimes the latter is still present.

3. Labradorite, hornblende and epidote; the latter, however, never is in sufficient quantity to give character to the rock.

4. Granular labradorite and mica, a variety which is quite dark, and has much the aspect of trap.

In this classification the variety composed of labradorite and hypersthene, from which the whole formation derives its name, has been accidentally omitted.

To this should be added as distinguishing characteristics:

5. That magnetic oxide is also disseminated very frequently through the mass, making it eminently an iron-bearing rock; also garnet in grains, or small masses, scarcely ever in crystals; it is common near the junction of the rock with the ore beds.

The rock has a jointed structure; in addition to which, it is often traversed by segregated veins and cracks or false joints; the latter serving to divide the mass into wedge-form pieces, are finally detached, and form the talus at the base of the cliffs.

The predominant color of the rock is smoke-grey, light or dark, weathering to ash-grey. The color most constantly associated with this is a dingy-green, which belongs, according to Emmons, to the labradorite, and not to the other minerals which happen to be present. It is traversed by a double system of joints, or divisional seams, which run S. 5° W. and N. 85° E., with a variation in this direction, amounting to from 5° to 10°, when observed at different places. Quartz is seldom found in this rock, occurring only in seams or thin irregular veins. The associated rocks are those allied to trap, of which the most constant in its occurrence is a compound of hornblende and feldspar, forming a granular mass quite friable in its texture, and of a dirty grey color. It is generally found in layers in the veins of iron ore, or in the vicinity of ore beds; it often forms, also, dykes traversing the rock in the manner of the common green-stone trap, as may be seen on Mt. McMartin, by Avalanche Lake. The hypersthene rock also contains two varieties of porphyry: 1. With a base of light green compact feldspar, spotted with small masses of a deep bluish-green feldspar. 2. With a white or flesh-red compact base, in which there are angular masses of greenish compact feldspar. Connected with these porphyries is prehnite, in mammillary masses of a pale green color, with a few indistinct crystals.

"The porphyries or breccias, which have been found mostly in loose masses upon the beaches of the East river, are undoubtedly all of them in veins like the ordinary trap of this region. One locality is known on this river, which it crosses one or one mile and a half below the Great Falls. It is an extremely tough mass, being composed of chalcedony and feldspar, and a decomposable green substance. Rolled masses of the common flesh-colored feldspar or granite, and handsome specimens of graphic granite, are also found. A variety of feldspar is not unfrequent in veins in the hypersthene, which resembles albite; and it seems to take the place of this mineral, or to hold the same relation to the hypersthene rock that the common albite does to the coarse granites of New England. It is in laminated and stellar masses, like the albite of Chesterfield, but not so distinct, or handsome. There is also a labradorite, of a dark bottle-green color, in cleavage masses, two or three inches in length, with striated surfaces and more feeble opalescence than the blue variety. This rock, above Russell Falls on the Ausable, passes into a light green and nearly compact feldspar. When wet, it is a pale apple-green; but when dry, it is dull, and weathers rapidly into a putty-like clay."

It will be seen from the above rather full abstract, that valuable as were the observations of Emmons, but little was done, or was possible at that time, towards forming a systematic lithology of the Adirondacks.

That lithology has its foundation in the extensive researches of Sir Wm. Logan, Prof. T. Sterry Hunt and their colleagues upon the azoic formation of Canada, and many valuable contributions towards it are embodied in the Canadian Geological Reports. Prior to their researches, the rocks underlying the fossiliferous strata had not been subdivided into well-characterized groups with distinctive local names. The first broadly defined group of rocks which were so divided off, were those which are largely developed in the rock-masses of the Laurentian Mts., and which were accordingly named by the Canadian Survey in 1846, the Laurentian System. Then, and in subsequent publications of the Survey, this name was applied to a vast thickness of highly altered metamorphic strata, consisting of feldspathic rocks interstratified with limestones and quartzites. The feldspathides included both the gneisses, which contained orthoclase and other rocks, more or less gneissoid in structure, but composed mainly of some variety of triclinic feldspar. The latter were further distinguished by a comparative absence of quartz, and the association with hypersthene, pyroxene or similar constituent. At that time they were not put in a separate group, but were merely classed together under the general term, anorthosites.

The orthoclase gneisses of the Laurentian system are characterized by their color, which, owing to the potash-feldspar, is generally reddish, though sometimes white to bluish-grey, by the presence of quartz, and by the frequent occurrence of hornblende and mica. They are both fine- and coarse-grained, in the latter case sometimes to such an extent as to present the appearance of a granitoid gneiss. The accompanying minerals are so disposed about the large cleavable masses of feldspar as to give a more or less reticulated appearance to the rock. But, in both coarse and fine, the metamorphic character of these gneisses, is manifested in the never-failing parallelism of the layers, in which the constituent minerals are arranged. These two varieties of orthoclase-gneiss, of which the granitoid constitutes the main peaks and ridges of the orthoclase region and is sometimes several thousand feet in thickness, are interstratified with bands of limestone and associated with quartzite and beds of hornblende and micaceous schist. Masses of pyroxenite are met with near the limestones, and the schists are frequently highly garnetiferous. The garnets are sometimes disseminated through a pure white orthoclase, or, associated with quartz, characterize many varieties of garnetiferous gneisses and quartzites. The limestones are both calcites and dolomites, the latter interstratified with the former, or more or less mechanically mingled with them. They also occur separately, as rock-masses of great extent. Serpentine, hornblende, tremolite, mica and graphite, are imbedded in these rocks, frequently in bands plainly or obscurely parallel with the beds; also pyroxene, wollastonite, apatite, chondrodite, quartz, scapolite, pyrite, and more rarely, zircon, spinel, fluor spar, idocrase, tourmaline, corundum and chalcopyrite.*

At the time of the publication of the Canadian Geol. Report of 1863, the identity of the Laurentian gneisses with the "Fundamental Gneiss" of the Western Isles of Scotland, had been recognized by Sir Roderick Murchison, and the term Laurentian correspondingly extended.† Emmons had previously given the name of Hypersthene Rock, rather than that of Labradorite Rock, which latter he appears to have preferred, to the mixtures of labradorite and hypersthene, occurring in the Adirondacks, for two reasons; 1st, on the ground of identity of these rocks with those occurring in Scotland, and 2ndly, the priority of MacCulloch's name of hypersthene rock as applied to them in the isle of Skye and elsewhere.‡ In the Canada Report above quoted, these hypersthene rocks, were referred under the appellation of anorthosites, to the Laurentian system. The rocks of the Adirondack Mts., were stratigraphically connected with the main body of the Laurentian range, through the exposure of azoic rocks, which crosses the St. Lawrence at the outlet of Lake Ontario. Subsequently, these anorthosites were shown by Sir Wm. Logan to be unconformable with the orthoclase-gneisses, limestones and quartzites, with which in certain portions of Canada they were interstratified, and were separated from them under the name of Upper Laurentian. This term was preferable to the "Labradorian System," a name which Sir Wm. Logan also used, on account of the extensive development of these anorthosites in Labrador, and the predominance of labradorite among their feldspathic constituents.

In one of the most recent of his very valuable contributions to American lithology, Dr. T. Sterry Hunt has urged the adoption of the title of Norian, instead of Labradorian or Upper

* Geolog. Report of Canada, 1863, p. 24–31. † Geol. of Canada, 1863, pp. 22.
‡ Geol. 2nd. District New York, pp. 27, 28.

Laurentian system,* on the ground of the identity of these anorthosites, with a vast extent of similar rocks found in Norway, and to which the name of Norite has long since been applied by Esmark.

The great value of this creation of the title "Norian System" is two-fold: — 1st, In distinguishing a widely-spread and strongly-characterized subdivision of the eozoic rocks, by a name applicable to their most important constituent rock, and by a local name moreover, which had been previously applied to these rocks, from a locality where they had been carefully studied. 2nd. In fixing the precise meaning of the term Norite, and establishing thereby an exact nomenclature for certain rocks, which had been very differently classified by preceding authors.

The name of Norite was originally applied by Esmark to certain Norwegian rocks, which are composed principally of a feldspar and hornblende, and which he regarded as a variety of diorite. They resembled diorite, moreover, in containing quartz and mica. With these diorite-norites, he also included some varieties of gabbro.† In this he was followed by Scheerer, who called the gabbro of the islands of Anabelöe and Hitteröe, norite. It is a mixture of diallage or hypersthene, labradorite, soda-orthoclase, and usually some quartz. Both these latter minerals are so infrequent in mixtures of hypersthene and labradorite, that such a gabbre would have to be regarded as an unusual mineral combination. According to Kjerulf,‡ the composition of I, a violet norite, consisting of labradorite and green diallage, from Tronfjeld, and II, a yellowish-grey norite, composed of labradorite, black augite, some tombac-brown mica and menaccanite, from Sölvsberg, is as follows:

	I	II
Silica	50.06	51.47
Alumina	16.44	15.62
Ferric Oxide	7.71	12.17
Lime	14.66	11.69
Magnesia	4.88	4.10
Potash	Tr.	0.20
Soda	1.38	0.55

* Amer. Jour. Sci., 1870 ([2] xlix, p. 180.)

† Zirkel, Lehr. der Petrographie, Vol. ii, p. 15.

‡ Kjerulf, N. Jahrb. f. Min. 1863 — quoted by Zirkel, ib. p. 131.

	I	II
Titanic Acid	5.73	0.75
Ignition	.....	1.22
	100.86	97.77

The gabbro-norite of Scheerer is characterized by the predominance of its feldspathic constituent, which is aggregated into concretionary masses, the augite being very subordinate. This description recalls the structure of the orbicular-diorite, or napoleonite, of Corsica, which consists of concretions of anorthite and hornblende, together with some quartz. In a general inspection of the suite of Adirondack rocks, whose particular description is to be given later, the most striking peculiarity of their structure is a similar aggregation of the feldspar, and sometimes though more rarely of the hypersthenic element, into masses which have a stratified appearance, arising from the parallel arrangement of the constituent minerals. Moreover, the Canadian norites, according to Dr. Hunt, are undoubtedly a bedded rock, and also the mixtures of labradorite, pyroxene and menaccanite, described by Haughton as occurring at Loch Scavig,* and whose similarity in lithological characters to the Canadian norites, had previously been noted.† The identity of these rocks with those of Norway, was further established by Dr. Hunt in a personal examination of the rocks, sent by the Royal University of Christiania to the Universal Exhibition at Paris, as a part of its geological display, and exhibited under the name of norites. In a printed note accompanying this collection from the University, it is said that the numerous varieties of rocks consisting of labradorite with hypersthene, diallage and bronzite, have, in the geological map of Southern Norway, published at Christiania in 1866, been designated by the common name of gabbro. This note at the same time suggests that "the name of norite should be preserved for certain varieties of gabbro rich in labradorite, which varieties may in great part with justice be called labradorite rock, since labrador feldspar is their predominant element." If along with labradorite, the other related triclinic feldspars from anorthite to andesine be included, the term norite becomes generically descriptive of

* Dublin Quarterly Journal, 1865, Haughton.

† Ib., July, 1863, T. S. Hunt, quoted in Amer. Jour. Sci., 1870, loc. cit.

the anorthosite rocks composing the Norian System in Canada, northern New York, and elsewhere. It will be so employed in the subsequent portions of this article, the names hypersthenic-hornblendic, or pyroxenic-norite, being applied to rocks in which these secondary ingredients occur, rather than hyperite, diorite or dolerite into which such rock combinations may pass, but from which they are to be distinguished by the stratified and concretionary structure of the constituent minerals.

II. DESCRIPTIVE LITHOLOGY.

The rocks, 69 in number, were all collected in the county of Essex, and most in the valley and township of Keene. Very many others, presenting nothing in their characters distinctive from the 69 mentioned, were excluded from this description. The design was not to attempt the study of the stratigraphy of the Adirondacks at the present time. It was rather, as preliminary to such an undertaking, to analyze and classify with precision as many varieties of Adirondack rock-masses as possible, in order to compare the rocks of one and different localities, and, in case of erratic boulders, to ascertain their origin and mode of distribution. During the course of last summer, the specific gravities of 44 of these specimens were determined by Mr. Brown Ayres, one of the students of the Stevens Institute of Technology, who was also my field-assistant. It will be most convenient, to study these varieties in the ascending order of their specific gravities, as they are presented in the following table:

Table of Specific Gravities of Norites.

1	2.67	16	2.81	31	3.09
2	2.68	17	2.82	32	3.097
3	2.69	18	2.82	33	3.097
4	2.70	19	2.86	34	3.10
5	2.71*	20	2.89	35	3.11
6	2.71	21	2.89*	36	3.11
7	2.71	22	2.89	37	3.13
8	2.72	23	2.91	38	3.15
9	2.74	24	2.96	39	3.17
10	2.74	25	2.96	40	3.21
11	2.76	26	2.97	41	3.23
12	2.77	27	2.99	42	3.24
13	2.77	28	3.00	43	3.386 †
14	2.77	29	3.04	44	3.459 ‡
15	2.79	30	3.062		

* Analyzed. † Diallage. ‡ Hypersthene.

These gravities were determined upon masses weighing from 5 to 15 grammes, and are all reduced to 0°C. They vary from 2.67, a figure agreeing with the lowest limit of the numbers, which have been obtained in determinations of the specific gravities of any labradorites, to 3.459, the specific gravity of diallage. These figures may be taken as the extremes, within which the specific gravities of norian rocks, composed of mixtures of labradorite and pyroxene in all proportions whatsoever, will vary. A lower specific gravity will be attributable to some other variety of feldspar, or an admixture of quartz: a higher, to an unusual percentage of garnet, menaccanite or magnetite. As an instance of the former, a specimen (a), analyzed in Part III, and microscopically examined in Part IV, may be mentioned, which strikingly differs in its characters from any of those contained in the above table. It resembles, in appearance, a vitreous ferruginous quartzite of a dark red color, for which at first sight it was mistaken. It is readily distinguished, however, by the finely striated surfaces of the minute crystalline masses, of which it is composed. The specific gravity of the powdered rock, such as was used in its chemical analysis, is 2.635, while that of the original mass is 2.65. The difference is due to the crystals of magnetite and menaccanite, picked out by the magnet prior to analysis, many being large enough to be visible to the naked eye. It fused more difficultly than labradorite, with the formation of a clear white glass, the red color disappearing, and the metallic constituent rendering the remaining partially fused portion black. It gives a strong flame-reaction, indicative of the presence of sodium. In these respects it resembles oligoclase, which is sometimes reddish, has a fusibility of 3.5, a specific gravity of 2.56–2.72, and contains much more soda than lime.

Nos. 1, 4, 8 and 39 are similar to one another in composition, and somewhat, though less so, in appearance. They consist of labradorite chiefly, and hornblende, disposed in parallel masses, the latter mineral increasing with the specific gravity. The gravity of No. 1 is 2.67, while that of labradorite itself varies between 2.67 and 2.76. This extremely low result is due to the mineral having lost some of its earthy bases by weathering, a change also shown by the iron stains on a fresh fracture of the decomposing rock, and by the white flinty exterior, from which the labradorite has disappeared leaving angular fragments of quartz projecting ; 42 is similar to the three preceding, but owes its exceptionally high gravity to many included iron-lime garnets, which, in conjunction with hornblende and weathered labradorite, account for its dark reddish-yellow appearance.

The above, on account of the strikingly stratified arrangement of their constituents, might be termed Gneissoid Norites. Along with them, should be included specimens 9, 14, 15, 16, 17, 20, 24, 29, 31, 37, 57 and 63. The labradorite of Nos. 9, 14 and 15, is almost as white as milky quartz — an appearance due to partial alteration, and the segregation of minute amorphous particles parallel to the stratification. These impart a milky aspect to the mass, and obscure the limpidity of thin sections. No. 14 also includes large masses closely striated, but of a white vitreo-waxy appearance, in this respect differing from the more highly vitreous smoky-grey crystalline aggregates, presently to be described. The interstratified black portions are, in part, diallage. Their metallic, in some specimens, even bronze-like lustre, has caused the names hypersthene and bronzite to be applied to them. They are associated with hornblende, derived from alteration of the diallage. The alteration in some cases is nearly complete. Besides diallage and hornblende, specimens 16, 17, 24 and 31, include almandite and 20 essonite, mostly distributed through the feldspathic base.

Nos. 2, 3, 5, 6, 7, 10, 11, 19, 25, 28, 31, 59, 60, 62 and 65, may be grouped together and classified under the title of Porphyritic Norites, inasmuch as they consist of highly twinned and finely striated polysynthetic macles of labradorite, in a coarse or finely-granular crypto-crystalline labradorite paste. Although this matrix in external aspect, differs so widely from the included labradorite crystals, that it is often mistaken by mineralogists for some other species, yet, as will be seen in Part III of the present article, in specific gravity, composition, pyrognostic and physical characters, it is almost identical. In some varieties, no other mineral is present in separately visible masses, and this species of norites, passes into Porphyritic Labradorite. The crypto-crystalline paste, as in No. 5, the specimen whose complete analysis is given beyond (A), is sometimes in color and lustre not unlike common yellow wax, thus contrasting strongly with the more vitreous bluish-smoky crystals imbedded in it. Or the paste may be granular or compact, or dirty-white or light or dark-green in color. Sometimes, when diallage is present, it may be segregated into minute separate masses, or distributed through the paste, may communicate to it a color.

In specimen 2, almandite, in Nos. 19, 25 and 31, diallage and hornblende as well, are present in these porphyritic norites, the garnets being in these cases more especially associated with the non-feldspathic portion. Garnet is not unfrequently disposed as a red border around the greenish masses of diallage, along the bounding surfaces between it and the labradorite. The included crystals are sometimes magnificently opalescent, as in No. 65 (a specimen not tabulated), which was obtained from a large boulder, probably derived from the adjacent mountain, lying in the Uba trail. When opalescence is not evident upon a natural or fresh fracture, it may be developed by grinding and polishing. This is beautifully shown in a large mass, weighing about 20 pounds, brought from the summit of Mt. Marcy, and polished, by kindness of Mr. John Matthews, at his manufactory in New York. It is of a mottled smoky-grey color, opalescent in the more highly crystalline portions. Unfortunately, the pyroxenic ingredient wears away irregularly and does not admit of polishing, while the feldspar is opalescent only where the incident light falls at particular angles — properties which must seriously militate against the introduction of any, but the most homogeneous of these porphyritic norites, as an ornamental stone.

In Nos. 30, 32, 33, 34, 35, 36 (see its microscopic characters, Part IV) and 41, the labradorite is represented by a very dark green variety. It appears to have undergone great alteration, having lost its crystalline character and become translucent, acquiring at the same time a greenish color. It is intermixed with much finely-granular quartz, visible only under the microscope. With these, reddish-brown hornblende is associated, having been derived from an alteration of the diallage so extensive, that the latter mineral is represented only by some scattered green particles, invisible to the naked eye. In specimen 63, the pyroxene is not foliated or bladed, but is the green granular variety called coccolite. It was obtained on the road from Lake Placid to Wilmington.

There are several varieties of labradorite rock, occurring in the Norian System of the Adirondacks, which are not porphyritic, as in specimen 33, which is apparently massive though in reality crypto-crystalline. On a fresh surface of fracture it is green, no diallage in separate masses being visible, but on a weathered surface it is white with green spots, showing that in fact the constituent minerals are partially segregated. A very common variety in certain localities, as on the East Branch of the Ausable River, where it forms hemlock-covered cliffs, is a greasy green compact labradorite, with some admixed diallage and garnet. In some of the norian porphyries, the smoky-grey crystalline portion predominates to the almost entire exclusion of the feldspathic matrix. There are also Pyroxenites, with but little feldspar admixed, and in which the pyroxene is sometimes the broadly foliated deep green variety of diallage, and at others is faintly or strikingly metallic in appearance.

In a few localities, rocks composed mostly of iron-garnet with some hornblende, have been encountered, showing a passage, by diminution of the feldspathide, of norite into grenatite.

Besides these norites proper, there are many intrusive masses composed of similar materials, but in which the constituents are not stratified, and are too finely divided to be visible to the naked eye. They consist chiefly of labradorite, quartz, pyroxene and to some extent hornblende, magnetite and menaccanite. Their specific gravity is about 2.9, in which respect they stand midway between the extremes of the Norian series. They have a dark grey or black color, with a smooth and sometimes large conchoidal fracture, and in some localities, as in specimen 66, obtained from the summit of Mt. Marcy, weather unequally into a pitted surface stained by yellow oxide of iron.

The pyroxenic constituent in these norites contains so large a percentage of iron, that fusion takes place very readily (F=3 to. 3) with a production of a black globule, generally very magnetic. In some cases, it is itself magnetic, from included magnetite.

III. ANALYSES OF THE MOST IMPORTANT MINERALS AND ROCKS.

The first point to be definitely established, was the constitution of the feldspars, which occur in this suite of Adirondack norites. Their specific gravities, degrees of fusibility, and flame-reactions, together with their optical characters, readily permitted their reference to that group of feldspars, which on account of its crystallographic relationships, has been termed Plagioclase, and with a single exception to that species of plagioclase, known as Labradorite. But to determine the formulæ of these particular labradorites, together with any important variations in their constitution, if such variations exist, as numerous quantitative analyses as time would permit, were requisite. With this object in view, the two varieties of Norian labradorite, which were found to be most widely divergent in physical characters, were selected. The one, was that which occurs in crystalline masses, with faces sometimes several inches in breadth and length. The faces are finely ruled with lines, significant of the multitude of individuals composing these polysynthetic aggregates. This variety is usually dark-grey or smoky, sometimes approaching to bluish in tint, and frequently opalescent. Such is the case with the material picked out for analysis, from the norite forming the mass and summit of Mount Marcy, the highest peak into which the Norian System of Northern New York rises, its altitude being 5,400 feet. The results are given under A.

The other variety is less vitreous in lustre, approaching often to waxy. This aspect especially characterizes the specimen analyzed, which also resembles common wax in color. It is crypto-crystalline, forming the matrix, however, of smoke-colored crystals analogous to the above. Its microscopic characters will be found in Part IV. The plagioclase base, forming similar porphyries and probably not differing essentially in composition from this type specimen, is also white to grey, and light- to dark-green in color, varying from compact (in reality crypto-crystalline) to fine- and coarse-granular, and even minutely phanero-crystalline in structure. In the latter case, the imbedded crystalline masses, are only distinguished by their greater size, their darker color and different lustre, from the feldspathic matrix. The composition of this variety is given under B.

	A.	B.
Specific Gravity	2.72	2.70
Silica	54.47	54.62
Titanic Acid	undet.	undet.
Alumina	26.45	26.50
Ferric Oxide	1.297	0.757
Ferrous Oxide	0.665	0.565
Lime	10.80	9.88
Magnesia	0.69	0.74
Potassa	0.92	1.23
Soda	4.37	4.50
Water	0.53	0.91
	100.192	99.702

Computation of Analysis A.

	Radicals.	Atoms.	Quantivalents.		Ratio.
Silicon	25.42	0.9079	3.6316	3.6316	6.83
Aluminum (Al)	14.07	0.2577	1.5462	1.5948	3
Ferricum (Fe)	0.9079	0.0081	0.0486		
Ferrosum	0.5172	0.0092	0.0184	0.5991	1.13
Calcium	7.714	0.1928	0.3856		
Magnesium	0.415	0.0173	0.0346		
Potassium	0.764	0.0195	0.0195		
Sodium	3.242	0.1410	0.1410		

The quotients obtained by dividing the percentages of the radicals by their atomic weights, are here employed to express the relative number of atoms of these radicals present in the compound, and the relation existing between these numbers is called the Atomic Ratio. The products formed by multiplying the atoms by the quantivalences, which they possess in the particular combination under consideration, have been termed above Quantivalents. Similarly, the ratio between these products might be called the Quantivalent Ratio. The latter has in some places been called the Atomic Ratio, but this term may with greater propriety be restricted to the first. The products themselves, for distinction's sake, are styled Quantivalents. This term is open to objection, on account of the close similarity of sound between Quantivalents and Quantivalence. For this reason, following the analogy of the substitution of the shorter terms, monad, dyad, triad, etc., for their synonyms, univalent, divalent and trivalent radical, Quantivalents might be abbreviated into Quantads. They have elsewhere been styled Chemical Units.

It will be seen that the Quantivalent Ratio $R^{II}_{2} : R^{VI} : Si^{IV}$ is 1.13 : 3 : 6.83, and the comparison with the quantivalent ratios of related minerals will be made in its proper place farther on. The Atomic Ratios are as follows :

Na (K)	:	Ca (Mg, Fe)	=	.1605	:	.2193	=	1	:	1.4
Na	:	Ca	=	.1410	:	.1928	=	1	:	1.4
Al (Fe)	:	Si	=	.2658	:	.9079	=	1	:	3.4
Al	:	Si	=	.2577	:	.9079	=	1	:	3.5

Then on the supposition that labradorites are mixtures of Anorthite and Albite in various, but definite relative proportions, a hypothesis presently to be discussed, the constitution of this variety might be expressed by

$$3 \text{ Mol. Anorthite} + 1 \text{ Mol. Albite, or } \left.\begin{matrix} 3\ Ca\ \ Al\ Si^2\ 0^8 \\ Na^2\ Al\ Si^6\ 0^{16} \end{matrix}\right\}$$

Computation of Analysis B.

	Radicals.	Atoms.	Quantivalents.		Ratio.
Silicon	25.49	0.9104	3.6416	3.6416	6.92
Aluminum (Al)	14.10	0.2583	1.5498	1.5786	3
Ferricum (Fe).	0.4394	0.0048	0.0288		
Ferrosum	0.5299	0.0078	0.0156	0.5766	1.09
Calcium	7.057	0.1764	0.3528		
Magnesium ...	0.444	0.0185	0.0370		
Potassium	1.02	0.0261	0.0261		
Sodium	3.339	0.1451	0.1451		

The quantivalent ratio for $R^{II}_{2} : R^{VI} : Si^{IV}$ is 1.09 : 3 : 6.92, which differs so slightly from that of A, that if, as is customary, the ratios had been carried out only to the first place of decimals, they would have been identical in the two varieties of labradorite. The atomic ratios are :—

Na (K)	:	Ca (Mg, Fe)	=	.1712	:	.2027	=	1	:	1.12
Na	:	Ca	=	.1451	:	.1764	=	1	:	1.22
Al (Fe)	:	Si	=	.2631	:	.9104	=	1	:	3.46
Al	:	Si	=	.2583	:	.9104	=	1	:	3.52

They are expressed, on the supposition stated above, in the formula,

$$\left.\begin{array}{l} 2\ Ca\ Al\ Si^2\ O^8 \\ Na^2\ Al\ Si^6\ O^{16} \end{array}\right\} \quad \text{or,} \quad \left.\begin{array}{l} \text{2 Mol. Anorthite} \\ \text{1 Mol. Albite} \end{array}\right\}$$

In A, if Na : Ca = 1 : 1.5, then Al : Si = 1 : 3, instead of 1 : 3.5, as obtained by the analysis ; and in B, if Na : Ca = 1 : 1, then Al : Si = 1 : 1.33, instead of 1 : 1.52.

Much of the ferric, and probably all of the ferrous, oxide, exists in both these varieties of labradorite as magnetite and menaccanite, and if we knew with exactness the composition of the latter mineral as it exists in the minerals, might with advantage be excluded from the computation of the formulæ. The silica in both analyses exceeds that which the formulæ require, but this excess, as the microscopic examination shows, is not due to combined silica, but to free quartz. And it is important to note, that while quartzites are not included in this suite of Adirondacks rocks and were not encountered by the writer in the limited area from which the collections were made, at the same time, in every microscopic section examined and every analysis which has been performed, a notable amount of uncombined silicic acid is present. In some cases, it is true, veins filled with quartz and amethyst crystals have been encountered, but these appear to have been formed by infiltration and deposition.

If the density of Albite be 2.62, its atomic volume is 400.4. Moreover, assuming that homœmorphous species have similar atomic volumes, the formula of anorthite will be $Ca^2\ Al^2\ Si^4\ O^{16}$, and its atomic volume, with density 2.76, is 403.8. The relationship between the two varieties of labradorite would then be :—

		Density.	Atomic Vol.
A	$\left.\begin{array}{l} \frac{3}{2}\ Ca^2\ Al^2\ Si^4\ O^{16} \\ Na^2\ Al\ Si^6\ O^{16} \end{array}\right\}$	2.72	400.2
B	$\left.\begin{array}{l} Ca^2\ Al^2\ Si^4\ O^{16} \\ Na^2\ Al\ Si^6\ O^{16} \end{array}\right\}$	2.70	400.6

In these two closely related minerals, the densities as determined by careful trial, vary directly with the atomic weights and the atomic volumes are nearly equal. Upon the supposition that the atomic volumes of homœmorphous species are identical, and that, as appears to be the case with the two labradorites and the albite, the atomic volume for the group of plagioclase feldspars is 400, how closely do the observed agree with the theoretical densities in other recorded analyses of labradorite? We shall use in this comparison:—I, Labradorite, from Neurode, Silesia, occurring in Hyperite. v. Rath. II, From Neurode (Volpelsdorf). v. Rath. III, Näröedal, Norway. Rammelsberg. IV, Berufjord, Iceland. Damour. V. Egersund, Norway. Kersten. VI, Havnefjord, Iceland. v. Rath. VII, Lund, Sweden. In Dolerite. Blomstrand. VIII, St. Paul's Island, Labrador. Tschermak.*

	Atomic Ratio. Na : Ca	Formula.	Density. Theoretical.	Observed.
I.	1 : 3½	3½ An. + 1 Al.	2.7498	2.715
II.	1 : 3	3 An. + 1 Al.	2.745	2.709
III.	1 : 2½	2½ An. + 1 Al.	2.739	2.714
IV.	1 : 2	2 An. + 1 Al.	2.731	2.709
V, VI.	1 : 1½	1½ An. + 1 Al.	2.7208	2.705 and 2.729
VII, VIII,	1 : 1	1 An. + 1 Al.	2.704	2.68 and 2.697

If, instead of assuming that the atomic volumes are identical, we take for the at. vol. of Anorthite, that deduced from its mean specific gravity, or 404, and furthermore assume that the molecules of the constituent minerals occupy in the labradorite their normal volumes, we have the following relations:

	Formula.	Density. Theoretical.	Observed.
I.	3½ An. + 1 Al.	2.728	2.715
II.	3 An. + 1 Al.	2.724	2.709
III.	2½ An. + 1 Al.	2.720	2.714
IV.	2 An. + 1 Al.	2.713	2.709
V, VI.	1½ An. + 1 Al.	2.704	2.705 and 2.729
VII, VIII.	1 An. + 1 Al.	2.691	2.68 and 2.697

The lack of closer agreement between the theoretical and observed density may be due to lack of structural homogeneity or continuity, and not to real discrepancies.

The above theoretical interpretation of the results of these labradorite analyses, is founded upon a certain misconception of views which were originally advanced by Dr. T. Sterry Hunt so long since as September, 1853, in an article published in the American Journal of Science of that date, upon "The Constitution and Equivalent Volume of Mineral Species." They

* Quoted from Handb. der Mineralchemie, Rammelsberg, Vol. II, p. 562.

were further expanded in an essay entitled Illustrations of Chemical Homology, which was published in the Proceedings of the American Association for the Advancement of Science, for 1854, and explicitly set forth in an abstract of the same, published in the American Journal of Science for September, 1854. A summary of these views, in the language of the original memoirs, together with some further illustrations taken from a later paper by the author in the Compte Rendu of the French Academy of Sciences for June 29, 1863, is given in the Seventeenth of the Chemical and Geological Essays, collected by Prof. Hunt into book-form and re-published in 1875. "It was asserted that the simple relations of volumes which Gay Lussac pointed out in the chemical changes of gases apply to all liquid and solid species, thus leading the way to a correct understanding of the equivalent volumes of the latter. While chemists have not hesitated to assign high equivalents to bodies of the carbon series, they have been inclined to make the equivalent weights of denser mineral species correspond to formulas representing the simplest possible ratios. We endeavored, from a consideration of the theory of equivalent volumes, to point out the errors to which this method has led, and to show that we must assign to most mineral species much higher equivalent weights than have hitherto been admitted."

"It was further asserted that a relation similar to that observed in the formulas of allied hydrocarbonaceous bodies, and designated as chemical homology, exists in the formulas of mineral species. It was shown, from the relations of carbon, sulphur, and oxygen on the one hand, and of hydrogen and the metals on the other, that M_2S_2, M_2O_2, and H_2O_2 (M representing any metal) may be compared with H_2C_2. This view will be applied in extending the application of the principle of homology."

"We have further asserted that, for species crystallizing in the same form, the density varies directly as the equivalent weight, so that the quantities obtained in dividing the one by the other, and known as the atomic or equivalent volumes will be equal. Such a relation is already recognized between species of the same genus, and we now propose, having fixed an equivalent weight for one species, to calculate, from their densities, those of the species isomorphous with it, and to show from their densities, those of the species isomorphous with it, and to show from the formulas corresponding to these equivalent weights that the different genera thus related are homologous, or exhibit other intimate relations.

"An attempt was then made to fix the volume of the prismatic and rhombohedral carbon-spars, which were compared respectively with the isomorphous species bournonite and the red silver ores, proustite and pyrargyrite. The received formula of bournonite being doubled, and that of the rhombohedral sulphides made to correspond with it, we find for the prismatic species an equivalent volume of 508, and for the rhombohedral ones 546–564. In accordance with this the equivalent of calcite corresponds to $C_{30}\,Ca_{30}\,O_{90}$ ($C=6$ and $O=8$), while dolomite, chalybite, and diallogite become $C_{36}\,M_{36}\,O_{108}$, and calamine and magnesite $C_{40}\,M_{40}\,O_{120}$. For the prismatic carbonates, aragonite, like calcite, is $C_{30}\,M_{30}\,O_{90}$, while strontianite, cerusite and bromlite are $C_{25}\,M_{25}\,O_{75}$, and witherite is $C_{22}\,M_{22}\,O_{66}$."

"From Glauber-salt and borax were deduced, in like manner, an equivalent volume of about 440, corresponding nearly with that of saccharose with $C_{48}=430$, and with these were compared the silicates of the amphibole group, from which it was concluded that these silicates present among themselves relations similar to those of the homœomorphous carbon-spars. The attempts to deduce correct formulas for these and other silicates at that time, were, however, vitiated by many incorrect analyses, and rendered uncertain by doubts as to the equivalent weight of silicon."

"An important point in the question of homology and homœomorphism was then referred to in the following language :—The similarity in crystallization between species whose formulas differ only in the elements of water has been pointed out by Laurent in certain salts of organic acids, and is seen in several mineral species. The chabazites, for example, give the formula 3 Ro. $Si\,O_3$, 3 $Al_2\,O_3$, 2 $Si\,O_3$, with 15 HO and 18 HO, while the variety ledererite affords, according to Hayes and to Rammelsberg, but 6 HO. The hydrous iolites are also cases in point, as well as aspasiolite, the serpentines, and the talcs, with their varying proportions of water. In the formulas of these species, water appears to replace magnesia, and Scheerer has shown that many different species may be referred to a common chemical type, by admitting 3 HO to replace Mg O, and 2 HO to replace Cu O, etc. These cases, to which he has given the name of polymeric isomorphism, are but instances of the partial substitution of water for other bases in homologous genera which differ by n MO."

"In the continuation of this subject, in 1854, as above referred to, the question of homologies was further illustrated by the neutral and basic nitrates of lead, represented by a common formula $(Pb_2 O_2)$ n. $N_2 O_{10}$. These salts vary in solubility and in physical characters, but resemble each other in yielding nitric acid and oxide of lead as results of their decomposition, and are completely analogous to the homologous series of Gerhardt, which differ by n $(C_2 H_2)$. From the relation between basic and hydrated salts, the same view is to be extended to the latter, and species differing by n $(O_2 H_2)$ and n $(O_2 M_2)$ may thus be homologous. The above formulas are intended to involve no hypothesis as to the arrangement of the elements, for in the author's view, each species is an individual, in which the pre-existence of different species that may be obtained by its decomposition cannot be asserted. He regards silicates like eudialyte, sodalite, and pyrosmalite as oxychlorides, $(M_2 O_2)$ n. Mcl, and nosean, hauyene, and lapis-lazuli as basic sulphates $(M_2 O_2)$ n. $S_2 O_8$, while cancrinite, and perhaps some scapolites, are (may perhaps be) basic carbonates. All other silicates are reducible to the same type as the spinels, n $(M_2 O_2)$, the formula of silica itself being written si O. (Si being represented by one-third its usual equivalent....Boric, titanic, tantalic, and niobic acids are reduced to the same formula as silica."

"Homœomorphous species have similar equivalent volumes, so that the density in species thus related enables us to determine their comparative equivalent weights, and to fix their positions in a homologous series. The proportion between the silica and the other oxides may vary greatly in related species, while the characters of the genus or the order are preserved. This is illustrated in hornblende, diopside, and aluminous pyroxenes like hudsonite....The triclinic feldspars, of which albite and anorthite are the representatives, furnish another example; the one is a lime feldspar, the other a soda feldspar, and both may be reduced to a common formula, $M_{64} O_{64}$. Petalite, a lithia feldspar, also enters into the same formula, with a similar equivalent volume, while orthoclase belongs to a homologous genus, which is $M_{60} O_{60}$. The formulas with their densities and equivalent volumes, are as follows :—

		Density.	Eq. Vol.
Anorthite	$(Si_{32}\,al_{24}\,Ca_8)\ O_{64}$	2.76	405.0
Albite	$(Si_{48}\,al_{12}\,Na_4)\ O_{64}$	2.62	402.4
Petalite	$(Si_{51}\,al_{10}\,Li_3)\ O_{64}$	2.45	401.5
Orthoclase	$(Si_{45}\,al_{12}\,K_3)\ O_{60}$	2.56	402.6

Between anorthite and albite, may be placed vosgite, labrodorite, andesine, and oligoclase, whose composition and densities are such that they all enter into the same general formula with them, and have the same equivalent volume. The results of their analyses are by no means constant, and it is probable that many, if not all of them, may be but variable mixtures of albite and anorthite....The small portions of lime and potash in many albites, and of soda in anorthite, petalite and orthoclase, are to be ascribed to mixtures of other feldspar species.''

These views were enunciated in the language, which we have purposely transcribed literally, twenty-three years ago in the American Journal of Science for September, 1854.

In 1865, in a memoir published in the Proceedings of the Academy of Sciences of Vienna, and of which an abstract was published in the same year in the Annalen der Physik und Chemie, Tschermak adopted these views of Hunt, but in such a manner as greatly to impair their original value and significance. He states that Hunt had enunciated the proposition, that the triclinic feldspars are to be looked upon as mixtures of lime and soda feldspars. But on the ground that the analyses show in numerous instances the lime and soda feldspars are present in molecular proportions, he regards this mixture as a mixture in definite relative proportions, or in other words. a molecular combination. He makes oligoclase consist of ten molecules of albite and three of anorthite, labradorite of two of albite and three of anorthite, with many intermediate feldspars, composed however in every instance of definite numbers of molecules. In these views he has been followed by Rammelsberg in the late edition of the Handbuch der Mineralchemie, 1875, who, after crediting Tschermak with having originated the theorem—that all lime-soda feldspars are to be regarded as isomorphous mixtures of anorthite and albite, applies it to the computation of rational formulas for labradorites as individuals comprised under a general labradorite formula of n molecules anorthite combined with one molecule of albite. It is held by Rammelsberg, that this general formula is sustained by the results of all properly performed analyses of such feldspars, and if these results do not admit of being represented by a certain ratio between molecules, they are to be set aside as uncertain. It is difficult to understand how the term mixture can be properly applied in this case, and in what way such mixtures of n molecules of anorthite and one molecule of albite differ from a chemical compound between anorthite and albite in these proportions. If there is a difference, then the forces concerned in the crystallization of isomorphous substances, must operate to produce a mixture in definite molecular proportions — a supposition not at all in accordance with what takes place in the crystallization of isomorphous artificial salts. Moreover this doctrine excludes from the category of labradorites, many minerals eminently characterized by all the distinctive peculiarities of this species. Notably is this the case in regard to the four following Canadian labradorites: I. A bluish-white granular homogeneous translucent variety from Rawdon. II. A similar rock from Château Richer, pale bluish or greenish-gray, with red spots. The lustre on the cleavage surfaces of the grains is vitreous, but elsewhere waxy. The rock contains small scattered flakes of black mica. III. A bluish opalescent cleavable feldspar from Morin. IV. Lavender-blue cleavable feldspar, with gray opalescence.*

	I.	II.	III.	IV.
Sp. Gr.	2.69	2.68	2.684–2.695	2.697
Silica	54.45	55.80	54.20	54.70
Alumina	28.05	26.90	29.10	29.80
Ferric Oxide	0.45	1.53	1.10	0.36
Lime	9.68	9.01	11.25	11.42
Magnesia		0.27	0.15	Tr.
Potash	1.06	0.86	undet.	0.23
Soda	6.25	4.77	"	2.44
Water	0.55	0.45	0.40	0.40
	100.49	99.59		99.35

* Hunt, Geology of Canada, 1863, Chap. xvii, p. 478.

The quantivalents ratios for $R_2^{II} : R^{VI} : Si^{IV}$ are for I, 1 : 3 : 6.6, in II, 0.9 : 3 : 6.9, in III, — : 3 : 6.2, in IV, 0.84 : 3 : 6.2. It will be seen that these ratios differ from the ratio, 1 : 3 : 6, which is the mean for the labradorite species, by an excess in the silicium. This is due, probably, to the same excess of uncombined silica over the amount needed to form the labradorite, as we have previously noticed was characteristic of the Adirondack norian labradorites. The atomic ratios are for:—

	Na : Ca	Al : Si
I.	1 : 1.8	1 : 3.2
II.	1 : 2.3	1 : 3.5
III.		1 : 3.2
IV.	1 : 5.8	1 : 3.1

But these numbers do not permit a structura formula made up of n molecules of anorthite and one of albite. They are, however, entirely compatible with Hunt's original theorem, which, freed from the misconceptions that have since impaired its value and significance is—That the triclinic feldspars. of which albite and anorthite are the representatives, are members of a series, whose composition and densities are such that they all enter into the same general formula with them, and have the same equivalent volume, and it is probable that many, if not all of them, are but variable mixtures of albite and anorthite.

The only feldspar in the series collected, which differed so strikingly in its characters from those whose analyses are given as to demand a separate quantitative analysis, was that forming the non-norite rock (a), which we have already found was excluded from the category given in Part II, and formed as a base, along with quartz, a red granitic rock. Its composition is

Silica	76.18
Al_2O_3	12.41
Fe_2O_3	2.97
CaO	0.11
MgO	0.22
K_2O	5.19
Na_2O	3.23
	100.31

Its specific gravity, as before stated, is 2.635. Its analysis was concluded, before the importance of determining the percentage of titanic acid and ferrous oxide, was realized. It is difficult to determine from the results of the analysis, the constitution of the feldspar present.

As a representative of the intrusive masses, which in very numerous localities, present themselves among the norian rocks, specimen No. 21, which is a black-grey, fine-grained dolerite, breaking with conchoidal fracture, was analyzed. Its specific gravity in mass was 2.89, in powder 2.92. An analysis was made upon the original rock I, upon the portion soluble in acid II, and upon the insoluble portion, III.

Dolerite.

	I.	II.	III.
Silica	43.41	......	43.410
Titanic Acid	0.35	0.367	......
Carbonic Acid	2.00	2.003	......
Alumina	19.42	9.097	10.324
Ferric Oxide	5.72	4.553	1.169
Ferrous Oxide	6.69	6.693	......
Lime	9.11	7.398	1.711
Magnesia	5.98	5.285	0.695
Potash	0.47	0.323	0.144
Soda	4.39	0.530	3.864
Water	3.00	2.997	......
	100.54	39.246	61.317

The insoluble portion, by direct weighing, amounted to 60.78 p. c. Speculations as to the nature of its mineral constituents will be found in Part IV, No. 21. The most singular fact concerning it, is the large percentage of the pyroxenic ingredient, which appears to have gone into the acid solution.

In order to determine the nature of the pyroxenic portion of these norian norites, two minerals were selected : I, Black, with sub-metallic lustre, breaking into cleavage masses, with surfaces an inch or more in width, occurring in seams in the labradorite of Mt. Marcy. Specimen analyzed was from near summit. Its microscopic characters are given under Part IV. Sp. Gr. 3.459.

I. HYPERSTHENE.

		O Ratio.	Radicals.	At. Ratio.	Quant. Ratio.	
Silica	50.33	26.842	23.488	0.8389	3.3554	
Titanic Acid	0.07	0.028	0.042	0.0009	0.0035	2
Alumina	3.36	1.566	1.794	0.0229	0.1973	
Ferric Oxide	1.03	0.309	0.721	0.0064	0.0386	
Ferrous Oxide	19.40	4.311	15.089	0.2716	0.5432	
Manganous Oxide	0.71	0.160	0.550	0.0029	0.0058	1
Lime	2.77	0.791	1.979	0.0495	0.0989	
Magnesia	21.40	8.553	12.847	0.5353	1.0706	
Water	1.14	.....	......	......	......	
	100.21					

The other variety, II, occurs in broadly-foliated, dark-green masses, with a metallic lustre, and specific gravity 3.386.

II. DIALLAGE.

		Radicals.	Eq. Ratio.	
Silica	46.28	21.600	3.086	
Titanic Acid	0.59	0.354	0.028	2.1
Alumina	7.38	3.927	0.432	
Ferric Oxide	2.21	1.547	0.084	
Ferrous Oxide	14.80	11.510	0.411	
Lime	18.78	13.410	0.670	1
Magnesia	8.91	5.346	0.445	
Water	1.115	......	......	
	100.065			

These two minerals represent the most important varieties of the pyroxenic constituent in these Adirondacks, although others occur as well, together with hornblende, the latter as is shown by the microscopic examination of the sections, being frequently derived from alteration of the foregoing.

I have the pleasure to acknowledge the co-operation of my assistants, Dr. G. A. Prochazka and Mr. W. E. Hoyt, in the performance of the foregoing analyses.

IV. MICROSCOPIC EXAMINATION OF ROCK SECTIONS.

The rock-sections, 9 in number, were ground by Mr. A. A. Julien, of the School of Mines, New York. The numbers correspond to those employed in Part II of this article.

a. This section is peculiar, differing from all those which follow as strikingly as the rock itself from the remainder of the collection. It is of a reddish color, interrupted by apparently blank spaces, and spotted with black opaque spots. The red portion is divided up into fine wedge-shaped masses, running one into another, and in polarized light assuming the two phases alternately. It is a highly twinned feldspar, in appearance altogether distinct from labradorite. Numerous amorphous reddish patches, perhaps ferric oxide, are included in it, imparting the color. These and crystals of menaccanite are distributed through the feldspathic portion, the quartz areas being distinguished by an almost entire freedom from foreign matters, and their hexagonal outline.

14. Consists mainly of labradorite, perfectly limpid except where confused particles of undetermined foreign matter are present. These are distributed parallel to the masses of hornblende, and give to the feldspathic matrix its white milky appearance. The hornblende is yellowish-red and strongly dichroic. It is surrounded by light to dark-green masses, which are less dichroic, and are probably pyroxene in course of alteration. The hornblende presents the characteristic cleavage lines, and is sometimes in twinned crystals. The labradorite is finely banded, and so intricately twinned as to give, in connection with the free quartz, of which considerable is present, an unusually beautiful appearance to this section when viewed in polarized light.

It is of great interest to compare these objects, occurring in the norites of the Adirondacks, with similar ones encountered in the labradorites (or plagioclases) of the norites of Sweden, Scotland and elsewhere. As a rule the latter present in the rock-section a tolerably clear field.*

An admixture of microliths of augite and hornblende or magnetite belongs to the less usual occurrences. Fluid-inclusions are not common. But in the plagioclase of the norite of the island of Mull, many very beautiful ones occur, and also in that of the isle of Skye. In the latter, are also black and brownish translucent needles, sometimes 0.06 m.m. long and 0.004 m.m. broad. Grains and small needles, which consist of granules arranged one after another, and also small plates are

* F. Zirkel. Die mikr. Beschaffenheit der Min. u. Gesteine.

found in it. The feldspar is filled throughout with excessively minute objects of the same nature as the larger objects.

The gray or dark color of the plagioclase, has been attributed to similar inclusions occurring in vast numbers. In part, they are fine black needles, usually of equal thickness, and in length at times as much as 0.14 m.m., now and then with acute terminations. They mostly lie in definite directions. There are besides, minute point-like grains, probably the black needles in section. In extremely thin slices, clear brown translucent lamellæ, at times rounded, at times six-sided, make their appearance. A long needle or lamella is often composed of many pieces. They are placed closely one after another, the indented terminations mutually interpenetrating. Frequently, there are found light green bodies, irregularly arranged and in smaller quantities, with rounded and somewhat elongated sides. They are probably hornblende, exhibiting sometimes an angle of 120°. Generally, they are associated with black particles of magnetite. The inclusions are usually met with in the central portion of the individual feldspathic masses. Their edges are ordinarily quite free from them, appearing pure and limpid. Such is the plagioclase of the norite of Krageröe, which while black in mass, is reddish-brown in sections on account of the myriads of yellowish or brownish grains and needles.

The larger six-sided crystals occurring in the labradorite of Hitteröe in Norway, sometimes with reddish or reddish-yellow translucency, Scheerer regarded as specular iron. All the remainder, with few exceptions, are quite opaque and black. Most probably they are not specular iron but menaccanite, a supposition borne out by the customary occurrence of menaccanite in the labradorite of Hitteröe. Besides these, some transparent plates were observed by Scheerer, in part brown, in part green, which appeared to form many-sided prisms, with replacements at both terminations. (They may have been pyroxene in part altered to hornblende.)

20. The labradorite, together with some quartz, is quite transparent and clear. It is traversed by masses of a dark intensely-green pyroxenic ingredient, which are arranged with a certain approach to parallelism. They are cut up by distinct fine lines, also approximately parallel to one another, which impart a fibrous appearance. In part they are feebly dichroic, as if

they had undergone incipient alteration, but for the most part do not alter in tint with crossed Nichols. They were referred to diallage.

In reference to the nature of this pyroxene, the following remarks by Zirkel * are of interest:

The diallage is usually filled with a multitude of foreign microscopic lamellæ and needle-like microliths, and exhibits often a highly fibrous appearance. This occurs upon the principal cleavage plane, the orthopinakoid, and distinguishes it from most augites. By its very feeble dichroism, on which account no manifest difference of tint is obtained on trial with a Nichol's prism, it is connected however with augite, just as through the same property it is distinguished from hypersthene and hornblende. Apart from the difference in chemical composition and its other optical properties, on account of this absence of dichroism, must those constituents of the "Hypersthenites" of Veltlin, of Penig and Neurode, and of the isle of Skye, which were formerly supposed to be hypersthene, be now regarded as diallage.

The diallages in the norites of the Hebrides are in the rock-sections greyish-green and brownish-yellow. They usually abound in small needles, which are arranged in the section in a parallel manner, but present among themselves two parallel-systems cutting one another obliquely. These needles appear to be identical with those observed in the neighboring plagioclase of the norite. They are sometimes dark, sometimes feebly translucent, regular and irregular, of larger or smaller size, disseminated in clusters or in single grains. The Norwegian norites, according to R. Hagge,† from Krageröe, is filled even to the point of opacity with dark brown or black lamellæ, which lie in two directions at right angles to one another. In the Scottish norites from Mull and Skye the gradual conversion of the compact scarcely dichroic diallage into the delicate aggregates of yellowish-green brush-like masses of hornblende, which are at the same time strongly dichroic, can be most distinctly followed.

21. Section of the Dolerite, whose analysis has previously

* F. Zirkel, ib. p. 181.

† Mikr. Untersuchungen über Gabbro und verwandte Gesteine. Kiel 1871 Quoted by Zirkel, loc. cit. p. 182.

been given. A large portion of the transparent base of this rock, could not be definitely referred by its optical characters to plagioclase. It presents a considerable admixture of quartz. The dark color of the section and rock is due in part to the magnetite and menaccanite, but in still greater degree to very minute light- to dark-green and yellowish-red masses. The former are probably pyroxene, the latter, which are by far the most abundant, hornblende.

36. A rock-section of the very common variety of norite, consisting of a waxy-looking green feldspathic base with brownish-yellow hornblende. Alteration has proceeded to such an extent, that a recombination and re-arrangement of the constituents has in part taken place. The labradorite is represented by translucent areas clouded with a greenish color, but containing no definite green particles. The structure of the labradorite is faintly recognizable, and the banded arrangement of the colors still visible around the edges of the clouded portions, when viewed with polarized light. The amount of free quartz is large, presenting a granular appearance. The diallage has almost disappeared, the original masses being represented only by small areas of deep green color. Instead of them, extensive areas of reddish-brown hornblende, in color resembling some varieties of garnet, are found. This hornblende, in the blowpipe-flame fuses readily with intumescence to a black globule attractable by the magnet.

3. This rock-section is from a mass similar in character to 5, which is the yellowish labradorite, the matrix of the smoky-grey crystals in the porphyritic rock. The composition of this matrix has already been given. It has been seen that it differs in a small but important degree, from the composition of the more highly crystalline portion. The microscope shows that No. 3 contains some free quartz. With a high power, minute crystals of menaccanite are found, along with some black amorphous specks, the character of which was not determined. The diallage is represented by imperfectly crystalline and feebly dichroic masses, which in a few places are slightly altered.

In 5, quartz is also present in the labradorite, and the number of crystals of menaccanite, and possibly magnetite, much larger than in the preceding section. A few masses of pyroxene are apparent, but a slight yellow is imparted to the section by small irregular patches, which have neither the crystallization nor the cleavage of hornblende, more nearly resembling stains of oxide of iron. It is to these that the yellowish tint of the matrix, in which the dark crystalline masses are imbedded, is due.

68. Broadly-foliated dark-green diallage sliced and ground parallel to the laminæ. The most striking characteristic is the striation with fine lines, giving a fibrous appearance. It contains also some particles of quartz and magnetite.

69. Hypersthene occurring in the labradorite from the summit of Mt. Marcy. It is made up of plates or flat, short rhomboidal masses, yellowish-red to opaque. They are very minute, with equally small intervals between them, and are arranged in parallel lines. They are spread through a transparent matrix, which does not present the highly twinned appearance of the labradorite occurring in the other specimens examined, but polarizing magnificently in broad bands of color graduating one into another and penetrated by quartz. It is probably plagioclase, which has sliced along a section nearly parallel with the brachypinakoid.

V. GENERAL CONCLUSIONS.

I. That the rocks of Essex county are parts of the Norian System, and are composed of Norites similar to those forming the rock-masses of the same system in Canada, the western part of Scotland, Norway and elsewhere.

II. That these norites are a stratified rock, but have undergone a metamorphosis so profound, as to have caused them to be regarded by Prof. Emmons and earlier observers, as unstratified. The dolerites, which are formed of the same constituent minerals and are of the mean specific gravity of these norites, have probably been formed from a portion of these stratified deposits by deeply seated metamorphic action, and have further modified and greatly tilted the superposed rocks in the course of their extrusion.

III. These norites are marked by the paucity of silica. The hypersthenes and diallages, which mainly compose the pyroxenic portions, are bisilicates in which the deficiency of silica is replaced by alumina. The labradorites are composed chiefly of anorthite, and while uncombined silicic acid is in every case present in them, its quantity is too small to form the more acidic varieties of plagioclase feldspars.

IV. The alkalies are notably deficient, potash being present in minute quantities and potash feldspars wanting. The relative preponderance of earthy bases is further shown by the multitudes of iron-lime-alumina garnets, the most abundant associated mineral. Also by the iron-holding hypersthenes and diallages, and the general occurrence of magnetite.

V. Menaccanite is found universally in both the labradorites and pyroxenes — a peculiarity noticed wherever the norites have been investigated, and which probably will be found universal.

VI. In the menaccanite of certain localities, over one per cent of chromite has been found — an association apparently not hitherto observed.

STEVENS' INSTITUTE OF TECHNOLOGY,
March 1*st*, 1877.

ON THE STRUCTURE OF ASTRÆOSPONGIA MENISCUS.

By Drs. J. W. HALL and R. FRITZ-GAERTNER.

Professor Ferdinand Römer, of Breslau, in his interesting monograph upon the Silurian Fauna of Western Tennessee,* and also in that of the Silurian Fossil Fauna of Erratic Boulders found near Sadewitz in Silesia,† has given, so far as we know, the fullest description of this peculiar and characteristic fossil of the Silurian formation of Tennessee.

Referring to Professor Römer, we find this fossil characterized as round, disc-shaped, concave on the upper and convex on the lower side, varying in shape from an almost flat disc to the form of a cup.

The surface of the sponge is covered with regularly shaped stars which also interlace the interior of the sponge, but without regard to order. The branches of these stars are, according to this author, without any connection with those adjacent. Neither could Professor Römer find any pores in the stars, nor any indications of animal tissue in the interstices in or among them, but considered them only as spines or spiculæ. His separation of the genus Astræospongia from Astylospongia seems to be chiefly based upon the want of regularity in the structure and arrangement of the component parts of the first, and the uniform relative position of the more minute stars in the second, namely, their various branches forming direct lines one with the other throughout the sponge; and also that in this latter genus, there exists evidence of animal matter.

A large collection of these fossil sponges, from the same localities which furnished Professor Römer with his specimens, having been kindly placed at our disposal, for study and comparison, by Professor Hall, Director of the State Museum,

*Die Silurische Fauna des Westlichen Tennessee. 1860.

†Die Fossile Fauna der Silurischen Diluvial-Geschiebe von Sadewitz bei Oels, in Nieder Schlesien. 1861.

we have had opportunity to make the following important observations on their structure :

In order to make the study of the sponge structure more complete, it has been necessary to prepare a number of cuts both vertical and transverse. The machinery and appliances already established in the State Museum enabled us to accomplish this object in a very satisfactory manner.

Besides the polished sections which in themselves were interesting as already indicating organic structure, we have made many transparent preparations for microscopic investigation.

The mineralogical condition of the material infiltrating the sponge was such as enabled us to make the thinnest possible objects for the microscope, and thus subject them to the highest power; though more satisfactory results have been obtained by the use of the lower magnifying powers.

These sections by the assistance of the microscope, and by the aid of photography furnish the material for minute description and the means of exact pictorial representation.

The photographic print being nothing more nor less than a microscopic enlargement transferred by mechanical means from the transparent section itself, to the paper, admits of no such deviations from the original as must of necessity occur where the illustration of a specimen has to undergo the manipulation of the draughtsman and lithographer.

There is much difference in the chemical composition of the various parts of the living sponge, therefore, during the process of petrifaction these different tissues would react and be acted upon in different ways, which in regard to their crystalline molecular arrangement is clearly shown by the use of the polariscope.

There are also chemical differences, which being made use of by the careful application of dilute hydrochloric acid, and in some cases where a more delicate operation is requisite, by the use of acetic acid, show also the peculiarities of the sponge structure.

We have sometimes taken the whole sponge upon which to operate after this manner. Some of the mineral matter having been dissolved, the result was a most exquisitely delicate representation of the form of the sponge during life.

We have also treated some of the microscopical sections with acids, producing most satisfactory results.

The microscopic examination of the sediment left after the etching process, was likewise important, as in many instances we found it, in a great measure, composed, of tubes (perhaps spiculæ) the presence of which we had not before detected in the sponge.

The external form of the sponge has already been given in our description taken from Professor Römer, from a simple disc gradually passing into the form of a cup.

The diameters of our specimens vary from two to eight centimetres, and the perpendicular depth is from one-half to four centimetres.

Judging from the examination of a great number of specimens, that the original form of all these sponges was a simple thin flat disc, containing only one or two layers of colons, it is by the gradual growth and addition of cells and colons that it takes its final cup-like form; the central depth of which is about half the height of the cup.

The convex side of many of the specimens before us show a slight depression, nearly central, and this peculiarity is much more marked upon the flatter specimens. In many cases a well defined star marks the middle of this indentation.

The concave surface, as a rule, exhibits the stars more finely developed and in a much better state of preservation. The central depression is also noticed, in some instances, upon this side, conforming in position to that which appears upon the convex surface; but neither of these depressions seem to mark a point of attachment to any extraneous object. As Professor Römer has already stated, there appears to be no doubt that these sponges were free, either floating in the water or bedded in the mud.

According to Dr. Bronn in his "Thier Reichs," we can conclude, from the minuteness of the pores in the species under consideration, that they inhabited shallow waters; as from observation upon recent sponges it is found that the size of the pores, bears certain relation to the depth of the water in which they live, increasing in size somewhat in proportion to the depth of the water.

Dr. Römer states, evidently from analogy with the recent forms of cup sponges, which are fixed, that these sponges must have grown with the concave side up. There appear to be other reasons in favor of this theory in regard to their position, for instance, as has already been mentioned, the stars upon the concave side are in a better state of preservation, perhaps indicating the newest growth of the sponge, while the appearance of the other side might seem to indicate a loss of organic action and gradual absorption or deposition of calcareous or silicious particles.

Nevertheless, upon examination of the vertical section represented in fig. 3, of Plate 3, we discover lines of tubes, the construction of which we will hereafter describe, commencing at the concave margin and gradually diverging as they approach the convex surface; and supposing the growth of the sponge to be upward, there seems to be but one conclusion, and that is, that the concave must have been the first or lower side.

This position would also account for the stars upon this surface being in a better state of preservation, on account of the protection it would afford them from external wear and accident. It is well known that nearly all fossils, when discovered, show the lower side to have been better protected.

We regret that we have no data from the collector showing the actual position of these specimens in the strata; but, so far as we know, they have been found separate among the debris and decomposed rock upon the surface.

The stars, which go to make up the most noticeable feature of the sponge, are superficially tangential; and from weathering and gradual dissolution of the interfilling substance stand in relief. The star may be described as follows: From a central bead spring six arms, at equal distances, each measuring from two to four millimetres in length, depending upon the individual star from which the measurement has been taken, and each branch diverging from the next at an angle of sixty degrees.

The central bead is a hollow globule bearing a strong resemblance to the independent or originating cell of a recent sponge as figured by Bronn in his "Thier Reichs" (Table 1, fig. 9). Sometimes this globule is slightly compressed upon the upper surface. It has six principal pores (seeming to be six sided) which form the direct communication with the arms or branches. Besides these, there are numerous smaller openings, each having the characteristic stellate appearance.

The branches of the star themselves are made up of smaller beads, gradually decreasing in size as they approach the point, each of these beads being formed similarly to the central cell, namely, being furnished with six principal stellate pores, surrounded by smaller ones which give to the arms a lined or striated appearance. The stellate pores only appear under a magnifying power of about three hundred diameters.

Commencing in the central bead and traceable throughout the line of cells forming the arms of the star, is a tube or spine connecting each with the other, the final point appearing open for external communication.

A yellowish mineral substance, mostly alumina, surrounds the stars and seems to have been the skin or epitheca.

Under a high magnifying power, this also exhibits the stellate pores, richly interlaced and crossed by fine spines. These spines, by the use of the polariscope, we conclude to be silicious in their composition, as they show the characteristic bright iridescence indicating quartz.

Upon placing one of the specimens in very dilute acid this yellow material, still retaining its form, floats like a thin membrane attached to the fossil. This fact can only be explained by the great number of spines which thus contribute to its tenacity, and these spines bear the greatest resemblance to those figured by Dr. Bronn in his "Thier Reichs" (Table 1, fig. 12).

The manner of growth has already been indicated in the description of the star, and it appears to be by the gradual development and division of a single cell.

Taking for example a single star for a basis and counting six larger cells to each branch we have thirty-six cells, and the central or germinating bead of these branches would make thirty-seven cells; each of these with an innate power of reproduction by elongation, could produce, if necessary, another mother cell which in its turn could throw off six branches and so on till the necessities of the sponge were accomplished and its growth attained.

But as a rule the general growth would seem to indicate that the function of germination was confined to the central cell.

In fig. 3, of Plate 3, we have given an illustration of a vertical section of one of these sponges. The principal feature observable, is the systematical arrangement of the colons or tubes formed of a number of balloon-shaped cells; these commencing on the concave surface, gradually diverge as they approach the outer or convex side. Taking for example two neighboring tubes, it will be seen that the cells appear to alternate, or the cell of one tube partially fills the space occurring between two of the cells of the next and so on; though exceptions to this mode of growth are observable.

In some of the vertical sections, there appears to be a division marked by a transverse line of cells from which the vertical growth seems to have taken place in both directions at the same time, though the lines of cells diverging to the convex, are more marked and larger than those passing toward the concave surface.

Although stars do occur in making the vertical sections, they appear to be rather the exception than the rule, and can be explained by the fact of the germinating power inherent in the cells forming the branches or side growths.

The mineralogical components are first calc spar which is indicated by the fracture, also alumina which has already been mentioned as composing the greater portion of the tegument, and which can readily be detected by the taste and odor. Blue and red chalcedony are present in variable proportions — in some, hardly observable, and in others forming the greater portion of the body of the sponge. We have also noticed in the specimens under examination that, as a rule, the flat sponges were nearly destitute of this mineral, while the deeper or cup shaped sponges were largely composed of chalcedony.

NOTE. — It is scarcely necessary to remark upon the rapid progress made in the use of the microscope as applied to science during the past few years. Mineralogy and Petrography have already materially advanced through its assistance, and Palæontology has but just entered upon this comparatively new branch of investigation.

The use of these fine microscopic sections in the study of Corals as well as Sponges, and in almost all fossils, will eventually become a necessity and will form a marked era in the progress of the science to which they are applied.

ENTOMOLOGICAL CONTRIBUTIONS—NO. IV.

BY J. A. LINTNER.

I. ON MERMIS ACUMINATA RUDOLPHI.

A PARASITE OF THE LARVA OF CARPOCAPSA POMONELLA.

In April, 1875, an example of this entozoan was received at the State Museum of Natural History, from the Hon. Joseph D. Friend, of Middletown, Orange Co., N. Y., with the request for information in relation to it. Its examination, in connection with the circumstances under which it was found, proved it to be of so much general interest, that the following reply was made to him, through the columns of the *Albany Evening Times*, of April 12th:

DEAR SIR: The "new apple-worm" which you submitted to us a few days since as having been found in a few instances in Orange county, N. Y., during the present season, coiled about the heart of the apple, bore so strong a resemblance to the Gordius, or "hair-worm" as it is ordinarily called, that on its presentation by you I unhesitatingly (but erroneously) referred it to that genus. The brief notice of the new worm, which has appeared in some of our journals, has excited no little apprehension, lest so diminutive a creature, the diameter of a horse-hair, five inches in length, and of the color of the apple pulp—might be introduced in its living state unnoticed into the stomach, and continue its existence as an internal parasite within some of the organs of the body.

The Gordius is not an uncommon animal. Under its popular name of hair-worm or hair-snake (either appellation being given to it, as the particular species or sex noticed approaches its minimum length of about four inches, or its maximum length of twenty-six inches), it has probably come under the observation of most persons living in the country. They are occasionally met with in turning up damp soil, where little groups of several individuals are sometimes found knotted together, occupying a cell in the ground. More frequently they occur in standing water by the roadside and in wagon ruts, in drinking troughs, in old wells, and in small pools on the banks of creeks or rivers. In color, shape and size, they bear so strong a resemblance to a hair from the mane or tail of a horse, as partially to excuse the very general superstition which prevails in relation to them, that they have actually originated from such hairs, and that if a horse-hair be placed in a barrel of rain-water, it will in due time be converted into a living hair-snake. Of course, the more intelligent portion of the community need not be told of the utter impossibility of such a transformation, by which a body devoid of animal life can become a living being. It is a law of nature, without exception, that all animal existence, the lowest as well as the highest, commences with an egg.

The Gordius belongs to that division of the animal kingdom known as the Entozoa, embracing animals which pass a portion of their existence at least, within the bodies of other animals. Our common grasshoppers are frequently infested with Gordii, and I once was so fortunate as to discover an individual in the act of emerging from the head of a grasshopper. They have also been found in crickets, in some of the butterflies, in various species of beetles, in aquatic larvæ of insects as of caddis-worms and May-flies, in the honey-bee, etc.

Much of the history of the Gordius remains unknown. Dr. Leidy has observed the operation of its laying its eggs, in a long, thread-like string, broken asunder in several places, but aggregating the extraordinary length of ninety-one inches, — more than ten times the length of the worm extruding it. The entire number of eggs contained in this oviposition was, by a careful calculation, computed at nearly seven millions (6,624,-800). The young Gordius, microscopic in size, and very unlike its parent in form, has been observed, and its entrance followed into the body of water larvæ, through the thin integuments at the joints of the legs. Their subsequent development during their condition of internal parasites is unwritten.

Upon submitting the specimen with which you favored us, to microscopic examination, it was seen to differ in its internal structure and in its more pointed extremities, from the species of the genus GORDIUS above referred to. As these forms have been so little studied and so little is known in relation to them, it was deemed proper before naming it for you in accordance with your request, to submit it to the eminent authority, Dr. Leidy of Philadelphia, who has given special study to the Entozoa. Having examined it, he returns the following very interesting information: "The worm is a species of MERMIS, a parasite of the larva of *Carpocapsa pomonella*, or apple-worm moth, which accounts for its presence in the apple itself. A similar specimen was referred to me a short time since, for an account of which see the next or forthcoming number of the Proceedings of the Academy of Natural Sciences [Philadelphia]."

MERMIS is a genus closely allied to GORDIUS. Leidy states that he has frequently seen specimens of it, which he calls "the white hair-worm," within insects—in one instance crawling out of a Carolina grasshopper which was struggling in a ditch. Siebold describes *Mermis albicans* of Europe (two to five inches long, of a whitish color) as parasitic in the drones of the honey-bee.

This new phase of parasitism of the Mermis upon a caterpillar living within the apple, at its core, and often in its younger stage within the seeds, is so remarkable and interesting an announcement, that we shall anxiously await the promised paper, for the explanation of much that seems mysterious to us. In what manner, and at what time, does the Mermis effect its entrance in the body of the Carpocapsa apple-worm? The eggs of the apple-moth are deposited on the blossom end of the apple, where the skin is the thinnest, at various periods during the summer months. Hatching within a week, the young caterpillar passes directly into the apple, eating its channel as it proceeds toward the core. Here it remains until it has completed its growth, when emerging from the apple it crawls down the branches, or drops itself to the ground by its thread, to seek some safe place of shelter in which to construct its cocoon. At this time and even during its subsequent hybernation in its larval form within its cocoon, it is exposed to parasitic attack; but this cannot be the period of the entrance of the Mermis, for its presence within the apple indicates its previous existence in the worm. It could not have taken possession of the worm while the apple was attached to the tree, for its structure would not admit of its ascending the trunk and branches of the tree. Should a wonderful instinct lead it to seek its prey through the closely packed excremental matter filling the worm-holes of the "wind-falls" lying on the ground, then the worm in its exit from the fruit, usually very soon after the apple falls, would carry its guest away with it, instead of leaving it behind to excite our wonder and perhaps alarm several months thereafter. Damp cellars would seem to be an appropriate habitat for the Mermis, but its abode within the stored apples would naturally be more brief in this case than in the preceding, the latest worms at this time having attained or being near their maturity. Without the labor of penetrating the apple, its prey could much more conveniently be found in the unchanged larvæ hidden often in immense numbers between the boards of the apple-bins or beneath the barrel hoops within a cocoon too slight to offer any material resistance to the entrance of so thread-like an organism.

The interesting inquiry also arises, is this the first state of parasitism in the cycle of the Mermis' history, or, as would seem more probable, has it already undergone its first transformation from its larval to its perfect form within the body of some other animal, totally unlike our apple-worm? It is to be hoped that Dr. Leidy's observations have enabled him satisfactorily to solve these several enigmas.

As an aid to the development of the history of the interesting animal, it will be of service if as full statements as possible be obtained of the conditions under which it has occurred in each instance in Orange county the present season—the first knowledge we have of its presence in the apple, or any other fruit. Was it found invariably in worm-eaten apples; and if so, had the fruit been much or little eaten? Were any remains of the Carpocapsa-worm noticed as associated with it? Were any living apple-worms seen in the apples eaten during the winter? Where and in what manner were the apples stored in which the Mermis was present? Can it be ascertained if the infested apples were hand-picked or "wind-falls?"

Any replies to the above, or such additional information as may promise to be of service, will be thankfully received at the State Museum.

The great importance of a knowledge of the history of the internal parasites, and the interest connected with them, from the fearful results following the introduction of some of the class within the human body, as for example, the *Trichina spiralis*, is my apology for replying to your inquiries at some length. The detection of the Mermis in the apple, in a few instances, recently, need not, we think, occasion alarm. It is possible that in eating an uncooked apple without the proper mastication, a living Mermis might be introduced into the stomach, for of the Gordius (a closely allied genus as above stated) Leidy says, "It is perhaps the hardest or most resistant to the feel of any of the order, and it is tough and elastic. It is very tenacious of life, and when cut into several pieces will continue to live and move for some time afterward." But should it escape the ordeal of the teeth and pass uninjured into the stomach, there is reason to believe that the action of the gastric juice and other conditions to which it would be there subjected, would deprive it of life before it could pass into the intestines or penetrate the integuments of the body.

Subsequent to the above communication, I addressed another to Mr. Friend, asking for such additional information as he might possess, or be able to obtain in relation to the interesting parasite. In reply he sent me a letter which he had received from Mr. James T. King, of Middletown, stating under date of April 16, 1875, as follows:

I regret to be able to give you but a very meagre report on the apple-worm. Two or three years have passed since the party who gave me the scanty information below, found the first specimen left with me.

The apple in which it was found was a fine looking fall pippin, appeared to be sound, was blown from the tree during a violent wind-storm at night, and picked up the next day.

The worm was coiled up in the fleshy part of the apple, about midway between the skin and the core. It was white, or of the same color as the pulp, and when uncoiled measured seven inches in length, and about one-fiftieth of an inch in diameter. It remained quite active for several hours, and was then placed in alcohol.

The specimen delivered to you was found this winter, but the person who discovered it and brought it to me could give me no definite information in regard to it. * * * *

Accompanying the above, Mr. Friend also writes: —

I send you herewith a letter which I have received from Mr. James T. King, Druggist and Chemist of Middletown. Mr. King forgot to state in his letter, that specimens of the worm have been found in stewed apples, by a family residing in Middletown, somewhat broken up, but in no other way sensibly affected by the heat to which they had been subjected.

Now, that public attention has been so widely drawn to this subject by the publication, in so many of the newspapers of the State, of your recent letter, I think it safe to predict that during the coming summer and autumn much more satisfactory information will be gathered respecting this curious and hitherto unknown parasite.

The above prediction was not verified, and it may therefore be inferred that the parasite is not increasing rapidly, and that its presence in fruit cannot be expected to be of frequent occurrence.

But a single instance of its detection has since been brought to my notice. Prof. J. H. Comstock, of the Department of Entomology, in Cornell University, has informed me that he has in his possession an example of *M. acuminata*, taken in January 29th, of the present year [1876], from a worm-eaten "Seek-no-further." The apple was grown in the vicinity of Ithaca, and had been stored in a bin in a cellar. The fruit had been shaken from the tree, but not allowed, it is believed, to lie upon the ground for any length of time.

Prof. Comstock proposes, during the coming season, to communicate with a large number of pomologists with a view of learning of the distribution, abundance, and such additional facts as may add to our knowledge of this interesting creature.

The first published notice of the detection of the Mermis in fruit (unknown to me at the time of my communication to Mr. Friend), appeared in the Gardener's Monthly, for May, 1872, a periodical published in New-York. A reference to this notice is made in Prof. Riley's Fifth Report on the Insects of Missouri, p. 49, in connection with descriptions of two additional parasites (Hymenoptera) of the apple-worm (*Carpocapsa pomonella* larva), discovered by Prof. Riley.

Mr. P. H. Foster, of Babylon, N. Y., communicates to the Gardener's Monthly, as follows:

I discovered a parasite on the above worm [*Carpocapsa pomonella*] in the year 1869. I sent a specimen to Mr. B. D. Walsh, of Illinois, which he calls a species of hair-snake (Gordius). I also found one last summer imbedded in the apple-worm in the center of a large pear. This Gordius is white. * * * * Prof. Leidy, of Philadelphia * * * describes several, and mentions one which he calls the white hair-worm (Mermis), which is the only one that corresponds with the specimen I have reference to.

Prof. Riley informs me that subsequent to his reference, above cited, he had obtained two specimens of Mermis from Carpocapsa larvæ found in fruit, and two other examples from larvæ taken from beneath bandages placed around the trunks of apple trees, to serve as a place of retreat for the larvæ during their transformations, from which they could be taken and destroyed. He had also taken a similar specimen from the posterior part of the brain of an owl.

The specimen taken by Prof. Riley from the brain of the owl may be presumed to be the same or closely allied to those described by Prof. Wyman,* which he has found so common, in the brain of the snake-bird or water-turkey, in Florida (in seventeen out of nineteen specimens shot), that their presence might be presumed to be the normal condition of the bird. Prof. Wyman finds them to correspond so closely to the *Eustrongylus papillosus* of Diesing, that he thought they might prove to be identical. In every instance they were coiled up on the back of the cerebellum, in numbers varying from two to eight. Figures of them are given, showing the male and female, their position on the cerebellum, enlarged views of their extremities, and the development, within the oviduct, of the egg to the free young embryo. Nothing is known of their transfer from the oviduct, through some other animal probably, to the brain of another bird.

In a subsequent communication to the *American Naturalist* (Vol. VI, p. 560), Prof. Wyman presents very interesting additional observations upon these parasites, and, upon the bird in which they have their habitat, and designates them as *Filaria anhingœ*.

The communication of Prof. Leidy to the Philadelphia Academy, to which reference has been made, in which he describes *Mermis acuminata*, is reported in the Proceedings of the Academy of Natural Science, of Philadelphia, for February, 1875, as follows:

Professor Leidy remarked that Mr. Thomas Meehan had submitted to his examination some worms which had been

**Proceedings of the Boston Society of Natural History*, October 7, 1868. See, also, *American Naturalist*, vol. III, p. 41, 1870.

found in an apple. They consisted of one entire individual and the anterior half of a second, and apparently pertain to the *Mermis acuminata*, a long thread-worm which has been discovered infesting the larvæ of many insects. Among others, it is parasitic in the larvæ of the fruit-moth of the apple, which readily accounts for its presence in the fruit. Twenty-five years ago (Proc. 1850, p. 117) he had described a worm, belonging to the collection of the Academy, and labeled as having been obtained from a child's mouth, which was evidently the same species. It having been in a child's mouth is probably to be explained by supposing that the child had eaten an infected apple.

The characters of the present specimens of the worm, both females, are as follows: Body filiform, pale fuscous, narrower anteriorly. Head conical, truncate, with the mouth simple and unarmed. Caudal extremity thicker than the head, obtusely rounded, and furnished with a minute spur-like process. Length, five inches eight lines; cephalic end at mouth $\frac{1}{12}$ mm.; a short distance below $\frac{1}{5}$ mm.; middle of body $\frac{3}{8}$ mm.; near caudal end $\frac{1}{4}$ mm.; mucro $\frac{1}{12}$ mm. long, $\frac{1}{80}$ mm. thick.

We transcribe for comparison the description of the example obtained from a child's mouth, to which reference is made above, together with the accompanying interesting remarks, which show the apprehension entertained by Dr. Leidy, at that time, at least, of serious results which might follow the introduction into the human system through the mouth, of the Mermis and allied species of Entozoa.

Filaria hominis oris.—Body white, opaque, linear, thread-like; mouth round, simple, posterior extremity obtuse, furnished with a short, curved, epidermal hooklet $\frac{1}{500}$ inch in length, by $\frac{1}{2000}$ inch in diameter at base. Length, five inches seven lines, greatest breadth $\frac{1}{66}$ inch; breadth at mouth $\frac{1}{250}$ inch; at posterior extremity $\frac{1}{80}$ inch.

Remarks.—The description is taken from a single specimen preserved in alcohol, in the collection of the Academy, labeled "obtained from the mouth of a child."

Is it a young individual, or perhaps a male of the *Filaria Mendinensis*, or Guinea-worm? The latter, as is well known, infests the human body, often growing to an enormous length, several yards or more, in the inter-tropics of Asia and Africa. It is frequently brought in the body of negro slaves from Africa to America, where no entozoon of the kind has ever been noticed to be parasitic in man, as an indigenous production. From some late observations on the course of life of entozoa, helminthologists have been led to suspect that most and probably all entozoa pass different stages of their existence in different animals. If such be the fact, may not the

Filaria Mendinensis owe its introduction into the human body from the custom which prevails in those countries where the worm is found, of using insect food. Insects are well known to be infested with Filariæ, probably more than any other class of animals. In Egypt, Arabia, etc., the locust is eaten; in Guinea, etc., the larger coleoptera, in the raw state; and in this condition Filariæ may often be swallowed, and reach a higher development of their existence in the human body.

In the same paper, Dr. Leidy describes two additional species of similar Entozoa, — the one (*Filaria canis cordis*) as indicated by the name given it, taken from the heart of a dog. The two examples were white, opaque, linear, nearly uniform throughout, posteriorly subulate, pointed; mouth simple, round. Length ten to ten and a half inches; greatest breadth $\frac{2}{5}$ of a line, anteriorly $\frac{1}{5}$ of a line. The other species (*Filaria boæ constrictoris*), was found in the areolar tissue, in an irregular or tortuous position, between the muscles of the ribs and the integument of a boa constrictor. This was a more robust form, ten inches in length by $\frac{4}{5}$ of a line broad, of a white color and longitudinally striated.

Dr. Leidy has also recently found* the common house-fly (*Musca domestica*, it may be presumed) to be infested with a thread-worm, of about a line in length, which takes up its abode in the proboscis of the fly. From one to three worms occurred in about one fly in five. The parasite was first discovered in the house-fly in India, by Carter, who described it as *Filaria muscæ*, and suggested that it might be the source of the Guinea-worm in man.

In view of these unwelcome suggestions, that it may be a necessary section of the life history of several of these entozoa that they should be introduced into the human body through the food of which we partake, there to undergo their final development, it is much to be regretted that the entire history of all the species to which man is exposed is not yet known. Much attention has been paid to them, but their study has proved a difficult one. A monograph of the Hair-worms, by M. Villet, has recently been published, of which we know nothing beyond the information given in the American Naturalist for December, 1874, to the effect that it was then being published in the "Archives de Zoölogie Expérimentale." The author had found the larvæ encysted in the larvæ of CHIRONOMUS (be-

* *American Naturalist*, Vol. IX, p. 247. 1875.

longing to the Diptera and aquatic in their habits), and afterward, in September, in the mucous lining of the intestines of fishes, thereby, in conjunction with the previous labors of Grube, Leidy, and Meissner, clearing up their metamorphoses. The larvæ are tadpole-shaped. The habits of GORDIUS seemed quite distinct from MERMIS found living in insects.

Dr. Speyer communicates to me the information that the occurrence of the Gordiacæa in the body of insects has frequently been observed in Europe, notices of which may be found in several interesting communications from Von Siebold, in the *Stettiner Entomologische Zeitung* for the years 1842, –43, –48, –50 and –54. The species which infests most frequently the Lepidoptera is *Mermis albicans*. They are found in both the larvæ and the perfect insects, oftener in the former. They occur in the larvæ which feed on tall trees, as well as those which live on plants and low shrubs. Wet seasons seem to be more productive of the parasitism, and Dr. Speyer recalls, a number of years ago, during an unusually wet season, his having met with several of such instances. From an example of *Hadena adusta* he had a Mermis emerge, of the length of eight and a half inches, and another from *Hesperia lineola* after it had been pinned. Prof. Von Siebold suggests that a heavy dew may moisten the trunks of trees sufficiently to enable the Mermis to ascend them.

The Mermis parasite (species not stated by Dr. Speyer) also infests the *Carpocapsa pomonella* larvæ in Europe.

These pages have been for some months in type. In the meantime, Dr. Packard's *Report on the Rocky Mountain Locust*, in Hayden's Geolog. and Geograph. Survey of Colorado, for 1875, has been received. In it (pp. 663–667) he gives an account of the several species of GORDIUS and MERMIS occurring in the United States, transcribing from the paper above cited (see full title below *), the descriptions of the Gordii and also the history of *Gordius aquaticus* as given by Villot, carrying it beyond its encysted state in the intestines of fishes, to its free and aquatic state the following spring. This stage it attains by boring through the cyst into the intestinal cavity of the fish, thence passing with the fæces into the water, where material changes take place before it assumes the active stage. For a more full account of these several transformations, see p. 665 loc. cit.

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*Monographie des Dragonneux (Genre GORDIUS Dujardin), par A. Villot. (Archives de Zoölogie expérimentale et générale, tome 3, No. 1, 2. 1874. Paris.)

II. THE NEW CARPET-BUG — ANTHRENUS SCROPHULARIÆ.

During the summer of 1874, notices appeared in various newspapers of the ravages of a carpet-bug, quite different in its appearance and in the character of its depredations from the well-known carpet-moth, *Tinea tapetzella*, which for so long a time had been the only known insect depredator on our carpets. Its *habitat* was stated to be beneath the borders of carpets where nailed to the floor, eating in those portions numerous holes of an inch or more in diameter. Occasionally it located itself in the crevices left by the joinings of the floor, following which, entire breadths of carpet would be cut across as by scissors. In several instances carpets had been destroyed — new ones as readily as older — and it was questioned whether their use could be continued, in view of a prospective increase of the alarming ravages.

The insect was new to every one, and no one could form a rational conjecture as to what order of the Insecta it belonged. It was described as a small ovate object, about one-eighth of an inch in length, thickly clothed with numerous short bristle-like hairs, and terminating in a pencil of these, forming a tail. It was exceedingly active in its motions, and when disturbed in its concealment would glide away beneath the base-boards or some other convenient crevice so quickly as in most instances to elude capture for its closer inspection. They were found only during the summer months.

In 1876 it was reported in many dwellings in Schenectady, and in the month of July examples of it, for the first time, came under my observation, taken, upon search having been instituted, under the carpets of my residence at Schenectady, where its presence had not been suspected. It was evident, on the first inspection, that it was the larva of a beetle, and in all probability a member of the very destructive family of DERMESTIDÆ, which comprises several of our most injurious depredators on animal substances.

A number of the larvæ were secured and fed upon pieces of carpet in order to rear them. In September they had evidently matured, and had assumed their quiescent pupal state within the skin of the larva, first rent by a split along the back for the escape of the perfect insect. At this stage they presented characters which led me to refer them, in all probability, to the genus ANTHRENUS.

In October, the first perfect insect emerged. Being entirely new to me, they were sent to Dr. LeConte, the distinguished coleopterist of Philadelphia, for determination. He returned answer that they were the *Anthrenus scrophulariæ* — a species well known in Europe for its destructiveness, but now for the first time detected in this country.

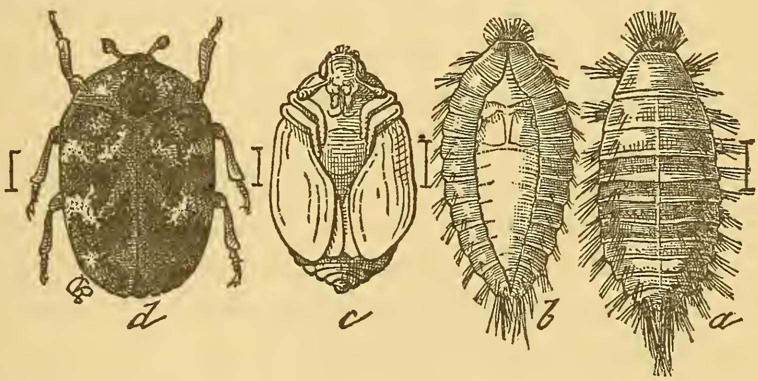
Notice of the discovery was communicated by me to the Albany Institute at its meeting of October 17th, 1876, and a report of the same published in the *Albany Argus* of October 21st. Owing to the interest attached to the introduction in our country of another addition to the already formidable list of injurious insects of European origin, the paper, or extracts therefrom, appeared in several of the journals of this and adjoining States. Through the publicity given it, I became informed of the presence of the insect in many localities in New York and other States. Examples of a beetle, believed to conform to the brief description which I had given of *A. scrophulariæ*, and known to possess the like habit of feeding upon carpets, were sent to me by Mr. A. S. Fuller of the *Rural New-Yorker*, for comparison. The species had been in his cabinet for some time, under the name of *Anthrenus lepidus* Le Conte, having received the first examples from Oregon in 1871 or 1872. Later, in 1874, specimens referred by him to the same species were found abundantly in a dwelling in Market street, New York, and thereafter in various parts of the city and neighboring localities. The examples reared by Mr. Fuller from larvæ taken in New York city were clearly identical with *A. scrophulariæ*. Upon informing Dr. Le Conte that examples of this species were in cabinets under the name of *A. lepidus* and requesting an explanation, he wrote me that the latter name had been given by him to a form which he had found on flowers at San Francisco and San Jose in 1850;* that it differed from the *A. scrophulariæ* of Europe in

***A. lepidus*, breviter ovatus, supra niger, thoracis lateribus albo-squamosis, gutta nigra inclusa, elytrus fasciis tribus angustis suturaque albo-squamosis, macula antica suturali aureo-squamosa ornatis, basi parce albo-squamosis. Long. .11 in San Diego, Cal. — *Proc. Acad. Nat. Sci. Phila.*, 1854, *p.* 112.

its sutural line being white instead of red; but that in all probability it should only be regarded as a variety of the European species.

Dr. Le Conte suggests that it may have been imported into California from Southern Europe during the Spanish occupation of that country. The eastern invasion of the insect, he believes to have been within a few years through the importation of carpets at New-York.

The accompanying figures, very faithfully drawn by Prof. Riley, represent *A. scrophulariæ* in three of its stages, viz., *a* the larva, *c* the pupa, and *d* the imago or beetle. At *b*, the skin of the larva, after the beetle has emerged from the fissure on the back, is shown. The figures are enlarged — the lines beside them representing the natural size.



The larva — the form in which it is usually found when pursuing its ravages beneath the carpets — measures, at maturity, about three-sixteenths of an inch in length. A number of hairs radiate from its last segment in nearly a semicircle, but are more thickly clustered in line with the body, forming a tail-like projection almost as long as the body: this terminal pencil of hairs is not shown in its full extent in the figure, doubtless taken from an immature individual. The entire length of the insect, including the pencil of hairs, is, in the largest specimens, nearly three-eighths of an inch. Measured across the body and the lateral hairs, its breadth just equals the length of the body. An ordinary magnifier will show the front part of the body, where no distinct head is to be seen, thickly set with short brown hairs, and a few longer ones. Similar short hairs clothe the body — somewhat longer on the sides, where they tend to form small tufts. Towards the hinder end may be seen on each side three longer tufts (thrice as long) projecting laterally; but these are not always visible, as the insect by the aid of a peculiar muscular arrangement, has the power of folding them out of sight along its sides. The body has the appearance of being banded in two shades of brown — the darker band being the central portion of each ring, and the lighter, the connecting portion of the rings, known as the incisure. By turning it upon its back, the six little legs, of which it makes such good use, can be seen, in vigorous efforts to regain its former position — its struggles while in this condition sometimes producing a series of jumps of about an eighth of an inch in length.

Having attained its full growth, it prepares for its pupal change without the construction of a cocoon or any other provision than merely seeking some convenient retreat. Here it remains in a quiet state, unaltered in external appearance, except somewhat contracted in length, until it has nearly completed its pupation, when the skin is rent along its back, and, through the fissure, the pupa is seen. A few weeks having passed, the pupal skin in its turn is split dorsally, and the brightly colored wing-covers of the beetle are disclosed. Still a few additional days of repose are required for its full development, when the now fully matured beetle crawls from its protective coverings of pupal case and larval skin, and appears in its perfect form — its final stage.

The earliest beetles emerge in the month of October, and continue to make their appearance during the fall, winter and spring months. Soon after their appearance probably, they pair, and the females deposit their eggs for another brood of the carpet-eating larvæ.

The beetle is quite small — smaller than would ordinarily be expected from the size of the larva — being only about one-eighth of an inch long by one-twelfth broad. An average of five examples before me gives, length .125 inch, breadth .085 inch. Its form is almost a perfect ellipse as seen from above ; its back and under surface are quite rounded. When turned upon its back, it often for a few moments counterfeits death, with its legs so closely folded to the surface as scarcely to be seen, and in this state the ordinary observer might be at a loss to know the lower from the upper side.

It is a beautifully marked little insect in its contrasting colors of white, black and scarlet, arranged as follows : The edge of each wing-cover, where they meet on the back, is bordered with red (forming a central red line), with three red projections from it outwardly — one on the middle of the back, and one other toward each end. Take a straight line and divide in four equal parts by three cross lines, and we have nearly the position of these projections. At the extreme tip of the wing-covers is a widening of the bordering line, making almost a fourth projection from it. The first projection, near the head, is connected with a white spot, running upwardly on the middle of the front border of the wing-cover. On the outer border of the wing-covers are three white spots nearly opposite the red projections. The intermediate spaces are black. The segments of the body beneath are covered with pale red scales, and the thoracic region (which bears the legs) with whitish scales.

The above description, although not presented as a scientific one, will suffice for the identification of the beetle when met with.

The detection of this insect adds to our fauna another species of the dreaded genus of ANTHRENUS, which there is reason to fear will equal in its destructive agency the well-known museum pest, the *A. varius* (formerly known as *A. musæorum*), the obtrusive guest of all our collections of natural history, whose ravages it seems impossible fully to guard against, and so exceedingly difficult to control.

It does not confine itself wholly to carpets, but it also infests and injures various articles of wearing apparel, hanging in closets or lain away in drawers. An instance has also been stated, but awaits confirmation, of its preying upon cotton fabrics—a habit not attaching to either the clothes or carpet moths.

It is known to have become almost ubiquitous in a house which had been for some time occupied by it, notwithstanding the persistent efforts made for its extirpation. Its exuviæ were encountered in trunks, boxes, tied up packages, drawers, beneath floor oil-cloths, etc. Late in the season (October) clusters of twelve or more of the full-grown living larvæ were disclosed, to the disgust and dismay of the housekeeper, in turning over a paillasse, the borders of which they had selected as a safe retreat on which to undergo their final transformation.

I have this present year found that a convenient place in which to discover the beetle, is upon the windows of the infested rooms during the day. In the latter part of April examples were taken upon the windows of my residence at Schenectady. After the middle of May, a systematic search instituted for them, gave several examples each day. In the six days from May 17th to 22d, forty-four specimens were taken from the three windows of two upper rooms. Should investigation show that the beetle is drawn to the windows before the deposition of its eggs, their ready capture and destruction at this time will offer an easy method of preventing their increase.

Should this insect continue to increase until its complete naturalization shall make it as common as *A. varius* (a dozen or more of which may sometimes be seen feeding on a single flower), it is difficult to conceive how, under such a visitation, the comfort of carpets can still be indulged in within our homes. Even now, when it has barely commenced its ravages, it is reported as having inflicted very serious pecuniary losses in several instances, where carpets have been entirely ruined; and such terror has its presence imparted, that not a few prudent housekeepers have already abandoned the customary nailing of their carpets to the floor, that frequent examinations may be made during the summer months for the discovery and destruction of the unwelcome guest.

The remarkable invasion of a dwelling in Cold Spring, N. Y., in the summer of 1874, after a twelve months' absence of the family in Europe, was by a larva of Anthrenus (as determined by Dr. Packard), which is now believed to have been this species. According to the statement made, "they took complete possession, from the cellar to the attic, in every nook and crevice of the floors, under matting and carpets, behind pictures, and eating every thing in their way." From this account we may infer an almost incalculable capability of increase if left to itself, and draw the lesson of the absolute necessity of combatting its invasion by every means in our power.

It will unquestionably prove an exceedingly difficult pest to dislodge. The ordinary applications of camphor, pepper, tobacco, turpentine, carbolic acid, etc., are powerless against it. It has even been asserted that it "grows fat" on these substances. An effectual means of destruction, and preventive against new invasions, is still to be discovered. The free use of benzine has been recommended in some of our journals, to be used in the saturation of cotton, with which to fill the joinings of the floors and crevices beneath the base-boards. This is to be done during the winter months, at which time the insect will be occupying these retreats, either in its perfect beetle form, or as eggs deposited for another brood; to either of these the direct application of benzine would be fatal. To some of my correspondents I have suggested the pouring of kerosene oil in the crevices of the floors, and filling of all places of retreat with cotton saturated with the oil. I would regard this as less dangerous in its use than benzine, and equally efficient.

The recommendation recently made in several of our newspapers, of the Persian insect-powder for the destruction of the insect, I believe to be of no value. I have not deemed it worth the trouble of experimenting with it, but I have been told by those who have given it a trial that it has been found to be of no avail whatever.

The insect has not as yet become sufficiently abundant in New York to be found resorting to plants for its food. The variety *Anthrenus lepidus*, which was introduced in California sufficiently long ago to permit its complete naturalization, was discovered there, in numbers, feeding upon some of the Compositæ. The *Anthrenus varius* is often found, in its perfect state, taking its food from the blossoms of different plants in the garden or field. I have met with it abundantly on peonies. It has also been found to frequent the rocket flower, *Hesperis matronalis*, a fragrant and showy perennial.

If the plants known to be attractive to the *A. varius* can be introduced into our houses, and made to flower during the months of April and May, I believe that the carpet-beetles would be drawn to them in preference to windows, perhaps as soon as they emerge from the pupæ.

We are unable to give at the present any precise statement of its distribution. It is known in Oregon, as well as in California. It is believed to be distributed throughout most of the western States, and it is known to occur in various portions of the State of New York.

It is announced as having appeared in considerable force in Syracuse. In Utica it has inflicted serious damage in many dwellings. It has occurred at Buffalo, but not in such numbers as to have originated the name sometimes applied to it—the *Buffalo bug*—a name given to it on the Pacific coast probably, from a fancied resemblance to that animal. Its presence has also been detected in Albany, but no serious ravages have been reported. It has occasioned much alarm in several places in the State of New Jersey. Without doubt it is committing its depredations in many localities where its work is ascribed to the carpet-moth, than which it is a far more pernicious insect.

A lady to whom I was relating the destructive capabilities of the new pest, congratulated herself that her carpets were free from it. The following morning her husband brought to me a beetle which he had taken from his face during the night, which proved to be the creature that I had described to her the previous evening—the abundant presence of which in her home, she had not suspected.

From the serious nature of its depredations as above referred to but in part, the secrecy with which it conducts them, the extreme difficulty with any known appliance of eradicating it—it becomes very important, as a preventive against its alarming increase, that it should, from the outset, be combatted by all the means known to be efficacious against its allied forms, or which may give promise of success as against a new foe.

It may be interesting, in connection with the above notice of this last importation, to recall the fact that nearly all of our most injurious insects have been introduced from Europe. Of a long catalogue given by Professor Riley, in one of his valuable reports, a few may be mentioned here:

The Hessian-fly (*Cecidomyia destructor*), the wheat-midge (*Diplosis tritici*), the cheese-maggot (*Piophila casei*), the house-fly (*Musca domestica*), the currant-worm (*Nematus ventricosus*), oyster-shell bark-louse (*Aspidiotus conchiformis*), several species of plant-lice (*Aphides*), the cockroach (*Blatta orientalis*), the croton-bug (*Ectobia germanica*), the meal-worm (*Tenebrio molitor*), the grain-weevil (*Sitophilus granarius*), the bee-moth (*Galleria cereana*), the codling-moth of the apple (*Carpocapsa pomonella*), the cabbage-moth (*Plutella cruciferarum*), the carpet-moth (*Tinea tapetzella*),* the clothes-moth (*Tinea vestianella*), the fur-moth (*Tinea pelionella*),* the currant borer (*Ægeria tipuliformis*), and within the few past years, the asparagus-beetle (*Crioceris asparagi*), and the well-known destructive cabbage-butterfly (*Pieris

*Mr. V. T. Chambers finds differences in these two species from the European ones (*Canadian Entomologist*, 7, pp. 124, 125).

rapæ). All of these, and the formidable list might be greatly extended, we have received from Europe, while very few of our native insect pests have been sent in return. Should our late exportation of the Colorado potato-beetle (*Doryophora decemlineata*), prove as injurious in Europe as in this country, which there is much reason to doubt, we shall still be very far from having made a commensurate return. While the few American species which have been introduced in Great Britain and on the continent have not spread to any great extent, in almost every instance where injurious insects have been brought thence to this country, their number and their ravages have been greatly increased. Thus, while the recent advent of the *Anthrenus scrophulariæ* has brought consternation in many of our homes, we have been unable to find any record of its preying upon carpets, or other woolens, in the Old World, where it has been so long known. Even special inquiry made by me of one of the leading Entomologists of Europe, has failed to elicit any such information. It is said there to infest dried meats and similar substances. Perhaps its fondness for carpets is a new taste which its transportation hither has developed.

III. ISOSOMA VITIS SAUNDERS.

THE GRAPE-SEED FLY.

During the early part of September of the present year (1876), a cluster of grapes, in very bad condition, which had been received at the office of the *Country Gentleman*, of Albany, was submitted to my examination, with a request for information as to the cause of the injury or disease. It was accompanied with the following letter from the gentleman in whose garden, at Plainfield, N. J., the grapes had grown:

EDS. COUNTRY GENTLEMAN.— I send you by mail to-day a single bunch of Walter grape, to ask if you will tell me in the columns of your paper, what is the matter with my grapes. They have been affected in same manner since the first year they bore (now the third year of bearing), but never so badly as this year. The disease attacks all kinds (I have about a dozen), and in different parts of my garden. It shows itself about the time of ripening, and this year promises to destroy the whole crop before they are fairly ready to pick. If this bunch carries well, you will probably notice a berry or two just touched, and you will see that the puncture is very small. Dr. Hexamer thinks it may be sun-burn, but I am sure this is not the trouble, for this very bunch which I send you was cut from underneath heavy foliage, and bunches heavily shaded are just as badly affected as others more exposed. I have watched for bees and wasps, but find scarcely any. Occasionally a single bee will be found sucking the juice of a berry already broken. Neither do I see many birds on the vines, though we have English sparrows in the neighborhood. The vines are very thrifty, and are taken as good care of as I know how to do.

H. R. M.

The nature of the difficulty was so singularly concealed that it was not readily detected by me. A critical examination, however, brought to view the hidden cause, and enabled me to return the following answer:

The injury which threatens to destroy an entire crop of grapes, as above narrated, proceeds from an insect pest which promises to prove very detrimental to the grape-growing interest of our country, and which, therefore, should be promptly met and circumvented by all the means in our power.

The bunch of grapes, as received, contained a large number of shriveled berries, upon which, as also upon nearly every one of the perfect ones, could be seen with the naked eye, a small round dot, in the center of which an elevated roughened surface was visible with a magnifier. The dot marks the spot where a very minute four-winged fly had punctured the skin and deposited its egg. The egg hatching, the larva passes through the pulp into one of the seeds, upon the kernel of which it feeds, and within the empty case undergoes its transformation to its pupal state, having previously provided for the escape of the perfect fly by gnawing an aperture of sufficient size in the seed.

For the detection of this insect, for our knowledge of its habits and transformations, and for its description, we are indebted to Mr. W. Saunders, the able editor of the *Canadian Entomologist*, who first observed the insect, in Canada, in the fall of 1868. It was at first believed by him to be the larva of a curculio, but subsequently was correctly referred by Prof. Riley to the hymenopterous genus ISOSOMA. In the *Canadian Entomologist* for November, 1869, it is described by Mr. Saunders as *Isosoma vitis*. The fly is quite small, being but about one-sixth of an inch in spread of wings; its head, thorax and abdomen are black, the wings clear and iridescent, and the legs brown and black. The species is interesting from its belonging to the same genus with the destructive joint-worm fly, the *Isosoma hordei* (Harris), which has proved so very destructive to the wheat, rye and barley crops; and, perhaps, even more interesting from a remarkable difference in the sexes, pointed out by the late Mr. Walker of the British Museum, "one of them representing the carnivorous EURYTOMA, and the other the herbivorous ISOSOMA, and thus one species figuratively combines the diminishers of vegetation and the controllers of such diminution."

In an account of this insect Mr. Saunders says: "On the 20th of August, 1868, we observed that many of the berries in the bunches of a Clinton vine, under our care, were shriveling up. On opening the grapes, we noticed that most of the smaller berries — that is, those which had shriveled earliest— contained only one seed, and that of an unusually large size;

but some of the larger withered grapes contained two seeds, each having a dark spot upon its surface. On cutting the seeds carefully open, the kernel was found almost entirely consumed, and the cavity occupied by a small, milk-white, footless grub, with a pair of brown hooked mandibles, a smooth and glossy skin, with a few very fine short white hairs. When at rest, it was nearly oval in form, but when in motion, its body became elongated, varying in length from one-fifteenth to one-twelfth of an inch.''

Mr. Saunders found the larvæ unchanged within the seeds, and quite active, in an examination made in the month of February. Early in July they were still soft, but motionless, and they may have been in the pupa state. On the 9th of August, a number of the perfect insects, dead, were found when the contents of the bottle containing the seeds were turned out upon a piece of white paper. They had probably effected their escape during the last half of July.

It is possible that this insect may not prove so destructive as it threatens to do, by spreading from garden to garden, and throughout our vineyards. If it were left unmolested, under circumstances continuing to favor its increase, it is capable within a few years of compelling the abandonment of the culture of the grape in our country. Hidden within the seeds, it could readily be distributed in the transportation of the grapes to distant markets, through the several States of the Union. This is the first instance that we have heard of its appearance within the United States.

Encouraged by the recollection that at different times in the past, when a destructive insect pest has threatened to pursue its ravages without the probability of its arrest by human agency, some kindly parasite or climatic condition has come to our aid — so we shall hope that in the present instance the little *Isosoma vitis* will not find conditions more favorable to its existence in its new habitat, or others that it may select, than it enjoyed in Canada, where its spread seems to have been, for the time, at least, arrested.

No means, however, should be left untried that promise to arrest and destroy it. Knowing the history of the insect, we are able to state that it can best, perhaps only, be destroyed while in the larval or grub state, or previous to attaining its perfect condition. This may be done by burning all the shriveled grapes, as well as those not shriveled, but showing the dot marking the entrance of the inclosed grub — in short, all infested clusters. Or, the clusters might be buried, with a foot of solid ground above them, through which, the perfect insects if developed under such circumstances, would not be able to penetrate.

Regarding so serious an attack upon the grape as of great economic importance, and with our knowledge of it limited to an experience in a single locality, I deemed it proper to request of the gentleman from whom its announcement had been received, a detailed statement for record, of the circumstances and conditions attending it, as an aid toward working out the life history of a dangerous insect pest, of which so very little was known.

He kindly communicated the following statement:

DEAR SIR — Your favor of 17th November is received. Please accept my hearty thanks. I will gladly take pains to learn what I can next year about the insect and inform you.

I only have a small place in New Jersey, where I live, and in my garden I have some twelve or fifteen vines only. The place I purchased five years ago, built my house and made my garden. The lot was a portion of an old neglected apple orchard. The soil is a light sandy loam, with a sub-soil of clear sand and gravel, running down probably twenty feet. Most of my grape vines are set in a border facing the south-west, trained on a post and wire trellis, with an ordinary picket fence about two feet in the rear — so they have an abundance of light and air.

About 150 feet from this trellis, facing it (hence a north-east exposure), is the rear of my house. On a piazza here I have a Croton vine, very thrifty, and not far away, against an out-house, I have a Catawba, with a south-eastern exposure. These two vines bear largely and are the only ones in my yard, apparently free from the attack of this insect.

Where I previously lived, I never had any trouble worth mentioning with grape enemies, and so was not on the look out for this insect. My grapes bore a very little two years ago (first crop), and I do not remember any appearance of disease. Last year they (or some of them) bore quite a crop, and the grapes were badly injured. Gardeners and fruit growers in my neighborhood, thought the trouble came from heavy and continued rains following a dry spell, the sap starting so vigorously as to burst the berry; I therefore gave the matter not much thought. This year, as you know, many of my vines fruited largely — notably the Concord, Martha, Walter, Croton, Catawba, with a smaller fruitage of Delaware, Hartford Prolific, etc. With the exception heretofore mentioned, *all* were attacked. I noticed it first as the grapes reached their full size, and began to ripen, and I suppose I lost quite three quarters of the fruit on the vines thus attacked.

I do not know how widespread the trouble may be. Some of my neighbors have suffered somewhat, but I think none so much as I. I propose to take pains to get the experience of the fruit-growers around me, and will then, as you request, communicate with you further.

Yours respectfully,

H. R. MUNGER,

PLAINFIELD, N. J.

Notices of "grape-rot," as a serious evil prevalent in various parts of the country, have appeared, from time to time, for the past few years, in our agricultural journals. Its cause has been extensively discussed, many speculations have been advanced, earnest study has been given it, but up to the present time, its occurrence, like that of the pear-blight, has received no satisfactory explanation.

Is it possible that it may be but a phase of a formidable *Isosoma vitis* attack? This question arises, when too late to answer it through examinations the present year. It may be that the conjecture, for such it merely is, may at once be dismissed as without foundation, by those conversant with the disease (of which the writer only knows the name), and can recall in it, conditions inconsistent with those attendant upon the insect attack, as above reported. The shriveling of the berry, its discoloration (its partial decomposition, perhaps, of which no mention has been made), and its dropping to the ground, might easily present most of the features of an ordinary decay.

If the question herewith raised of the identity of the two may not be at once authoritatively answered by the grape-grower familiar with all the phases of the grape-rot, then it will remain as a most interesting subject for determination the coming season. Should the suspicion be verified, and the cause of the wide-spread and growing evil be discovered so singularly hidden within the seeds, then there is scarce a doubt, but that by the sacrifice of one or two crops the progress of the evil can be effectually arrested.

IV. LIST OF LEPIDOPTERA.

COLLECTED BY W. W. HILL, IN THE ADIRONDACK REGION OF NEW YORK.

It is with much pleasure that we present the following record of some recent collections of Lepidoptera from one of the most elevated regions of the State of New York. It is, we believe, the first published local list, of any considerable extent, of the Lepidoptera of the State, and in view of the absolute necessity of such lists to an extended knowledge of the distribution of insects, it will be appreciated by the student. The great interest pertaining to the subject of geographical distribution, and its important bearing upon the derivation and modification of species, is illustrated by the admirable chapter on "The Geographical Distribution of the Phalænidæ of the United States," constituting pages 567–594 of Dr. Packard's *Monograph of the Phalænidæ.*

The enthusiasm of the entomologists of an adjoining State, has led them to explorations of a peculiarly interesting field lying beyond the limits of their own State — the White Mountains of New Hampshire. For successive years, the members of the Cambridge Entomological Club have established a midsummer encampment upon the slope of Mt. Washington, by which, through their protracted sojourn for weeks, and opportunity for collecting crepuscular and nocturnal forms, they have been able to enrich their cabinets and those of their correspondents with many rare boreal species, to accumulate much valuable biological information, and to present local lists of Lepidoptera, Coleoptera and Orthoptera which have been received as special contributions to science.

Meanwhile, the extensive Adirondack region with its numerous lofty mountain peaks, its deep gorges, its hundreds of lakes — perhaps second only to the White Mountains in point of interest to the entomologist of any locality in the United States east of the Rocky Mountains — has been permitted, each year, to bury within itself its entire entomological wealth.

Previous to the collections noticed in this paper, scarce an insect had been drawn from it. At the present, nothing has been reported of its mountain insect fauna. Many new species are doubtless to be discovered there, and the first comparison of its fauna with that of other elevated and more northern regions is yet to be made. It is not impossible (although our eastern friends will not admit the possibility) that the naked summit of Mt. Marcy may yet yield to earnest search another locality for that very interesting butterfly of so restricted range—*Chionobas semidea*, while aspirations less lofty, would in all probability be rewarded by the addition of *Argynnis montinus* to our State fauna.

It is sincerely to be hoped that, from the growing interest manifested in entomology, the numerous accessions to the number of its students, the facility for study afforded by recent publications and in several extensive classified collections — the reproach resting on the Entomologists of New-York, may speedily be removed. And while the thorough exploration of any locality can scarcely fail of bringing to light much new material, the ambitious student may have for his incentive the assurance that in the Adirondack region, and especially among the Adirondack Mountains proper, there is open to him an unexplored field where faithful search will assuredly yield him a most abundant return.

For the valuable information embodied in the following List, in its enumeration of species, dates of apparition, comparative abundance of species and of sex, we are indebted to the zeal of Mr. W. W. Hill, of Albany. Although having but recently devoted himself to entomological study, the ardor with which he has entered upon it, the unwearying industry displayed in its pursuit, and the very satisfactory results thus far attained, give every assurance that the science to which he has so earnestly consecrated his available time, will be materially advanced by his labors.

The collections were made in Township No. 4, of Lewis county, at Fenton's, and its immediate vicinity. The elevation above tide has not been computed, but may be given approximately at 1450 feet.

The larger proportion — perhaps three-fourths — of the Noctuidæ were attracted by light, and taken within the Fenton House. Quite a number were captured "at sugar"; the inexperience of the collector in this usually very successful method made it far less remunerative than under other circumstances it would have been, and than it promises to be hereafter.

It is to be regretted that this List could not present the results of an entire season, instead of being necessarily so partial an exhibit of the Lepidoptera of the region, from the brief time to which the collections were limited. As may be seen from the record, they commenced on July 1st (1876), and were continued until the 21st of August. On the part of Mr. Hill, they terminated August 4th, the subsequent additions having been made by friends sojourning at the place. An absence of one week during this time limits the period of regular collecting to four weeks.

Collections of considerable less extent made during the preceding year (1875) from July 1st to August 4th, are also incorporated with the above. Of the species taken at this time no dates were recorded ; when, therefore, they were not met with during the following season, they appear in the list simply as taken in July or August, 1875.

RHOPALOCERA.

Papilio Turnus *Linn*	July,	1875.
Pieris oleracea (*Harr.*)	"	17, 19, 27, 29 31.
P. rapæ (*Linn.*)...........	"	19, et al.
Colias Philodice *Godart*	"	12, et al.
Danais Archippus (*Fabr.*).....	"	3, 10, 20, 27, 31.
Argynnis Cybele *Fabr*........	"	19, 31.
A. Aphrodite *Fabr*... ...	"	12 to 29. 12 ♂, 5 ♀.
A. Atlantis *Edw*.........	"	4 to 21. 8 ♂, 15 ♀.
A. Myrina (*Cramer*).....	"	27, 30. 3 ♂.
A. Bellona *Fabr*.........	"	19.
Phyciodes Nycteis *Doubl.*	"	8, 10.
P. tharos (*Drury*).......	"	2, 3, 5, 6, 7, 18. 9 ♂.
P. Batesii (*Reak.*)	"	1875.
Melitæa Phaeton (*Drury*)	"	1875.
Grapta comma (*Harr.*)........	"	14.
G. Faunus *Edw*.........	"	17, et al. 6 ♂, 5 ♀.
G. Progne (*Cramer*)......	"	1.
G. J-album (*Bd.-Lec.*)...	"	1875. Aug. 1. 2 ♂, 2 ♀.
Vanessa Antiopa (*Linn.*)......	"	1875.
V. Milberti *Godart*......	"	1875. Aug. 5.

Pyrameis Atalanta (*Linn.*)....	Aug. 1875.
P. huntera (*Fabr.*).......	July 27, Aug. 1, 5.
Limenitis Arthemis (*Drury*)...	" 5, (15 ♂, 2 ♀) 10, 12, 15, Aug. 1. 19 ♂, 4 ♀.
L. disippus (*Godt.*)......	" 1875.
Neonympha Eurytris (*Fabr.*)..	" 1875.
N. Canthus (*Linn.*)......	" 3 to 19. 8 ♂, 2 ♀.
Satyrus Alope (*Fabr.*)........	" 19, 26, 31, Aug. 1. 5 ♂.
S. Nephele (*Kirby*)......	" 15, 17, 19.
Thecla strigosa *Harr*..........	" 1875.
T. Titus (*Fabr.*).........	" 6, 17, Aug. 1, 4. 7 ♂, 3 ♀.
Lycæna neglecta *Edw*.........	" 1875.
Chrysophanus Thoe (*Bd.-L.*)..	" 1875.
C. Americana (*Harr.*)....	" 2, 3, Aug. 1, 5,
Pamphila Zabulon (*Bd.-Lec.*).	" 1875.
P. Leonardus (*Harr.*)....	" 1875.
P. Peckius (*Kirby*)......	" 18.
P. Mystic *Edw*..........	" 2, 3, 4, 5, 12. 7 ♂, 2 ♀.
P. Cernes (*Bd.-Lec.*).....	" 2, 3, 4, 5, 12. 6 ♂, 3 ♀.
P. Metacomet (*Harr.*)....	" 2, 5, 6, 8, 10, 18. 4 ♂, 2 ♀.
Eudamus Pylades (*Scudd.*)....	" 1875.

HETEROCERA.

SPHINGIDÆ.

Sesia uniformis *Grote-Rob*.........	July 5, 12.
Daremma undulosa *Walk*.........	" 1875.
Smerinthus geminatus *Say*........	" 27.

ZYGÆNIDÆ.

Ctenucha virginica (*Charp.*).......	July 5 to 18. 10 ♂ 2 ♀.
Lycomorpha pholus (*Drury*)......	Aug. 12.

BOMBYCIDÆ.

Callimorpha militaris *Harr*........	July 1875.
Arctia virgo (*Linn.*)..............	" "
A. Saundersii *Grote*.........	" "
Spilosoma textor *Harr*...........	" "
Orgyia nova *Fitch*................	" 26.
Parorgyia Clintonii *Gr.-Rob*.......	" 12.
Nadata gibbosa *Walk*.............	" 7.

Crocota ferruginosa *Walk.*	July 18, 19.
Dryopteris rosea (*Walk.*)	" 1875.
Cœlodasys unicornis *Sm.-Abb.*	" "
Clisiocampa Americana *Harr.*	" 11, 12, 18, 27.

NOCTUIDÆ.

Pseudothyatira cymatophoroides	Aug. 12.
P. expultrix *Grote*	July 4, 6, 9, 27. 3 ♂, 6 ♀.
Thyatira scripta *Gosse*	" 30.
Diphthera fallax *Her.-Sch.*	" 11, Aug. 3. 1 ♂, 1 ♀.
Briophila lepidula (*Grote*)	" 12.
Acronycta lobeliæ *Guen.*	" 12.
A. Radcliffei (*Harvey*)	Aug. 26.
A. lepusculina *Guen.*	July 7.
A. Americana *Harr.*	" 10, 12, 18.
A. brumosa *Guen.*	" 29, Aug. 3.
A. superans *Guen.*	" 11, 14.
A. hamamelis *Guen.*	" 10.
A. dentata (*Grote*)	" 11.
Micrococlia fragilis *Guen.*	Aug. 2.
M. diphteroides *Guen.*	July 10.
M. obliterata *Grote.*	" 4.
Agrotis Chardinyi (*Boisd.*)	" 30.
A. sigmoides (*Guen.*)	" 3, 9, 10.
A. perattenta *Grote*	" 1875.
A. conflua *Tr.*	Aug. 1875.
A. perconflua *Grote.*	" 8.
A. baja (*W.-V.*)	July 26, 30, Aug. 13, 22.
A. Normaniana *Grote.*	" 1875.
A. rufipectus *Morr.*	" 29.
A. haruspica *Grote.*	" 11, 17, 27.
A. bicarnea (*Guen.*)	" 13, 28, Aug. 5, 15.
A. subgothica (*Haw.*)	" 1875.
A. herilis *Grote*	" 27.
A. tricosa *Lintn.*	" 3, 27, Aug. 2.
A. plecta (*Linn.*)	" 9, 14, 21, Aug. 7.
A. redimicula *Morr.*	" 30.
A. pitychrous *Grote*	" 1875.
A. muraenula *Gr.-Rob.*	" "
A. ypsilon (*Rott.*)	" 31, Aug. 1, 8.
A. placida *Grote.*	" 26.

Agrotis turris *Grote*	July 30.
A. pressa *Grote*	" 8.
A. prasina (*W.-V.*)	" 17, 27, 29. 4 ♂, 2 ♀.
A. astricta (*Morr.*)	" 15.
Dianthœcia lustralis *Grote*	" 9.
Mamestra purpurissata *Grote*	" 27 to Aug. 8. 4 ♂, 3 ♀.
M. nimbosa (*Guen.*)	" 1875.
M. imbrifera (*Guen.*)	" 4 to 15. 9 ♂, 2 ♀.
M subjuncta *Gr.-Rob.*	" 8.
M. legitima *Grote*	" 10, 13, 15, 29.
M. trifolii (*Esper*)	Aug. 8.
M. lorea (*Guen.*)	July 2, et al. 6 ♂, 5 ♀.
M. renigera (*Steph.*)	" 11 to 31. 6 ♂, 2 ♀.
M. olivacea *Morr.*	" 30 — Aug. 21. 10 ♂. 1 ♀.
Hadena loculata (*Morr.*)	" 3, 11, 16, 30, Aug. 6.
H. devastatrix (*Brace*)	" 12 to Aug. 8.
H. lateritia (*Hüfn.*)	" 3, 9, 10.
H. sputatrix *Grote*	" 8 to Aug. 9.
H. apamiformis (*Guen.*)	" 8.
H. impulsa (*Guen.*)	" 10.
H. arctica *Boisd.*	" 3, 4, 6, 10, 17, 26, 27.
H. lignicolor (*Guen.*)	" 8 to Aug. 7. 3 ♂, 8 ♀.
H. verbascoides (*Guen.*)	" 10, 15.
H. sectilis (*Guen.*)	" 6 to 31. 2 ♂, 6 ♀.
H. modica (*Guen.*)	Aug. 4.
H. Hillii *Grote*	July 26.
Hyppa xylinoides *Guen.*	" 6, Aug. 15, 19.
Eriopus mollissima *Guen.*	" 1875.
Phlogophora periculosa *Guen.*	" 27, 29, 31. 5 ♂, 3 ♀.
Euplexia lucipara (*Linn.*)	" 1 to 18. 7 ♂, 4 ♀.
Brotolomia iris (*Guen.*)	" 1875.
Nephelodes violans *Guen.*	Aug. 3, 19, 22.
Hydrœcia sera *Gr.-Rob.*	July 12, 14, 16, 17, 27. 5 ♂.
H. nictitans (*Linn.*)	" 27 to Aug. 19.
Achatodes zeæ (*Harr.*)	" 30, Aug. 4.
Leucania pallens (*Linn.*)	" 1.
L. phragmitidicola *Guen.*	" 1875.
L. Harveyi *Grote*	Aug. 9, 19.
L. lapidaria *Grote*	July 9.
L. adonea (*Grote*)	" 10.
L. commoides *Guen.*	" 6, 11, 16, 26. 1 ♂, 5 ♀.

Leucania unipuncta *Haw*	Aug. 13, 21.
Caradrina fidicularia (*Morr.*)	" 1.
Amphipyra tragopogonis (*Linn.*) ..	" 19.
A. pyramidoides *Guen.*	July 30, Aug. 4, 6.
Orthodes infirma *Guen.*	" 11.
Tæniocampa oviduca *Guen.*	" 11, 17.
Tæniosea gentilis *Grote*	" 9.
T. perbellis *Grote*	" 6.
Plastenis pleonectusa (*Grote*)	" 1875.
Eucirrœdia pampina (*Guen.*)	Aug. 19.
Anytus sculptus *Grote*	" 21.
Cucullia convexipennis *Gr.-Rob* ...	July 3.
C. asteroides *Guen*	" 3.
C. postera *Guen.*	" 15, 29.
C. intermedia *Speyer*	" 18.
Nolaphana Zelleri *Grote*	Aug. 17.
Plusia æreoides *Grote*	July 3 to Aug. 7. 13 ♂, 3 ♀.
P. balluca *Guen*	" 29.
P. Putnami *Grote*	" 1875.
P. bimaculata *Steph*	" 6, Aug. 3.
P. precationis *Guen*	" 28, Aug. 4, 13.
P u-aureum *Boisd*	" 30.
P. mortuorum *Guen*	" 11, 30.
P. epigæa *Grote*	" 1875.
P. ampla *Walk*	" 30.
P. simplex *Guen*	Aug. 4, 5.
Erastria carneola *Guen*	July 7, 30, 31, Aug. 1, 7, 9.
E. albidula *Guen.*	" 3.
E. muscosula *Guen*	" 3, 6, 11.
Leptosia concinnimacula *Guen*	" 1875.
Lithacodia bellicula *Hübn.*	" 2, 3.
Drasteria erechtea (*Cram.*)	" 29, Aug. 1.
Catocala ultronia (*Hübn.*)	" 31, Aug. 1.
C. Ilia (*Cram.*)	" 8.
C. polygama *Guen*	Aug. 5.
C. præclara *Gr.-Rob*	July 31.
Pangrapta decoralis *Hübn*	" 2, Aug. 17.
Homopyralis tactus *Grote*	" 8, 10, Aug. 7.

DELTOIDÆ.

Pseudoglossa lubricalis (*Geyer*)	July 11 to Aug. 1.
Epizeuxis æmulalis (*Guen.*)	" 1875.

Epizeuxis americalis (*Guen.*).......	Aug. 2.
Litognatha nubilifascia *Grote*......	July 3, 4.
Zanclognatha lævigata *Grote*......	" 16.
Z. ochreipennis *Grote*........	" 11.
Z. marcidilinea *Grote*........	" 14.
Philometra longilabris *Grote*.......	" 4, 9, 11, 14.
Rivula propinqualis *Guen*.........	" 2, 27
Palthis angulalis *Hübn*............	" 2, 10, 11, Aug. 17.
Renia discoloralis *Guen*...........	" 1875.
R. Belfragei *Grote*.............	" 15 to 31. 5 ♂, 2 ♀.
Bleptina caradrinalis *Guen*........	" 1, 12.
Hypena humuli *Fitch*	" 15, 21, 29.

PHALÆNIDÆ.

Chœrodes transversata (*Drury*)....	July 27 to Aug. 3. 5, ♂ 9 ♀.
*Ennomos magnaria *Guen*..........	Aug. 12, 15.
Endropia serrata (*Drury*)..........	July 1875.
E. bilinearia *Pack*...........	" 8, 9, 10, 13, 14. 10 ♂.
E. effectaria *Walk*...........	" 11, 19, 26.
Ellopia fiscellaria (*Guen.*).........	" 1875.
Sicya truncataria *Guen*............	" "
Angerona crocataria (*Fabr.*).......	" 6, 8.
Nematocampa filamentaria *Guen*...	" 17, 18, 19.
Boarmia humaria *Guen*............	" 18, 30.
B. pampinaria *Guen*.........	" 6.
Paraphia subatomaria *Guen*.......	" 1875.
Synchlora rubivoraria *Riley*.......	" "
Ephyra pendulinaria *Guen*........	" 31.
Acidalia enucleata *Guen*...........	" 1, 13.
†A. quadrilineata *Pack*.......	" 3, 4, 11.
A. inductata *Guen*...........	" 1, 11, Aug. 8.
Stegania pustularia *Guen*..........	" 18, 28, 30, Aug. 4, 11.
Cabera erythemaria *Guen*..........	" 1.
C. variolaria *Guen*...........	Aug. 7, 22.
Eumacaria brunnearia *Pack*.......	July 28.

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*I cannot agree with Dr. Packard in the reference of this form to the *alniaria* of Europe, the two differing so much in the shape of the wings. Dr. Speyer has remarked of *magnaria*, "near to our *alniaria*." Mr. von Meske has recently sent a large number of the eggs of *magnaria* to Dr. Speyer, which will probably furnish the means for such a comparison, in all of the four stages of the insect as will authoritatively decide the question of identity which is raised.

†One example of the species was entirely without lines.

Macaria enotata *Guen*..............	July 8, 27.
M. granitata *Guen*.	" 3, 8, 11, 18, 27.
Phasiane trifasciata *Pack*..........	" 29.
P. mellistrigata *Grote*........	" 30, Aug. 19.
*Thamnonoma brunneata (*Thunb.*).	" 4. 2 ♂, 1 ♀.
Eufitchia ribearia (*Fitch*)..........	" 16, 19, 30.
Caripeta divisaria *Walk*............	" 1875.
Hæmatopis grataria (*Fabr.*)........	Aug. 8.
Aspilates Lintneraria *Pack*........	July 27.
Heterophleps triguttata *Her.-Sch*...	" 1875.
Odezia albovittata (*Guen.*).........	" 5, 8.
Scotosia undulata (*Hübn.*)........	" 5.
Melanippe hastata (*Linn.*).........	" 6.
M. sociata (*Bork.*)...........	" 3, Aug. 17.
M. lacustrata *Guen*..........	" 1, 3, 6, Aug. 5.
M. basaliata (*Walk.*).........	" 3, 27.
Melanthia ruficillata *Guen*.........	" 4 to Aug. 8. 6 ♂, 5 ♀.
Coremia designata (*Hüfn.*)........	" 6, 30, Aug. 17.
C. ferrugaria *Clerck*..........	Aug. 9.
Cidaria Packardata *n. sp*..........	July 27.
C. testata (*Linn.*)............	Aug. 15.
C. albolineata *Pack*..........	" 15.
C. cunigerata *Walk*..........	July 6—Aug. 17. 7 ♂, 6 ♀.
C. hersiliata *Guen*...........	" 7, 14.
C. truncata (*Hübn.*)..........	" 4 to Aug. 22. 5 ♂, 4 ♀.
Spargania magnoliata *Guen*........	" 11, 15.
Oporabia cambricaria (*Curtis*).....	" 11.
O. 12-lineata (*Pack.*)..........	" 7.
†Larentia cæsiata *W.-V*...........	" 10.
Eupithecia miserulata *Grote*.......	" 11.

PYRALIDÆ.

Asopia farinalis (*Linn.*)...........	July 26, 29, 30, 31.
A. devialis *Grote*.............	" 12, 13, 17, 18.
A. squamealis *Grote*..........	" 9.
Ennychia octomaculalis (*Linn.*)...	" 11.
Desmia maculalis *Westw*...........	Aug. 1876.
Botis theseasalis *Walk*.............	July 6, 8, 16, 29, 30.
B. plectilis *Gr.-Rob*..........	" 1, 3, 4, 5, 14, 17.
B. marculenta *Gr.-Rob*.......	" 27.

*Determination of Dr. Packard.
†Determination of Dr. Packard.

Botis badipennis *Grote*	July 30.
B. generosa *Gr.-Rob*....	" 5.
B. hircinalis *Grote*...........	" 4.
B. subolivalis *Pack*..........	" 5.
Scoparia centurialis *W.-V.*........	" 28.

MICROLEPIDOPTERA.

Galleria cereana (*Fabr.*)....	Aug. 1875.
Crambus girardellus *Clem*.........	July 10.
Crambus præfectellus *Zell*.........	" 3, 17, Aug. 6.
Tortrix cerasivorana (*Fitch*).......	" 17.
Ditula blandana *Clem*.............	" 7.
Sericoris cæsialbana *Zeller*........	" 4.

In the above list two hundred and fifty-four species are recorded, and represented, as in the detailed memoranda preserved by Mr. Hill, but not convenient to reproduce in these pages, in 796 examples, viz.: of the Rhopalocera, 152 ♂'s and 69 ♀'s; of the Heterocera, 306 ♂'s and 269 ♀'s.

The preponderance of the captures of male Rhopalocera is very marked, being 120 per cent in excess of the females: of the Heterocera, the males exceed the females by only 12 per cent.

The paucity of the Sphingidæ and Bombycidæ reported, is to be explained by the late date at which the collections commenced. Numerous sphinges had been observed, attracted to light, during the month of June. The period of greatest abundance of most of the Diurnals both in species and in individuals had also passed. On the 5th of July, *Limenitis Arthemis* was still abundant, but in worn condition. At this date, Mr. Hill captured of this upland species, as noted above, eighteen examples, upon a moist spot near a stream, three miles distant from Fenton's on the wagon-road to Lowville. Two visits to this locality were afterward made, without obtaining additional examples.

Among the Phalænidæ, are a larger number of northern forms than might have been expected from the comparatively moderate elevation at which the collections were made. The following of the species are recorded by Dr. Packard in the paper before referred to, as circumpolar or subarctic species, "ranging between the isotherm of 32° and 44°, and also following the isothermals of 44° and 48° southward into Colorado and California — in Colorado ranging from an elevation of 8,000 feet to the limit of trees, 11,000 feet:" *Larentia cæsiata*, *Oporabia cambricaria*, *Spargania magnoliata* *Cidaria truncata*, *C. hersiliata*, *C. cunigerata*, *C. Packardata* (populata of Pack.), *Coremia ferrugaria*, *Melanippe fluctuata* and *M. hastata*.*

To these ten species may be added *Thamnonoma brunneata*, which, if the identification of our species with the European *brunneata* and *pinitaria* be correct, also occurs in elevated regions in Europe.

In consideration of their very interesting distribution, we transcribe for these species the localities ascribed to them in Dr. Packard's monograph, adding to his table the new locality given them in this paper.

	Colorado or Pacific Coast or both.	Mt. Washington.	Adirondack Region, New York.	Labrador.	Iceland.	Lapland.	Alps of Central Europe.	Ural or Altai Mts., or both.
Thamnonoma brunneata	..	*	*	..	..	..	*	..
Melanippe hastata	*	*	*	*	*	*	*	*
Melanippe fluctuata	..	*	*	..	..	..	*	*
Coremia ferrugaria	*	*	*	*	*	*	*	*
Cidaria Packardata	*	*	*	*	..	..	..	..
Cidaria cunigerata	..	*	*	..	..	..	..	..
Cidaria hersiliata	*	*	*	..	..	..	..	..
Cidaria truncata	*	*	*	*	*	*	*	*
Spargania magnoliata	*	*	*	..	..	..	..	..
Oporabia cambricaria	..	*	*	..	..	..	*	..
Larentia cæsiata	*	*	*	*	*	*	*	*

*It will be observed that in several citations in this paper from Dr. Packard, his late generic references have not been followed, as I cannot regard the lists of Hübner as of any authority in nomenclature. I fully concur in the opinions so unequivocally expressed by Guenée, Dr. Speyer, Wallace, Dr. Boisduval (see Canad. Entomol. 8, p. 117.), Dr. Hagen, Edwards and other leading entomologists, that catalogue names (as were Hübner's), have no just claim for precedence over those of properly defined generic and other groups, and that the attempt to introduce them in nomenclature can result only in confusion and other serious evils.

Among these catalogue names of Hübner, "still-born" (Guenée) more than three score and ten years ago, recently galvanized into life, and for which Dr. Packard stands sponsor, are the following from the Tentamen: Epirrita, Petrophora, Rheumaptera, Hydria, Cymatophora; and from the "Verzeichniss" a few years later:

Ochyria,	Operophtera,	Semiothisa,	Calothysanis,	Therina,
Philereme,	Perconia,	Deilinia,	Eois,	Epirranthis.

It is probable that *Cidaria albolineata* should be numbered among the above subarctic forms, although not so included by Packard. The localities ascribed to it are all of northern or high elevations, as Quebec, Brunswick, Me., and the White Mountains. It has never been observed by me in this portion of New York, except upon the summit of the Catskill Mountains.

Phasiane trifasciata of the list, may also prove to belong to the above, — its only other recorded locality being Berlin Falls, Me.

Of the species cited above, *Larentia cæsiata*, *Oporabia cambricaria*, *Spargania magnoliata*, *Cidaria Packardata* and *Melanippe fluctuata* have not been collected in the vicinity of Albany.

Larentia cæsiata from this locality, is an interesting acquisition, it having been previously reported only from high elevations or northern regions, as the White Mountains, at an elevation of between 8,000 and 9,000 feet in Colorado, Okak in northern Labrador, and Caribou Island (Packard). Guenée states that it has the widest distribution of any species of the [Glaucopteryx, Hübner] group, occurring in the mountainous regions of France, Germany, Italy, Piedmont, Scotland, north of England, Iceland, etc., in barren places resting on rocks and the trunks of trees. From its range of variation, different species have been made of it, as *infrequentata* Haw., *flavicinctata* Steph., etc.

Of the Noctuidæ, the following species have not been found in the vicinity of Albany:

[a]Agrotis Chardinyi,
[a]Agrotis conflua,
Agrotis perconflua,
Agrotis rufipectus,
[a]Agrotis astricta,
Dianthœcea lustralis,
Hadena Hillii,
[a]Plusia bimaculata,
[a]Plusia u-aureum,
Plusia mortuorum,
Plusia epigæa.

At the present, we can only venture to indicate as probable subarctic forms, the five species of the above marked *a*. Of these, two are particularly interesting, from their northern and extended distribution and their occurrence in the lower Adirondack region. *Agrotis Chardinyi*=(A. gilvipennis *Gr.*) has been collected in several examples on Anticosti Island, Gulf of St. Lawrence, N. Lat. 49°; it also, according to Staudinger, occurs in Siberia; Guenée cites it as common in Russia. *Agrotis conflua* was found by Mr. Couper to be common on Anticosti Island; it occurs also in Iceland (Staudinger), Scotland (Norman), Switzerland (Grote), Prussia? and France (Guenée).*

The geographical distribution of the Noctuidæ of the United States has not been studied. No attempt has been made to assign the species to distinct faunal provinces, although the material for such an arrangement is unquestionably far more ample than with the Phalænidæ. Much of it is unpublished, although accessible, if sought for, from the various collectors to be found in nearly every State of the Union. It would prove of essential service if every skilled collector would furnish for publication, authenticated lists of the Lepidoptera known to him to occur in his vicinity. These, for greater convenience, could be combined into State Lists, similar to that given by Prof. Snow, of the Lepidoptera of Eastern Kansas.†

The editor of the *Canadian Entomologist*, in appreciation of such work, has made special request for such lists of the Diurnal Lepidoptera,‡ and has arranged for their tabulation previous to publication in the pages of that valuable journal. We feel assurance that lists of the Heterocera would also be gladly received and promptly published.

A very excellent local list, is that given by Mr. Roland Thaxter, in *Psyche*, Vol. II, pp. 34–38, 80, of collections of Noctuidæ, recently made, mainly by himself, at Newton, Mass., and vicinity. It enumerates three hundred and forty-seven species, and is accompanied with statements, in an abbreviated form, of the comparative abundance of each, month of appearance, means of capture of all (whether at light, at sugar, or at rest), and the food-plant of the larva of a number.

In Vol. VII of the *Canadian Entomologist*, pp. 3 and 21, Mr. George Norman records his captures of Noctuidæ at St. Catherines, Ont., during the year 1874, citing one hundred and seventy-four species, with their dates of capture and compar-

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*For the determination of these species, and of many others, I am indebted to the kind services of Mr. Grote, always most cordially rendered.

†*Transactions of the Kansas Academy of Science*, Vol. IV, pp. 29-59. 1875.

‡*Canadian Entomologist*, Vol. VII, p. 72. 1875.

ative abundance: the larger number of these were attracted to sugar. In Vol. VIII of the same journal, p. 12, Mr. O. S. Westcott publishes a list of eighty-three species of Noctuas, taken by him at sugar, at Maywood, Cook Co., Ill.

In a list (still in MS.) of collections at sugar made by me at Schenectady, N. Y., in 1876, two hundred and twenty-six species of Lepidoptera are recorded, embracing a few Bombycidæ, about twenty-five species of Phalænidæ, a few Pyralidæ and Microlepidoptera — the remainder Noctuidæ.

In 1873, lists were given in the 23d N. Y. State Museum Report, of the Butterflies and the Sphingidæ of the State of New York. Similar lists of the Bombycidæ and Noctuidæ are in preparation.

Mr. Henry Edwards, of San Francisco, who has contributed so largely to our knowledge of the Lepidoptera of our western coast, is engaged upon a Synopsis of the Butterflies of the Pacific coast, which is promised for the press during the present year. Mr. Grote has published several lists of the Noctuidæ of Texas. Will not the members of the Cambridge Entomological Club favor us with a list of Lepidoptera collected on Mount Washington, as a companion to Mr. Austin's list of Coleoptera of the same locality.*

*Catalogue of the Coleoptera of Mount Washington, N. H., with Descriptions of New Species, by E. P. Austin and J. L. Le Conte, M. D.; in *Proc. Bost. Soc. Nat. Hist.*, Vol. XVI, pp. 265-276.

V. COLLCTIONS OF NOCTUIDAE "AT SUGAR."

AT SCHENECTADY, N. Y., IN 1875.

The list below given is a record of collections made between the 7th of July and the close of the season on the 25th of October. It includes all the species of Noctuidæ (one hundred and thirty-one in number) that were captured or observed on the fifty-three evenings devoted to the work — three or four evenings of each week. A few species of Bombycidæ, Phalænidæ, Pyralidæ and some Microlepidoptera were also taken, which are not embraced in the list.

The attempts previously made by me at collecting by sugaring, had been attended with no success. The satisfactory results obtained at this time are to be ascribed to persistent and more extended sugaring than before employed. The locality was not an unusually favorable one, for, instead of choosing a place for the purpose "on the border of some wood," as has been usually recommended, where the proper number of trees of a certain diameter and character of bark could be found, the collections were entirely confined to my garden — not a large one — in the city of Schenectady. It was an unexpected revelation that collections of such a variety and extent could be made within city limits, and in a garden where the presence of flowers undoubtedly interfered with the attractions of the bait. But as the convenient locality of one's own home may not always prove equally productive in other cities, the statement should be made that my residence was within a block of the Mohawk river which forms the northern boundary of Schenectady,—a city of comparatively small size, numbering under 13,000 inhabitants.

The slats and posts of a grape trellis of sixty feet in extent, offered a convenient place upon which to spread the bait: the leaves extending over the slats had been removed, except at intervals, where they were permitted to remain to serve as a cover or a lure to the moths attracted thither. The odor diffused from the area of surface sugared — computed at sixteen square feet — was evidently sufficient to draw the moths from quite a distance beyond the boundary of the garden. Farther experience has shown that a larger quantity of the bait might have been advantageously used in extending it to the fences inclosing the garden, and that the results to be obtained by this method of collecting, are to be measured by the extent of the locality, the area sugared, and the frequency of its repetition, provided the region be one where the Noctuidæ occur in reasonable abundance.

As directions for sugaring have already been published,* they will not be repeated here, but will be given in a paper in preparation, in which the various methods employed in the attraction of Lepidoptera will be detailed.

A brief account of the collections herein noticed was presented at the meeting of the American Association for the Advancement of Science, held at Detroit in 1875. Several of the members present were stimulated to test for themselves the recommendation made of this simple and most valuable means of enlarging their cabinets and extending our knowledge of an interesting and important class of insects. In every instance, it is believed, the results were highly gratifying.

Pseudothyatira cymatophoroides, July 17, 23, 27, 30, 31.
P. expultrix, July 12, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; Aug. 2, 5, 6, 7, 16.
Habrosyne scripta, July 24, 28, 31; August 7.
Acronycta occidentalis, July 27, 31.
A. Americana, July 14, 20, 21.
A. dissecta, July 24.
A. vinnula, July 7.
Agrotis sigmoides, July 24, 30; August 7.
A. badicollis, August 6.
A. baja, Aug. 16, 18, 19, 21, 25, 26, 28, 30; Sept. 2, 4, 7.
A. haruspica, July 7, 13, 17, 20, 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 16, 19.
A. c-nigrum, July 7, 23, 24, 30; August 2, 25, 26, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 18, 30; October 2, 4, 6, 10, 16, 21, 22.
A. bicarnea, July 30, 31; August 2, 6, 7, 21.
A. subgothica, August 2, 19, 21, 26.

* By Mr. George Norman, in the *Canadian Entomologist* for April, 1875, and by Prof. O. S. Westcott in the same journal for January, 1876.

Agrotis tricosa, August 19, 21, 28.
A. herilis, July 7, 20,
A. plecta July 7, 24; August 2, 5, 6, 7, 16, 18, 19, 21, 25, 26, 28, 30; September 2.
A. sexatilis, August 7.
A. pitychrous, August 30.
A. muræenula, August 21, 25.
A. messoria, August 19, 21, 25, 26, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 18.
A. velleripennis, September 2.
A. venerabilis, September 15.
A. annexa, July 31; August 7.
A. ypsilon, July 7, 21, 24, 27, 31; August 2, 5, 6, 7, 16, 19, 21, 25, 26, 28, 30; September 7, 9, 11, 13, 15, 18, 25, 29, 30; October 2, 4, 6, 10, 19, 24.
A. saucia, September 7, 9, 11, 13, 15, 20, 29, 30; October 2, 4, 10, 19, 22.
A. alternata, July 7, 17.
A. herbida, July 7, 8, 10, 12, 14, 17, 24, 28, 30, 31; August 2, 5, 6, 7, 26, 28; September 4.
A. occulta, August 30.
Mamestra nimbosa, July 27, 31.
M. latex, July 7.
M. adjuncta, August 2, 6, 7.
M. subjuncta, July 31; Aug. 5, 7, 19, 21, 26; Sept. 15.
M. chenopodii, July 24, 30, 31; Aug. 2, 5, 6, 7, 19; September 9.
M. albifusa, July 28; August 6.
M. Godelli, June 8.
M. lorea, July 14.
M. renigera, July 7, 21, 23, 24, 27, 28, 30; August 2, 5, 6, 7, 16, 19, 21, 25, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 27; October 2.
M. olivacea, August 25.
Hadena loculata, July 14, 15, 23.
H. devastatrix' July 8, 10, 13, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 16, 18, 19, 21, 25, 26, 28, 30; September 2.
H. sputatrix, July 8, 10, 12, 13, 14. 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 16, 18, 19, 21, 25, 26, 28, 30; September. 2.
H. impulsa, July 8, 15.

Hadena apamiformis, July 24; August 6.
H. suffusca, September 7.
H. arctica, July 7, 8, 10, 12, 13, 14, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; Aug. 2, 5, 6, 7, 16, 19, 21, 25, 26.
H. lignicolor, July 7, 8, 10, 12, 13, 14, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5, 6.
H. verbascoides, July 12, 13, 14, 17, 20, 21, 23, 24.
H. modica, July 31; August 7.
H. sectilis, September 7.
Perigea luxa, August 7.
Dipterygia pinastri, July 28; August 5, 19, 30.
Hyppa xylinoides, July 28, 30, 31; August 2, 5, 7, 16, 18, 19, 21, 25, 26, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 18, 20.
Laphygma frugiperda, September 15.
Euplexia lucipara, July 10, 21, 31.
Phlogophora iris, June 30.
Nephelodes violans, September 9.
Luperina reniformis, August 2, 5, 6, 7, 18, 19, 28; Sept. 2, 4, 7, 9, 11, 13, 15, 18, 20, 22, 25, 30; October 19, 25.
L. reniformis, v atra, August 19; September 4, 7.
Gortyna sera, July 7, 8, 10, 12, 13, 14, 15 17, 20, 21, 23, 24, 27 28, 30, 31; August 2, 5, 6, 7.
G. nictitans, July 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 16, 18, 19, 21, 25, 26.
Leucania pallens, July 31; August 18, 19, 21, 25, 26.
L. phragmitidicola, August 16, 19, 21; September 2.
L. lapidaria, August 7, 16, 19, 28.
L. adonea, July 7, 8, 15, 17, 24.
L. commoides, August 19.
L. unipuncta, July 7, 21; Aug. 7, 16, 18, 19, 21, 25, 26, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 18, 20, 22, 25, 27, 29, 30; October 2, 4, 6.
L. pseudargyria, July 12, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2.
Amphipyra pyramidoides, July 20, 24, 28, 30, 31; August 2, 5, 6, 7, 16, 19, 21, 26, 28, 30; September 2, 7, 13, 15, 25, 30; October 2, 4, 24.
A. tragopogonis, July 31.
Orthodes infirma, July 7, 8, 10, 12, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5.
O. candens, July 7.

Tæniocampa oviduca, July 21.
Cosmia infumata, September 4, 9.
Plastenis pleonectusa, July 31 ; August 7.
Orthosia ferrugineoides, September 7, 9, 11, 13, 15, 18, 20, 22, 25, 27, 29, 30; October 2, 4, 6, 10, 16, 19, 21, 22, 23, 24, 25.
O. helva, August 5, 6, 7, 16, 18, 19, 21, 25, 26, 28, 30.
O. sp. (no. 3885), July 12, 17, 20, 21, 24.
Eucirrœdia pampina, September 13 ; October 10.
Scoliopteryx libatrix, July 8, 10, 12, 13, 14, 15, 20, 24, 30.
Xylina disposita, September 9, 11, 13, 25, 27, 29, 30 ; October 4, 10, 16, 21, 22, 23, 24, 25.
X. petulca, September 11, 13, 27, 29 ; October 21.
X. ferrealis, September 7, 11, 13.
X. Bethunei, September 4, 9, 13, 15, 18, 26, 29, 30; October 2, 10, 23, 24.
X. laticinerea, September 29, 30; October 4, 6, 10, 19, 21, 22, 23, 24, 25.
X. cinerea, September 15, 30.
X. pexata, September 26.
Anytus sculptus, September 7, 15.
Crambodes talidiformis, July 21.
Placodes cinereola, August 16, 19, 21, 25.
Plagiomimicus pityochromus, August 19.
Pyrrhia angulata, July 23; August 5.
Chamyris cerintha, July 23, 24.
Erastria carneola, July 7, 8, 10, 12, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31 ; August 2, 5, 6, 7, 16, 19, 21, 25, 26, 28, 30; September 2, 4, 13, 15, 27.
E. synochites, July 15, 24, 27, 28; August 7.
E. nigritula, July 24, 27, 28, 30, 31 ; August 2, 5, 6, 7, 16, 18, 19, 21, 26 ; September 13.
Drasteria erechtea, July 27, 28, 30, 31 ; August 5, 7.
Ophiusa bistriaris, July 14, 28.
Euparthenos nubilis, July 14, 15.
Catocala Meskei, July 24.
C. Briseis, July 24, 28.
C. Ilia, July 27.
C. parta, July 24, 27, 28, 30, 31 ; August 5, 6, 7, 21, 26, 30 ; September 2, 13, 15, 25.
C. ultronia, July 8, 10, 13, 14, 17, 20, 21 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 25.

Catocala concumbens, August 26, 28; September 15.
C. amatrix, August 21, 28.
C. cara, August 18, 21; September 2, 15, 26, 27.
C. cerogama, August 19, 26.
C. neogama, August 25.
C. habilis, September 15.
C. antinympha, August 26.
C. serena, July 24.
C. Clintonii, July 17.
C. polygama, July 7.
C. pretiosa, July 8, 10, 17.
C. nuptula, July 15, 20, 21, 23, 24, 27, 28, 30; August 2, 5, 6, 7.
C gracilis, July 21.
Homoptera lunata, August 26, 30; Sept. 2.
Homopyralis tactus, July 7, 8, 10, 12, 13, 14, 15, 17, 20, 21, 23, 24, 28, 30, 31; Aug. 2, 5, 6, 7, 16, 18, 19, 25.
Pseudaglossa lubricalis, July 17, 20, 21, 23, 27, 28, 30; Aug. 5, 7, 16, 18, 19.
Epizeuxis æmulalis, July 28, 31; Aug. 5, 28; Sept. 9, 25.
Xanclognatha marcidilinea, Sept. 9.
Clanyma angulalis, July 17, 31; Aug. 2, 16.
Renia Belfragei, Aug. 26.
Renia centralis, Aug. 30.
Renia lævigata, July 2.
Bomolocha abalienalis, July 21.
Hypena humuli, Aug. 25, 30; Sept. 2, 7, 13, 15, 27, 29; Oct. 22,
Plathypena scabra, Aug. 21; Sept. 9, 13, 26, 27; Oct. 22, 24.
Tortricodes bifidalis, July 28; Aug. 6, 7, 19.
Philometra serraticornis, July 20.

It will be observed from the above memoranda that a large number of the species (no less than forty, or nearly one-third of the whole) were quite rare, appearing on but a single evening, and usually in a single example. This, however, may not be taken as a measure of the actual rarity of the species in this portion of the State of New York. For some of the species other attractions would undoubtedly offer greater inducements. Many species are extremely local in their occurrence, perhaps abounding in a limited locality, and hardly to be found a mile or two distant. And again, the fact is well known to collectors that with nearly all the Lepidoptera, a year occasionally occurs when a species will appear in remarkable abundance. The two examples of the beautiful Noctua, *Chamyris cerintha*, taken as above stated on the 23rd and 24th of July, were very highly prized by their captor from their rarity up to that time. The following year, by the same method of sugaring and from the same grape trellis, between the 10th of June and 17th of August, nearly a hundred examples of it were taken — sixteen in a single evening. Such rarities in 1875 at Schenectady, as *Agrotis pitychrous*, *Agrotis alternata*, *Nephelodes violans*, *Cosmia infumata*, *Xylina ferrealis*, *Xylina pexata*, *Anytus sculptus*, *Catocala Briseis*, *Catocala antinympha*, *Catocala gracilis*, etc., — in 1877 at Center, by the captures there made, were consigned to the rank of common species.

In addition to a knowledge of the abundance of a species, the above and similar records may be serviceable in showing the duration of the period of apparition of the more common species, and also the succession of broods, when they occur.

On the first evening of collecting, July 7th, twenty-one species were taken, of which number one-third were species of AGROTIS. Of those present at this time, three, viz., *Agrotis c-nigrum*, *Agrotis ypsilon* and *Mamestra renigera*, continued into the month of October. In the record of *A. c-nigrum*, three intervals are shown of respectively sixteen days in July, twenty-three days in August and twelve days in September: may not three successive broods be inferred from this? *A. ypsilon* was not observed for the two weeks following July 7th, but continuously thereafter to October 19th, with the exception of five indicated absences of one and two evenings each.

Agrotis baja was captured in several examples on the 16th of August, and was observed each evening until its disappearance on Sept. 7th. The period of duration was probably a month (no collections were made between the 7th and 16th of August), and the same also of *Agrotis messoria*, from August 19th to September 18th.

In *Mamestra renigera*, two intervals appear of sixteen and twelve days each, in July and September.

Hadena devastatrix, *H. sputatrix*, *H. arctica* and *H. lignicolor* were among the most common species, and probably appeared in successive broods, as they were each present when the collections commenced, and two of the species continued into September.

Hyppa xylinoides, commencing the latter part of July, continued through all of August and September into the early part of October.

Luperina reniformis continued throughout August and September, and reappeared in the last half of October.

Leucania unipuncta, after the appearance of a single individual on two evenings in July, was present each evening for the space of two months. It was one of the most common moths at sugar, and was nearly always in remarkably good condition.

Amphipyra pyramidoides, appearing first on July 17th, continued, not every evening, however, for more than two and a half months.

Orthosia ferrugineoides was constant in its presence, and also an abundant species from its first appearance until the close of the season.

Orthosia helva was confined to the month of August, but was uniformly present after the 5th.

Of the Xylinas, *laticinerea* was the last to appear. It was in abundance and in perfect condition at the cessation of sugaring. It was the first to appear the ensuing spring (1876), on the 11th of April, followed a few days thereafter (April 25) by *X. Bethunei*.

Erastria carneola had a long duration, and was very seldom absent, although never appearing in large numbers. It continued until late in September. As it is known to occur in the month of May, its four months presence with us is evidence of a succession of broods, as is also shown in the freshness of examples collected at various times throughout the season.

Catocala parta continued for a very long time, having been taken on fifteen evenings in the months of July, August and September.

C. ultronia was the most abundant of the Catocalas, and, although not seen in the month of September, was observed on eighteen evenings during the preceding two months.

Homopyralis tactus was a remarkably constant visitor, having been unobserved on one evening only for nearly two months.

Pseudothyatira expultrix was present each evening of the month commencing July 15th.

The following table shows the period of duration of several of the species and their comparative constancy of attendance at sugar.

SPECIES.	First noted appearance.	Last appearance.	Evenings absent.	No. of days' duration.
Hadena arctica	*July 7	Aug. 26	1	†51+
Hadena lignicolor	7	6	0	31+
Hadena devastatrix	8	Sept. 2	2	57+
Hadena sputatrix	8	9	2	64+
Hydrœcia sera	7	Aug. 7	0	32+
Leucania unipuncta	Aug. 7	Oct. 6	0	61
Erastria carneola	July 7	Sept. 27	10	83+
Homopyralis tactus	7	Aug. 26	1	51+
Gortyna nictitans	17	26	0	41
Hyppa xylinoides	28	Oct. 2	5	67
Orthosia ferrugineoides	Sept. 7	25	0	49+
Catocala ultronia	July 8	Aug. 25	6	49
Catocala nuptula	17	7	2	22
Catocala parta	24	Sept. 25	12	64
Catocala Briseis	24	20	..	59
Catocala cara	Aug. 18	27	11	41
Catocala neogama	25	30	15	37
Xylina Bethunei	Sept. 4	Oct. 24	7	51
Xylina disposita	9	25	6	47
Xylina petulca	11	21	12	41
Xylina laticinerea	29	25	2	27

A few Microlepidoptera were among the preceding collections at sugar: for most of the determinations, I am under obligations to Prof. C. H. Fernald, of the Maine State College, at Orono.

Tortrix rosaceana *Harr* .... July 4.
Exartema permundanum *Clem* .... July 21.
Tmetocera ocellana (*Fabr.*) ‡ .... July 7.
Condylopeza nigrinodis *Zell* .... June 23.
Depressaria atrodorsella *Clem* .... Sept. 15.
Depressaria pulvipurella *Clem* .... Aug. 21.
Depressaria Fernaldella *Chamb* .... Sept. 15.

* The collections were commenced at this date.
† The annexed + indicates that the entire period of duration is not shown.
‡ The Bud-moth (*Grapholitha ocellana*) of the Canadian Entomologist, v. III, p. 13, f. 9.

VI. ON SOME LEPIDOPTERA COMMON TO THE UNITED STATES AND PATAGONIA.

In the *Bulletin de la Société Impériale des Naturalistes de Moscou*, for 1875 (Vol. 49, Pt. 2d, pp. 191–247), an interesting paper is published by Prof. C. Berg, Director of the Museum of Natural History of Buenos Ayres, on "Patagonian Lepidoptera." It is based on collections made by the writer, in Patagonia, during a short visit in the year 1874. The collections were confined to the coast region, extending from the Rio Negro to the Rio Santa Cruz, or between 41 and 50 degrees of south latitude. The insect-fauna was found to be quite limited, as might be expected from the scanty vegetation of the coast. Could the interior country have been explored, it would, no doubt, have yielded much more abundantly.

Previous to this visit, but four or five species of Patagonian Lepidoptera were known. Fifty-six species were collected by Prof. Berg, at this time, of which twenty are described in his paper as new to science. Of these fifty-six species, nineteen were observed only in Patagonia, — the others had also been collected in the countries adjacent. The interesting statement is made that *Agrotis ypsilon*, *Heliothis armiger* and *Asopia farinalis* — species of extensive distribution throughout Europe and America — were apparently confined to those sections of the coast to which cultivation had extended, and, therefore, it was inferred that they had, in all probability, been introduced through commercial intercourse with other countries.

The collections were of the following groups: Of Rhopalocera, 14 species. Of Heterocera—Sphingidæ 3 sp.; Bombycidæ 5 sp.; Noctuidæ 11 sp.; Geometridæ 1 sp.; Pyralidæ 6 sp.; Chilonidæ 1 sp.; Phycidæ 4 sp.; Tortricidæ 1 sp.; Tineidæ 8 sp.; Pterophoridæ 1 sp.

A special interest attaches to the record of the above collection from the occurrence among them, in this remote region, of so large a number of species belonging to the United States — no less than seventeen species, or over thirty per cent of the entire number.

As the geographical distribution of our insects is at the present time receiving much attention, this list of Prof. Berg will be welcomed, from the care, apparently, with which he determinations have been made, and the extension of observations to a country of whose Lepidoptera scarcely any thing was previously known.

The species recorded which also occur in the United States are as follows:

Callidryas Eubule *Linn.*
Danais Archippus *Fabr.*
Pyrameis huntera v. Iole *Cram.*
Pyrameis Carye *Hb.*
Pamphila Phylæus *Drury.*
Philampelus labruscæ *Linn.*
Philampelus vitis *Linn.*
Agrotis saucia *Hb.*
Agrotis ypsilon *Rott.*
[1]Leucania extranea *Guen.*
Heliothis armiger *Hb.*
Erebus odora *Linn.*
Asopia farinalis *Linn.*
[2]Ephestia interpunctella *Hb.*
Nomophila hybridalis *Hb.*
[3]Plutella xylostella *Linn.*
[4]Pterophorus leucodactylus *Fabr.*

Collections of the larvæ were also made, and a number of them described: their food-plants and transformations were also observed. A peculiarity of the caterpillars noticed by Prof. Berg presents so wide a departure from normal habits resulting from the modifying influence of surrounding conditions, that we are led to give the following translation, in full, of his statement:

"It still remains for me to note a peculiarity of the caterpillars, viz., their extreme ferocity — their cannibalistic propensities. All of them, irrespective of family or group, manifest the liveliest desire to kill their fellows. While confined they ate only one another, seldom, if ever, touching the food-plants. The caterpillars of the Bombycidæ completely devoured others of the same family, leaving absolutely no fragments of them. They even tore open the cocoons, from which they dragged out the pupæ and ate them — to which fact I called the attention of my traveling companions.

In like manner, the larvæ of the Noctuidæ acted among themselves and toward the Bombycidæ, and the latter toward the former. Among these last, *Heliothis armiger* was gluttonous beyond all measure,— one of them devouring in twenty-four hours, from six to seven others. The caterpillar of

[1] L. unipuncta *Haw.*
[2] Tinea Zeæ *Fitch.*
[3] P. cruciferarum *Zeller.*
[4] Aciptilia alternaria *Zell.*

Pyrameis Carye was also carnivorous, but to a very moderate extent, preferring at all times fresh plant-food to flesh, while others, as the Noctuidæ, *would not touch the plants after having once tasted flesh.*

This peculiarity of the Patagonian caterpillar is easily explained. During the summer, excessive heat and drought prevail, and these, coupled with dry winds, tend to wither and destroy all vegetation. As the caterpillar is then deprived of its proper nourishment it is compelled by the law of self-preservation to seek elsewhere for food, and so it comes that they eat one another. This habit becomes hereditary, and the descendants frequently practice it, even when there is no lack of vegetable food."

VII. ON LYCÆNA NEGLECTA EDW.

[From the Canadian Entomologist, for May 1, 1875.]

In the very interesting paper of Mr. W. H. Edwards, published in the May number of the Canadian Entomologist, in which another valuable addition is made to the knowledge of our Lepidoptera, by the identity therein shown of the Lycænas *pseudargiolus* and *violacea* — autumnal and vernal forms of the same species — it is suggested that *neglecta* and *Lucia* may prove to bear the same relationship to one another. The possibility of this is inferred by Mr. Edwards from observations made by him, that *Lucia* is an early spring form (April and May in New York), and *neglecta* a later one, "occurring at intervals from June till September."

I cannot believe that *neglecta* and *Lucia* will ever be united as seasonal varieties of the same species. Several years of diligent collecting by Mr. von Meske and myself in this portion of the State, embracing a range of ten miles of territory, have failed to reveal a single example of *Lucia*, nor has it come under our observation in any of the collections made by others in this part of the State. We might, therefore, be almost justified in asserting that it does not occur here. We have it from Long Island collected by Mr. Graef and Mr. Tepper.

On the other hand, in that famous collecting ground, Center, on the "pine-barrens," midway between Albany and Schenectady, upon the line of the N. Y. Central and Hudson River R. R., than which, we believe, the northern United States can produce no superior locality for the Lepidoptera, *neglecta* usually swarms at its proper season. There have been times and seasons when, as we have traversed the roadways leading over the yellow sands of Center and among its pines, that the air about us has seemed blue from the myriads of *neglecta* driven up from the damp sands by our approach. Here, certainly, one might confidently look for *Lucia*, were it but a varietal form.

Our observations and records do not agree with those of Mr. Edwards, giving June as the earliest appearance of *neglecta*. From notes made by me, and from dates of capture appended to examples in my collection, I cite the following:

In the year 1869, on May 21st, *neglecta* occurred in great abundance, all of which noticed, with three exceptions, were males. The worn condition of some of the captures indicated that they had already been abroad for several days. The locality had not been explored since the 11th of May, when the species was not found. About the 9th of June it was observed at its greatest abundance; it was seen for the last time during this year on the 30th of July. In 1870, it was first observed on the 14th of May (none in a collecting trip on the 6th). The last recorded appearance was on the 16th of June. *L. comyntas* was seen from May 6th to September 14th, continuously. In 1871, *neglecta* is recorded from May 16th to June 16th. In the following year its first record is on May 21st.

The latest date of my capture of this species is August 20th, at Schoharie, N. Y.; the earliest is at Bath-on-the-Hudson near Albany, on May 14th (the year not stated)

The observations which I have given above, when coupled with those of Mr. Saunders appended to the paper above referred to, of the frequent occurrence of *neglecta* in his neighborhood (London, Ont.,) and non-occurrence of *Lucia*, would seem almost to establish beyond question their non-identity. That these statements may receive all the consideration to which they are entitled, it may be proper to accompany them with the mention made to me by Mr. Scudder, not to be construed to the disparagement of the valued labors of others, that, as the result of an elaborate tabulation of the numerous returns made to him or collated by him, of the Rhopalocerous fauna of the various portions of the United States and Canada the two most thoroughly worked up fields were found to be those of London, Ont., and Albany, N. Y.

As a part of the history of *neglecta*, it may deserve mention that Mr. von Meske reports the species as quite rare this year at Center, where in so many preceding years it has abounded.

[Since the publication of the above *L. Lucia* has made its appearance for the first time at Center. Examples of it were collected by Mr. W. W. Hill, on the 16th of May, 1876, at this locality, where it was also captured on the 13th, 20th and 26th of May (5 specimens). At West Point, N. Y., it was observed in abundance on the 30th of April, when 8 males and 4 females were taken by a collector, and three or four times as many in addition, it is believed, were seen.]

VIII. DESCRIPTIONS OF TWO NEW SPECIES OF CALIFORNIAN BUTTERFLIES.

Lycæna Lotis n. sp.

Male. — Wings glossy violet-blue; margins bordered with black, extending narrowly on the costa to near the base — the black of the costa edged outwardly with white; veins defined by black scales; fringes white with black basilar scales. Palpi black above, white laterally. Thorax and abdomen black with long whitish hairs.

Beneath: wings gray. Primaries: the discal, extradiscal* and submarginal black spots, in appearance and position much as in *Scudderii;* the two rows of the submarginal series are more contiguous than in that species, nearly equally well defined, and without space between them for the fuscous spots usually present (at least in the median portion of the range) in the ♂ *Scudderii*, and always in the ♀. Secondaries: three white-annulated, black extrabasilar spots; the extradiscal doubly-curved series of similar spots, nearly as in *Scudderii;* the black spots of the submarginal series are nearly covered with metallic scales giving a green reflection (*blue in Scudderii*), anterior to which and resting thereon, a connected (on the veins) series of fulvous crescents, tending to a sagittate

*Reference in this description, to the shape of the spots in this series, is purposely omitted, for the reason that, in this group they are subject to so great variation that it is impossible to draw from them any reliable specific characters — at least from the inspection of a few individuals. In the twenty-eight examples of *Scudderii* before me, the following variations are noticeable: In one, all the spots are round (or nearly so) except the last interior one, which is geminate on the submedian fold: in another, not a single spot is round or even approximating that form: in one, the fifth spot, which, in the original description of the species is said to be "twice as long as the others," is in this, the shortest of all. In four examples, the second and third spots are prolonged inwardly toward the discal spot in a tail-like projection, while in others they are regularly rounded, and again in others, quite extended toward the outer margin. In one example, the first five spots are distinctly semi-oval in form; in others, the spots assume ovate, elliptical, triangular, crescentic and irregular forms. In five examples, there is an additional smaller spot between veins 8 and 9, preceding the one commonly called the first spot. A difference is frequently to be seen between the corresponding spots of the opposite wings form, narrowly edged before with black; at the tips of the veins, a row of subtriangular black spots. Legs, thorax and abdomen clothed with long, white hairs.

Female.— Above uniformly brown, being without the interior violet-blue shade characterizing *Scudderii;* a few (perhaps twenty on each side) purple scales are to be seen beneath the basilar portion of the median of the primaries and at the base of the secondaries. On the primaries, a submarginal crescentiform fulvous band, which is more distinct between the nervules of the median; on the secondaries a submarginal row of six semi-elliptical black spots, preceded by fulvous crescents, and followed by a few pale scales.

Beneath: on the primaries, the extradiscal row of black spots rather weaker than in *Scudderii* (as also on the secondaries), while the outer row of the submarginal series, which, in that species is often obsolescent, is in this, well defined and of nearly equal strength to the interior row. The secondaries show but two of the usual four extrabasilar black spots; the remaining ornamentation much as in the other sex.

Expanse of wings, ♂, 1.30 inch — ♀, 1.25 inch. Length of body, ♂, .5 inch — ♀, .44 inch.

This species differs principally from the allied species with which it is compared, in the black veins and brighter and more glossy wings of the ♂, and the uniform brown wings of the ♀, with its submarginal fulvous band on the primaries; in the stronger submarginal spots of the lower surface, and the weaker interior spots; the more numerous metallic scales and their peculiar hue; the shape of the fulvous crescents and the narrowness of the black lines bordering them; the heavy black termination of the veins, etc.

The secondaries are more prolonged on the submedian nervure, giving to the anal angle a greater prominence.

Hab., etc.—Mendocino, California. Two examples. Collection of W. H. Edwards.

Pamphila Osceola n. sp.

Wings above dark glossy brown as in *P. Metacomet;* outer margin blackish-brown; fringes, dark brown.

Male: primaries with some dull yellowish scales on the inner half of the costa, on the outer side of the discoidal stigma, and within it between the median and submedian nervures. Discoidal stigma velvety-black, consisting of two acutely ellipsoidal spots, which join on the 1st median nervule, and have their other extremities resting on the submedian and 2d median nervule — the inner spot with distinct black scales near the submedian. Beneath brown, blackish over the discoida stigma, with obscure yellow shades exterior to it as the only markings. Abdomen above, unicolorous with the wings, with yellowish scales laterally. Thorax beneath and abdomen contiguous, brown with some longer clay-colored hairs. Palpi clothed with bristling yellow scales, from which the tip of the last joint barely projects.

Female: primaries with dull yellow scales and hairs, more numerous on the inner half of the interior margin, and nearly absent from the outer margin; two yellow spots between the median nervules—the outer one scarcely more than a spot, the inner subquadrangular; no anteapical spots, but in their place some clustering yellow scales. Beneath, dark brown, the primaries reddish-brown basally, and the secondaries of the same shade throughout except toward their inner margin. The two spots of the upper surface of the primaries are reproduced beneath somewhat more obscurely. Thorax and front of head yellowish scaled; palpi with black scales above, and beneath with some clay-colored scales.

Expanse of wings, 1.28 inch; length of body, .62 inch.

The species is allied to *P. Metacomet;* the geminate character of its discoïdal stigma is better defined; its fringes are darker; its median spots are yellow instead of whitish; it is without the anteapical spots, and lacks the band of pale spots on the secondaries beneath; the lower side of the abdomen is without the conspicuous mesial line of pale scales of *P. Metacomet.*

Hab., etc.—Mendocino, California. 1 ♂ and 1 ♀ in the collection of W. H. Edwards.

The references of these two species to the *28th Rep. N. Y. State Mus. N. H.*, made on pages 53 and 62 of *Edwards' Catalogue of Diurnal Lepidoptera*, require correction for the reason stated on page 70.

IX. ON SOME SPECIES OF NISONIADES.

Nisoniades Pacuvius n. sp.

Head and palpi thickly clothed with bristling brown and gray hairs, the obtuse tip of the third joint of the palpi only visible; antennæ brown above, the joints bordered with white beneath and within. Thorax and abdomen beneath with long brownish hairs; legs brown with pale hairs at their joints.

Wings approaching those of *N. Persius* in shape, but the primaries somewhat narrower.

Primaries umber-brown, mottled with black as in *Martialis;* near each extremity of the cell, conspicuously marked with a large black spot, the outer one having the hyaline white cellular spot on its outer margin. A row of black spots cross the nervules, upon which are the following white hyaline spots: four costo-apical ones, of which the costal one is scarce more than a dot, the second, the largest and quadrate, the third and fourth quite small, with their longest diameter in the direction of the breadth of the wing; in cells 2 and 3 each, a triangular spot with the apex directed toward the outer margin of the wing — that in cell 2 but partially hyaline; in cell 1 b, two triangular spots (not hyaline), marked with white scales so obscurely in the somewhat imperfect specimen, that possibly they may not prove a constant feature. Some white hairs and scales separate this row of black spots from a subterminal row of rounded black spots, which is again separated by a few similar white scales from the black terminal margin. Fringes umber-brown, their base cut by some white scales projected from the black margin.

Secondaries fuscous, faintly marked by some brown spots and an indistinct subterminal row of brown dots. Fringes snow-white with some brown scales of the terminal margin cutting their base, and at the apical angle of the wing, extending nearly to their outer edge.

Beneath, primaries pale brown, the hyaline spot in cell 3 showing conspicuously, and with white scales covering the extreme apical portion of the wing. Secondaries reddish brown basally and medially, and with a double row of pale brown spots before the outer margin between veins 1 b and 4. Fringes as above.

Expanse of wings 1.38 inch. Length of body, .58 inch.

Habitat.— New Mexico. Described from 1 ♂ in the collection of Mr. W. H. Edwards.

This species may be recognized among all those of the genus known at present, by the white fringes of the secondaries less sharply defined at their base than in *N. tristis*, by its smaller size, less pointed primaries and a less projected anal angle of the secondaries than in that species.

Nisoniades funeralis Scudd.-Burg.

Wings black, approaching *Pholisora Catullus* in shade; in the ♂, a few white scales on the outer half of primaries which cluster in a crescentiform subterminal line; an umber-brown spot resting on the discal cross-vein and another mid-way on the submedian fold; in the ♀, some white scales occur also on the basal half of the wing, the two umber-brown spots more conspicuous than in the ♂, and, in addition, a line of the same shade associated with the white scales of the subterminal line: in each sex four small (the two inner ones linear) anteapical white spots, and a larger one in cell 3; in the ♀, a discal spot in addition. Cilia brown, with some basilar white scales, more numerous in the ♀. Secondaries of ♂, prolonged at inner angle, nearly unicolorous; of the ♀, showing indistinctly two rows of umber-brown spots before the margin. Cilia snow-white, in the ♂ with black basal scales at and near the apical and inner angles, intermediately contrasting sharply with the black margin of the wing; in the ♀, the cilia longer, with some anteapical black basal scales, but none before the anal angle, where the white scales run over on the inner margin for a short space and then become dusky.

Head, thorax and abdomen above, black; terminal joint of palpi moderately projecting beyond the squarely-cut scales; antennal hook red.

Beneath, wings fuscous, the ♂ with the white discal spot indicated, and with two obscure rows of paler brown spots before the margin; in the ♀ the spots are much more conspicuous, of a much paler shade — the outer row of each wing consisting of whitish intranervular lines cutting the pale spots (the corresponding spots in *N. Brizo* and *N. Icelus* present this character in a degree). Antennal joints narrowly marked with white.

Expanse of wings; 1.75 inch.

Habitat. — Texas and California.

Described from 1 ♂ and 1 ♀ in perfect condition, received from Mr. Heiligbrodt, of Bastrop, Texas, and from 3 ♂'s in inferior condition from the Collection of W. H. Edwards (two from Texas and one from San Diego.)

This species is believed to be the *N. funeralis* of Scudd.-Burg. (*Proc. Bost. Soc. N. H.*, xiii, p. 293. 1870), it having been received from Mr. Edwards under that name. The marked contrast between the snow-white fringes of the secondaries and the black of the wings, in fresh examples, makes this the most beautiful species of the genus.

Nisoniades tristis (Boisd.).

Nearly allied to *N. funeralis*, and may best be separated from it by comparison. It is a little smaller in size; the secondaries of the ♂ are apparently less prolonged at the anal angle; the white spots of the primaries are larger, and the ♂ has also a white cellular spot; the brown basal scales of the cilia of the secondaries are not confined to the angles, but cut the white scales throughout the entire margin although less numerously intermediately. The wings on the under side lack the whitish intranervular lines upon the submarginal spots seen in *N. funeralis*.

Expanse of wings; 1.55 inch.

Habitat. — California. Material under observation, 2 ♂'s and 1 ♀, in imperfect condition.

The diagnosis of this species as given by Dr. Boisduval (*Lépidoptères de la Californie*, p. 22; 1869) is as follows: "*Alæ nigro-fuscæ; anticæ punctulo medio strigaque e punctulis sex similibus transversis albidis; posticæ fimbria alba.*

Elle a le port et la taille de *T. Juvenalis.*"

The description given in Morris' Synopsis, in addition to the above features, represents the line of white points as "separated into two groups — the one of four near the upper edge, the other of two, beyond the median nerve."

The spots "beyond the median nerve" vary in size and in number in the same species, as will readily be seen by an inspection of a number of individuals. In two of the above examples of *N. tristis*, there is a white spot in each of the cells 2 and 3; in the third, in cell 3 only. When but one spot is present, it is always that in cell 3,—the smaller of the two having disappeared. Nor does the number of anteapical white spots afford a specific character, for while the normal number is four, some examples of *N. Martialis* in my collection show but three, and others (more rarely) five.

Nisoniades Afranius n. sp.

Thorax and abdomen above, black; beneath, with brown hairs. Palpi clothed with long brown hairs. Legs fuscous.

Primaries with the costal margin nearly as straight as in *N. Persius*, but rounded toward the apex; moderately bent basally. Outer margin more rounded than in any ♂ Nisoniades known to me (the ♀'s, as a rule, having more rounded wings), as much so as in *N. Brizo* ♀. Inner angle rounded, with internal margin short.

The usual black markings in the basal region of the wing; the remainder clouded with brown, distinctly relieving the transverse line of elongated black spots, and the row of rounded submarginal black spots; a few gray scales are sprinkled over the brown ground. The black spots of the transverse band above vein 2 are more elongated in proportion to their width, more acute toward the outer margin, and more sharply defined than in any other known species—even than in *N. Ausonius*. The line of four small, anteapical, white, hyaline spots is sensibly drawn inward toward the base, so that an imaginary line traversing these spots will cut the outer margin within its apical half. A white hyaline spot rests on the black spot in cell 3, and the three black spots in cells 2 and 1 b, have some gray scales centrally. There is a trace of a small, whitish, hyaline, discal spot. The terminal margin is without the black line seen in *N. Martialis*.

Secondaries, dark umber-brown, with the two rows of pale brown spots, similar to those of *N. Persius* ♀.

Wings beneath, a rich umber-brown, showing on the primaries the discal and anteapical spots more plainly than above, and a white spot each in cells 3 and 2. The two rows of pale brown spots on the secondaries are strongly relieved by the dark ground. The margins of the wings bear a black marginal line, obsolete toward the apex of the primaries.

Expanse of wings, 1.20 inch: length of body, .48 inch.

Habitat.— Colorado.

I venture, from a single example, to designate this as a distinct species, in consideration of the entirely different aspect it presents from the other forms. It is one of the smallest of our species, about equal to *N. Ausonius;* has unusually rounded wings, and is more distinctly marked than any other species, except *N. Martialis*, from which it differs materially in the shape of its wings and its transverse band of spots less inflected at its last fourth toward the outer margin.

I have no opportunity of determining at the present, if the above may not be one of the two species from Colorado, to which Mr. Scudder has given the MS. names of *N. Petronius* and *N. Rutilius*, in Lieut. Wheeler's *Report upon Geographical and Geological Explorations and Surveys West of the One Hundredth Meridian*, 1875, pp. 786, 787.*

Through the kindness of Mr. W. H. Edwards, I have been permitted to examine a number of examples of NISONIADES collected in 1877 by Mr. H. M. Morrison, in Colorado. They were all perfectly fresh, in fine condition for examination, and were as follows:

Nisoniades Icelus Lintn.

Several examples did not differ, apparently, in the slightest particular from New York specimens, except in one small individual, of less than an inch expanse of wings, in which the pale color, indistinct ornamentation, and small size, are, in all probability, the result of imperfect development in the larval stage. One specimen of this species is reported by Mr. Mead, loc. cit., as having been taken in Central Colorado, but in Edwards' *Catalogue of Lepidoptera* (1877), its greatest western distribution is given as Illinois.

Nisoniades Brizo Boisd.-Lec.

The examples of this species in their bright coloring and distinct ornamentation were more beautiful than any which

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*Chapter VIII Report upon the Collections of Diurnal Lepidoptera made in Colorado, Utah, New Mexico and Arizona, during the years 1871-1874. By Theodore L. Mead, pp. 733, 794; plates xxxv-xxxix.

had previously come under my observation. The series of six gray-centered and black-bordered spots crossing the cell parallel to the outer transverse row, which usually forms an interrupted series, in these, blend in a connected band, nearly as conspicuous as the outer row. This species, I believe, has not been previously reported from Colorado.

Nisoniades Martialis Scudd.

One of the two examples of this species corresponds with our usual New York forms, and the other, in the more subdued tone of its ornamentation, is similar to the individuals of our second brood, appearing in July and August. It is unfortunate that no dates of capture are appended to these specimens.

Nisoniades Persius Scudd.

The examples which I refer to this species, present some differences as compared with our eastern forms. In Mr. Mead's Report, ut cit., Mr. Scudder is quoted as having noticed some points of difference. Although Mr. Mead represents this species as the most common of its genus in Colorado, I have but three examples before me; and upon so small a number, I am unable to form a decided opinion.

Nisoniades Juvenalis Fabr.

I have, with some hesitation, labeled several examples agreeing among themselves, with this specific name, as I am unable to trace any constant features in which they differ from some of our New York forms. I am, however, of the opinion, that in the collections made in the vicinity of Albany, two species are included in our *N. Juvenalis*. Marked differences are noticeable in size, shape of wings, and markings, which are hardly consistent with a single species. The smaller form is that in which are seen more pointed wings and narrower, less rounded outer margins, and plainer ornamentation. Still, I have not been able to discover any marked features by which a separation can be made. The larger form with broader wings and conspicuous markings is of less frequent occurrence than the other. A large series from Center, N. Y., submitted some years ago to Messrs. Scudder and Burgess for the examination of the genitalia, contained both of these forms, but were all returned to me labeled as *N. Juvenalis*.

It is very desirable that large collections of these forms should be made for study, and that broods of them be reared from captured females imprisoned over their food-plant, upon the plan practised by Mr. Edwards with such signal success, and extremely valuable results.

X. TRANSFORMATIONS OF NISONIADES LUCILIUS LINTN.

The egg measures .03 of an inch in diameter. Its shape was not noted. An example examined was marked with fourteen ribs and twenty-five transverse striæ.

The larva before its second molting measured .30 of an inch in length, and previous to its third molting .55 of an inch. After the molting, its length was .70 of an inch. Its body bears numerous short, white, downy hairs, and is marked with white dots. Its color is yellowish-green, especially on the incisures, with a blue-green vascular line. The legs are tipped with fuscous, particularly the anterior pair; the prolegs are green. The segments show four annulations on the posterior half.

The body of the larva is translucent, allowing the internal organs to be seen. On the eighth segment an oblong yellow spot on each side of the vascular line, as in *Pieris oleracea*, marks the position of some of the viscera, and on the second segment is a similar mesial mark. The pulsations of the dorsal vessel are quite conspicuous. With a magnifier, ramifications of the branchiæ are to be seen, surrounding the stigmata.

After its third molting, the two brown spots on the head of the larva appear, which thenceforth are so marked a feature. At maturity the larva has attained a length of .8 of an inch, with a diameter in its broadest part of .16 of an inch; diameter of head .10 of an inch.

The last molting was on August 3d, and on the 6th the chrysalis was formed.

The chrysalis is cylindro-conical in form, not angulated; thorax slightly elevated; head-case rounded in front, depressed below a line drawn from the anal spine across the bases of the wings to the humeral tubercle — this tubercle dark brown in color, cylindrical, truncated at the apex, and located a little before the base of the anterior wings. The stigmata are white.

At this stage the transparency of the chrysalis permits the rapid pulsations within to be clearly seen. The nervulation of the anterior wings is perfectly visible, and that of the posterior pair, indistinctly.

Five days after pupation (August 11th), the following changes were noticed. The eye-cases had become purple; the wing-cases were whitish, perfectly relieving the nervulation; the abdomen green except at its tip where it was brown. The antennæ folded over the eyes, cutting off a small section of their upper portion, have the club brown, and showing the joints; the posterior leg-cases show numerous brown spinules on the inclosed legs.

On August 12th, a few hours before the escape of the butterfly, the chrysalis was brown, except at the abdominal incisures, where it was green and of a transparency disclosing some of the internal organs. The white annulations of the antennal joints were visible, and through the wing-cases could be seen the gray scales of the margin, the disk and the cilia of the wings. The butterfly emerged in the afternoon of the 12th.

From two other larvæ which had been reared on *Aquilegia canadensis** and changed to chrysalis on the 8th and 9th of August, butterflies were obtained on the 15th, giving for the length of pupation of the three examples, six, seven and six days respectively.

The following captures in the field of *N. Lucilius* were made during the year (1870) when the above notes were taken: May 16th, at Bethlehem, Albany county, 3 ♂'s; May 21st and 31st, one ♂ each, at Center; July 6th, 9 ♂'s at Bethlehem, and another at same locality on the 28th; and others again on August 26th, and September 9th and 14th at the same place.

On August 25th and 28th, five butterflies were obtained from larvæ which had been collected at Bethlehem. So late as September 9th, larvæ just emerged from the egg were taken, associated with others about half-grown.

There are two annual broods of this butterfly, and possibly a third.

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* See Twenty-fourth Report on the N. Y. State Museum of Nat. Hist., p. 164.

XI. DESCRIPTION OF EUDAMUS EPIGENA BUTL.

Eudamus Epigena BUTLER. Lepidop. Exot., p. 65, pl. 25, f. 6. 1871.
Thymele " " KIRBY. Syn. Cat. Diurn. Lep., p. 655. 1871.
Eudamus " " EDWARDS. Cat. Diurn. Lep. N. A., p. 58. 1877.
Eudamus Orestes LINTNER MS.: non 28th Rep. N. Y. St. Mus. N. H.

Thorax, abdomen and wings dark brown, nearly unicolored, but rather deeper toward the terminal margin.

Primaries: costa moderately curved, outer margin nearly straight; in general shape in the ♂ resembling *E. Bathyllus* of same sex, but in the female with its prolonged secondaries, approaching *E. Tityrus* ♂. Cilia, fuscous on primaries merging into white toward the inner angle; on secondaries, white with black basilar scales opposite the veins, until to the angle on the internal vein, thence black. Eight transparent white spots on each wing, viz.: three small disconnected anteapical ones; one triangular cellular spot; a small one in cell 1a, touching vein 2; a larger double-concave one reaching from vein 2 to vein 3; a subtriangular one extending from vein 3 to vein 4; a minute one just above vein 4, equidistant from the margin with that in cell 1a.

Beneath: primaries black costally and above the 1st median nervule (vein 2) outwardly to the white spots — remainder, brown; spots same as above, margined with black. Secondaries, with the bands much as in *Lycidas*, except that they do not contrast so strongly with the ground, producing less of a mottled effect; the outer fourth (third in *Lycidas*) bordered with white (except at anal angle), traversed by numerous short, wavy, brown lines.

Expanse of wings: male, 2 inches, female 2.15 inches.

Habitat.—Texas.

From a pair in the collection of Mr. Otto von Meske, received from Mr. Heiligbrodt, of Bastrop, Texas, to whose faithful labors science is indebted for the discovery of a number of new and peculiarly interesting species of Lepidoptera.

The above species is of special interest from its uniting the principal features of *Bathyllus* and *Pylades*, and the consequent argument which it furnishes against the adoption of proposed genera, resting on microscopic detection of some slight variation in form or proportion.

In the belief that the insect was new to science, it was described by me as *Eudamus Orestes*, for publication in the 28*th N. Y. St. Mus. Report*, then passing through the press; but in the necessitated printing of the Report at an earlier day than was anticipated, the description could not (together with other papers in readiness) be given place. Hence, the erroneous reference made to *Orestes* on page 58 of Edwards' *Catalogue of the Diurnal Lepidoptera of North America.*

Subsequently, Mr. W. H. Edwards identified the species with a figure of Butler in his *Lepidoptera Exotica*. As the figure is accompanied by only a brief diagnosis, and but a few copies of the work are to be found in this country, it is thought that the above description may be of service.

XII. A SYSTEMATIC ARRANGEMENT OF THE EUROPEAN AND SOME AMERICAN HESPERIDÆ.

During the preparation of the Edwards' *Catalogue of the Diurnal Lepidoptera of North America*, the aid of Dr. Speyer, of Rhoden, Prussia, was solicited in the rearrangement of the difficult group of Hesperidæ. The revision kindly undertaken by him embraced only those of the North American species — forty in number — which were represented in his cabinet, together with the European species, of which twenty-three are enumerated. These latter could not conveniently be given in the pages of the catalogue, but as it is the first satisfactory arrangement of the European forms — the more valuable to us from its incorporation with our more numerous species — the present opportunity is taken to present the arrangement in full as furnished by Dr. Speyer.

It is proper to state that the free use which was made in the catalogue of the MS. of Dr. Speyer, especially in the publication of the generic definitions, was not in accordance with his intention, and has called from him an expression of regret. We hope that this further use of the MS. may prove less objectionable.

A. ASTYCI Scudd.

1. **Carterocephalus** Led.
   - **Palæmon** *Pall.*
     - =*paniscus* Fabr.
2. **Cyclopides** Hübn.
   - **Silvius** *Knoch.*
   - **Morpheus** *Pall.*
     - =*Steropes* W.-V.
3. **Ancyloxypha** Feld.
   - Numitor *Fabr.*
4. **Copaeodes** n. g.
   - Waco *Edw.*
   - minima *Edw.*
5. **Thymelicus** Hübn.
   - **Thaumas** *Hufn.*
   - **lineola** *Ochs.*
   - **Actæon.** *Rott*
6. **Pamphila** Fabr.
   - *a* Massasoit *Scudd.*
     - Zabulon *Bd. Lec.*
       - *Hobomok* Harr.
   - *b* **Sylvanus** *Esp.*
     - **comma** *Linn.*
   - Sassacus *Harr.*
   - Metea *Scudd.*
   - Leonardus *Harr.*
   - Huron *Edw.*
   - Phylæus *Drury.*
   - Brettus *Bd.-Lec.*

conspicua *Edw.*
Ætna *Boisd.*
Peckius *Kirby.*
Mystic *Edw.*
Manataaqua *Scudd.*
Cernes *Bd.-Lec.*
=*Ahaton* Harr.
Metacomet *Harr.*
bimacula *Gr.-Rob.*
Vitellius *Sm.-Abb.*
=*Iowa* Scudd.
Osyka *Edw.*
verna *Edw.*
Hianna *Scudd.*

7. **Amblyscirtes** Scudd.
vialis *Edw.*

B. HESPERIDES Scudd.

8. **Pyrgus** Hübn.
a Lavateræ *Esp.*
alceæ *Esp.*
=*malvarum* O.
althææ *Hübn.*
Proto *Esp.*
b Sao *Hübn.*
=*Sertorius* O.
orbifer *Hübn.*
c malvæ *Linn.*
=*alveolus* Hübn.
alveus *Hübn.*
serratulæ *Ramb.*
cacaliæ *Ramb.*
andromedæ *Wall.*
centaureæ *Ramb.*
carthami *Hübn.*
sidæ *Esp.*
d tessellata *Scudd.*

9. **Nisoniades** Hübn.
Tages *Linn.*
Persius *Scudd.*
Lucilius *Lintn.*
Icelus *Lintn.*
Brizo *Bd.-Lec.*
Martialis *Scudd.*
Juvenalis *Sm.-Abb.*
tristis *Boisd.*

10. **Pholisora** Scudd.
Catullus *Fabr.*
Hayhurstii *Edw.*

11. **Eudamus** Swains.
a Pylades *Scudd.*
Bathyllus *Sm.-Abb.*
Lycidas *Sm.-Abb.*
Cellus *Boisd.*
b Tityrus *Fabr.*
c Proteus *Linn.*

Since the above was in type, a copy has been received of a paper on the Hesperidæ of the European Fauna (*Die Hesperiden-Gattungen des europäischen Faunengebiets*), by Dr. A. Speyer. The author was not satisfied with the arrangement above presented, which had been drawn up at the request of some of his American friends, and which, from the limited time that he was able to devote to it, and the partial examination of species upon which it was based, was contributed only for private use — not for publication. Since then, he has undertaken a more thorough study of the species pertaining to the European Fauna, and the result, published in the *Stettiner Entomologische Zeitung* for 1877, pp. 167–193, is the exceedingly valuable contribution to the knowledge of this interesting group, which is cited above.

At the present time, as these pages are passing through the press, there is only the opportunity of presenting, in justice to Dr. Speyer, in company with his provisional arrangement, the following carefully prepared one recently given to the public. It embraces not only the Hesperidæ of Europe proper, but all those occurring within the European Faunal Division, which includes some of the northern and eastern portions of Asia, as defined in the author's "*Geographischen Verbreitung der Schmetterlinge.*" The Asiatic species are indicated by an asterisk. Forty-one species are recorded in the list, of which twenty-nine belong to Europe. The following is the list, which, in consideration of its careful arrangement, we transcribe literally:

HESPERIDES Latr.

1. **Cyclopides** H. (p.)

1. Morpheus (Pap. m.) Pall. = Steropes WV.
*2. Ornatus Brem.

2. **Carterocephalus** Led.

1. Palaemon (Pap. p.) Pall. = Paniscus F.
2. Silvius (Pap. s.) Knoch.
*3. Argyrostigma (Steropes a.) Ev.

3. **Thymelicus** H. (p.)

1. Lineola (Pap. l.) O.
2. Thaumas (Pap. th.) Hufn. = Linea WV.
*3. Hyrax (Hesp. h.) Led.
4. Actaeon (Pap. acteon) Rott.

4. **Pamphila** F. (p.)

A.
1. Comma (Pap. c.) L.
2. Sylvanus (Pap. s.) Esp.
*3. Ochracea Brem.
(Ætna Bdv. spec. americana ?)
B. (Goniloba HS.).
*4. Alcides (Hesp. a.) HS.
C. (Goniloba HS.).
*5. Mathias (Hesp. m.) Fabr. = Thrax Led., non Lin.
*6. Zelleri (Hesp. z.) Led.
7. Nostrodamus (Hesp. n.) F. = Pumilio O.
D.
*8. Inachus (Pyrgus i.) Mén.

5. **Catodaulis** n. gen.

*1. Tethys (Pyrgus t.) Mén.

6. **Pyrgus** H. (p.)

A. a. (Carcharodus H., Spilothyrus Bdv.).

1. Lavaterae (Pap. lavatherae) Esp.
2. Althaeae (Pap. altheae) H.
   Var. b. Baeticus (Spil. b.) Ramb. = Floccifera Zell.
3. Alceae (Pap. a.) Esp. = Malvarum O.
4. Proto (Pap. p.) Esp.
5. Tessellum (Pap. t.) H.
   *Var. b. Nomas (Hesp. n.) Led.
6. Cribrellum (Hesp. c.) Ev.

B. a.

*7. Poggei (Hesp. p.) Led.

B. b.

8. Phlomidis (Hesp. phl.) HS.
9. Sao (Pap. s.) H. = Sertorius O.
10. Orbifer (Pap. o.) H.

7. **Scelothrix** Ramb.

*1. Maculata (Syricht. maculatus) Brem. et Grey.
2. Sidae (Pap. s.) Esp.
3. Cynarae (Hesp. c.) Ramb.
4. Carthami (Pap. c.) H.
5. Alveus (Pap. a.) H.
   Var. b. Fritillum (Pap. fr.) H.
   Var c. ? Cirsii (Hesp. c.) Ramb.
   Var d. ? Carlinae (Hesp. c.) Ramb.
6. Serratulæ (Hesp. s.) Ramb. HS. An praeced. var. ?
   Var. b. Caeca (Hesp. caecus) Fr.
7. Cacaliae (Hesp. c.) Ramb. HS.
8. Andromedae (Syrichth. a.) Wallengr.
9. Centaureae (Hesp. c.) Ramb.
10. Malvae (Pap. m.) L. = Alveolus H.
    Ab. Taras (Hesp. t.) Meig.
    *Var. b. Melotis (Hesp. m.) Dup. = Hypoleucos Led.

8. **Nisoniades** H. (p.)

*1. Montanus (Pyrgus m.) Brem.
2. Tages (Pap. t.) L.

9. **Thanaos** Bdv. (p.)

1. Marloyi Bdv. = Sericea Fr.

The List is followed by a Diagnostic Table of the Genera, after which, twelve pages are devoted to descriptions of, and remarks upon, the several genera.

A translation of the entire paper of 27 pages is contemplated, that American students of Lepidoptera may have the benefit of the highly valuable observations and criticisms which it contains.

XIII. NOTES ON NOTODONTA DICTÆA LINN.

? *Phalæna tremula* CLERCK. Icon. pl. ix, f. 13. 1759.
? *Phalæna Bombyx tremula* LINN. Faun. Suec., Ed. ii, p. 298, no. 1121. 1761.
? " " " LINN. Syst. Nat., Ed. xii, p. 826, no. 58. 1767.
" " *dictæa* LINN. Syst. Nat., Ed. xii, p. 826, no. 60. 1767.
Leiocampa dictæa STEPHENS. Ill. Brit. Ent., Haust. ii, p. 25. 1829.
Pheosia rimosa PACKARD; in Proc. Ent. Soc. Phil., iii, p. 358. 1864.
Notodonta Californica STRETCH. Zygænidæ-Bombycidæ N. A., i., pp. 116, 240, pl. 4, f. 5; pl. 10, f. 9, 1872–73.
Notodonta tremula STAUD. Cat. Lep. Eur. Faun., Ed. ii, p. 72, no. 975. 1871.—p. 72. 1877.

A larva of the above species was taken at Bath-on-the-Hudson, Sept. 9, 1869, on willow. It molted during the night, and on the following day it measured, when at rest, .95 of an inch. The following were its features: Head light yellow-green, subquadrangular, with an impressed median line; mandibles yellow, tipped with black. Body white dorsally, with a bright yellow stigmatal stripe bordered above with green. Caudal horn conical, white, tipped with glossy black and with a black stripe laterally. Caudal shield granulated, broadly elliptical in outline—its largest diameter transverse to the body. Stigmata broadly oval, velvety-black on a white ground. Legs ferruginous, with a black spot above them: prolegs with a glossy black spot laterally, and a dull black larger one above them, extending upward to the stigmatal line.

The larva was of remarkable transparency, exceeding that of any other which had come under my observation. The lateral and ventral regions had almost the transparency of glass.

It matured on the 19th, when it measured 1.1 inch long and .17 inch broad. It was not suspected at this time of having reached maturity, but was thought to be a young Sphinx, with probably one or two additional moltings to undergo before its pupation. The diminished activity shown by it, and its refusal of food, was ascribed to its change to poplar soon after its capture. On the 21st, at the suggestion of a friend that it had possibly matured, it was placed on some ground, when, much to my surprise, notwithstanding its weak condition, it speedily buried itself beneath the surface for pupation.

The moth was not obtained from it.

On Sept. 14, 1869, a second larva was found at Bethlehem, Albany county, feeding on the aspen (*Populus tremuloides*), in an earlier stage of its growth, and just after a molting, judging from the comparative size of its head, which was twice the breadth of its body. Its length was .56 inch, and diameter .05 inch.

It was fed on aspen leaves, and on the 19th it again molted. The following day it resumed its feeding, and the day thereafter its dimensions were, length —, diameter .08 inch, diameter of head .12 inch. It was of a yellow-brown color dorsally, with transverse slate colored markings centrally on the segments. (No further record of the larva: it probably died before its maturity).

On Sept. 5, 1872, another larva, 1.65 inch long, was taken on poplar. Body greenish-white dorsally, shading on the side into green; substigmatal stripe bright yellow, interrupted below the stigmata by the extension of the oval white spot encircling the stigma. Caudal horn black. Caudal shield broadly crescentic, granulated, with a glassy tubercle centrally and margined with brownish-red. Legs and prolegs having the portions of the body above them of a violet color — the prolegs with an acutely elliptical ferruginous spot upon them outwardly, crossed on their anterior part by a quadrilateral black spot.

Sept. 14, 187–, larva feeding on *Populus tremuloides*, at Bethlehem. Length at rest, 1.3 inch; diameter .18 inch; the head and first pair of legs extended in line with the body. Head of the diameter of the thoracic segments, subquadrangular, deeply impressed medially, smooth, of a bluish-gray color, showing reticulations under a magnifier; mandibles and a crescentiform spot bearing the eyes dull yellow. Body with a marked degree of transparency in its lower portion, shining, without the usual annulations of the segments, nearly cylindrical to the tenth segment, the eleventh broad, elevated in a prominent cone; the thoracic segments contracted when at rest, forming each three distinct wrinkles, making these segments broader than the succeeding ones; incisures deep; color bluish-gray, a yellow ventral line, and a bright yellow substigmatal one indicated by obscure yellowish markings at the incisures; a dark, bluish-gray transverse line on the side of each segment — the same shade surrounding the stigma and extending to the proleg; on the eleventh segment a blackish transverse line running behind the stigma upon the caudal horn — the latter .09 inch long, glossy black. Caudal shield ferruginous, rugose, elevated marginally and in a small tubercle centrally, in outline a broad ellipse having a lenticular portion excised from its upper fourth; anal plates subtriangular, and of a similar color and surface. Stigmata depressed, elliptical, surrounded (except the first) with a well defined white ring which is more broadly elliptical than the stigma.

Entered the ground for its pupation on Sept. 16th.

The larvæ briefly described by me in the *Proceedings of the Entomological Society of Philadelphia*, vol. III, p. 670, were in all probability this same species. Their color is given as bluish-slate, of about the shade of the branches of the poplar, on which they were feeding (*Populus nigra*). The body is described as gradually increasing in size to the tenth segment; the eleventh segment elevated in a hump, bearing the black caudal horn, one-tenth of an inch long; the stigmata broadly oval, black, white annulated. It is probably identical with the form occurring in Europe, and mentioned as a variety of the *dictæa* larva.

All my efforts to obtain the imago from the above larvæ, have resulted in failure. Examples of the larvæ collected by Mr. von Meske, have also failed to give the imago; after having safely reached the pupal state, they have uniformly died while in that stage. A figure of the larva, taken from a drawing made by me, is given in Glover's Plates of Lepidoptera, XCIX, fig. 16.

No examples of the pupæ, unfortunately, have been retained, and I am only able to recall their smooth and shining surface, and the tapering form of their abdominal segments tipped with a rather long, bifid anal spine.

Mr. Græf, of Brooklyn, has succeeded in rearing the moth from larvæ collected by him, and to him I owe the privilege of being able at the present to refer descriptions made by me several years ago of larvæ which have meanwhile proved an enigma to me, to the imago which they produce, which is apparently identical with the *Notodonta dictæa* of Europe.

I regret that I have not at hand a detailed description of the European larva, to compare with our own. Stephens (*Illustrations of British Entomology*, *Haust. II.*, *p.* 25), says of it: "Larva naked, with a small conical protruberance on the anal segment; reddish-brown, green on the sides and glossed with violet above, with a black dorsal streak: it feeds on poplar, willow and birch, and is found in July and September."

Newman, in his *History of British Moths*, page 228, gives the following description: "The caterpillar has rather a large head, which is very slightly notched on the crown and shining, and is of a pale green color. The body is almost uniformly cylindrical until the twelfth segment, which is humped, and the hump terminating in a moderately sharp point; the color of the body is whitish or glaucous-green on the back, with a broad paler green stripe on each side — and adjoining this there is a narrow raised yellow-green stripe, just below the spiracles, and touching all of them except that on the twelfth segment; it extends the entire length of the caterpillar, terminating in the anal claspers; on the summit of the twelfth or hump segment, is a black transverse line. It feeds on the sallow (*Populus nigra*), etc. There is a common variety of this caterpillar which is plain brown, without the slightest appearance of the lateral stripe; this occurs after the last change of skin."

Dr. Speyer writes of the larva of the European *N. dictæa*: It has a tubercle of pyramidal shape on the 11th segment, which is much more pointed in the younger stages of the larva, so as closely to resemble the horn of a Sphinx. The mature larva has a strong porcelain lustre, and occurs in two varieties: one is of a green color with a yellow stripe on its sides, and the other is brown without the stripe. It lives on poplar.

Several examples of the American *N. dictæa* were sent by Mr. von Meske to Dr. Speyer to compare with the European forms. Having made the comparison, he does not doubt that they are identical, although the following differences are noticeable. "The American form has a bent white cross-line on the inner part of the brown portion of the anal angle of the secondaries, which is not found in the European. In the former the interior branch of the median nervure [vein 2] has the white streak with which it is marked, shorter and narrower than in the European, and entirely wanting from the middle branch [vein 3]. These are the only differences observable, and they are too slight to afford grounds for their separation."

In addition to the two examples in my own collection, I am indebted to the kindness of Mr. von Meske for the opportunity of comparing two examples of *N. dictæa* from Germany, and two from Racine, Wis.

In the European, the white stripe which traverses the brown anal patch very near the margin, commences in cell 1, within the internal vein, and is continued until near or just beyond vein 2. In the American, this line is not so distinct, and in an ex-larva example, from Albany, it is obsolete, being represented only by a few white scales; in another example, it commences on the fold and continues to vein 3.

The bent white cross-line pointed out by Dr. Speyer as characterizing the American form, is not equally well marked in all. In the Racine specimens, the line commences on the internal margin, runs for a short distance parallel with the general direction of the outer margin of the wing (not of the anal angle portion), and curves inward toward, and is lost in, the submedian fold. An exserted portion of the brown patch lies inside of this white line on the submedian vein (1 *b*). In the Albany example, the line is less conspicuous, and the brown portion inside of it is barely indicated.

The American examples, besides having the brown patch larger, have also the brown border of the secondaries heavier than the European, and continued to the apex.

The comparison of Dr. Speyer of the length of the white lines on the veins of the primaries is not sustained by the examination of other examples, as they vary in length and distinctness. In one before me, the white lines are of the same length on veins 2 and 3 — in another, shorter on 3. The more conspicuous bifurcating white line on the submedian fold, also varies in length. All the above lines also vary in their breadth; those on veins 2 and 3 being nearly as heavy as in the European, while in the Albany example, they are much more delicate.

In the other markings of the wings I find no differences of sufficient constancy to aid in the separation of the forms of the two continents.

So far as we are able to judge from the descriptions at hand, the larval forms also agree; and it is quite an interesting fact that the European variety which is destitute of the yellow lateral stripe, has also its counterpart in the example found at Schoharie, of which the description has been given, and in another taken at Sharon Springs by Mr. von Meske.

From an example of our eastern form sent by me to Mr. Stretch, of San Francisco, he has identified it as his *N. Californica.* If, however, the sketch of the larva made by Dr. Behr and the information which he gives of the larva, be correct, then there is a possibility that a comparison of additional examples of "*N. Californica*" may show it to be distinct. The figure of the larva, as reproduced by Mr. Stretch, is certainly quite different in its appearance from any of those which have come under my observation.

It will be seen that I have included in the synonymy of this species, references to the *Ph. Bomb. tremula* of Linnæus and Clerck, as probably identical with it. This opinion is held by several of the best European Lepidopterists, who claim that the same species was twice described by Linnæus. Others, as Staudinger, entertain the belief that the *dictæa* of Linnæus is a distinct species,—the one ordinarily occurring in Europe being the *N. tremula*, to which the name of *dictæa* has been improperly applied. Staudinger, in his citation of *N. tremula* in his catalogue, includes as a synonym "*Dictæa* (L. S. N. xii, 826, ex Barbaria, alia species esse videtur)," adding the references to the following authors who give *tremula* under the name of *dictæa:* "Esper, 58, 5; 84, 2; Hübner Beitr., 22; Ochsenh., iii, 63; Godart, iv, 19, 1; Freyer, 579."

For the present I think it proper to retain the familiar name of *dictæa* for the species, as the necessity for the proposed change does not appear to be clearly shown.

XIV. ON SOME NEW SPECIES OF CERURA.

Cerura occidentalis n. sp.

Head white. Palpi white, blackish laterally. Antennæ white with black pectinations.

Collar pale cinereous, traversed by a darker band and edged behind by a black band. Tegulæ pale cinereous, darker posteriorly; the narrow black band crossing their front, followed by a patch of orange scales, and a few black scales on their inner side. Thorax marked with black and orange bands of raised scales (apparently three orange bands).*

Abdomen above cinereous, the segments bordered behind with pale cinereous; beneath whitish; sides tufted with a lateral row of small black spots.

Primaries whitish basally, sprinkled with some black hairs; medially and terminally pale cinereous with more numerous black hairs. A black basal dot on the subcostal; an extra-basilar row of five black spots on the nervures, usually, in the males, in a straight line (5 examples), but sometimes the two superior are nearer the base (2 examples)†; in the ♀'s (5 examples) the two superior spots are considerably drawn in toward the base, the line presenting quite a curve costally. The median band of black and a few orange scales, paler than in *borealis* and *aquilonaris*, broadest on the costa, elsewhere of nearly uniform width; its black borders subparallel; the inner border more distinctly marked; its general course in the male, direct or slightly excavating the band below the median, while in the female it is conspicuously bent, on or below the same nervure; the outer border usually not well defined below the submedian fold. Behind the median band, a black transverse line, interrupted on the cell and indistinct over the submedian fold. On the discal cross-vein, an elongated black spot. Beyond this, two or three subparallel crescentiform

*A cabinet specimen of this species is rarely seen, in which the thoracic scales have not been so affected by greasing, that the bands can with difficulty be traced.

†In five examples of the European *bifida*, this line curves outwardly at the costal or on the inner margin; in one example (female) it is straight.

black lines (the inner of the three sometimes obsolete), preceding the abbreviated blackish subterminal band — the band usually terminating at the second median nervule (vein 3). The nine marginal intra nervular black spots smaller than in *borealis*, but larger than in *aquilonaris*.

Secondaries white, with traces of the inner margin of an outer border, mainly seen on the nervules and at the anal angle, and sometimes with indications of a mesial band behind the obscure discal spot.

Beneath: primaries as above, but less distinctly marked; secondaries with a large discal spot.

Described from 7 ♂'s and 6 ♀'s from the Collections of the Buffalo Society of Natural Sciences, Messrs. von Meske, Hill, Riemann, Tepper, Strecker, Kuetsing and Lintner.

Habitat.—From New York, Pennsylvania, Wisconsin and Canada (Montreal). It will probably be found to extend throughout most of the eastern portion of the United States. It has not, to my knowledge, been observed west of the Mississippi.

The above insect may be found in nearly all the principal collections of the country, under the name of *Cerura borealis*, it being the one which was described by Dr. Harris in his *Report on the Insects of Massachusetts*, 1841, p. 306, and referred by him to the *borealis* of Dr. Boisduval. The description is as follows:

"The ground-color of our moth is dirty white; the fore-wings are crossed by two broad, blackish bands, the outer one of which is traversed and interrupted by an irregular, wavy, whitish line; the hinder margins of all the wings are dotted with black, and there are several black dots at the base and one near the middle of the fore-wings; the top of the thorax is blackish, and the collar is edged with black. In some individuals the dusky bands of the fore-wings are edged or dotted with tawny yellow; in others [*Cerura cinerea*] these wings are dusky, and the bands are indistinct. They expand from one inch and three-eighths to one inch and three-quarters."

The extrabasilar straight row of five spots readily distinguishes this species from *borealis* and *cinerea* (but not from *aquilonaris*) and ally it with *furcula* and *bifida* of Europe. It is usually of a smaller size than our other species.

Cerura borealis (Boisd).

This is quite a different insect from the preceding, and need not be mistaken for it, or any other species. It is figured in *Cuvier's Animal Kingdom*, London, 1836, vol. IV, pl. 98, fig. 5, as *Dicranura borealis* Bdv. The figure leaves no doubt of the species intended. On the right wing of the illustration, the five inferior nervular spots (see description below) are faithfully depicted in proper position on the median nervules (the two superior ones not shown). On the left wing the two inner sinuses and the three outer of the mesial band are correctly represented in form, size and position. The absence of the two costal black spots between the bands, and of some of the extrabasilar ones, would indicate some imperfection in the example figured. It is also well figured in Smith and Abbot's *Lepidopterous Insects of Georgia*, London, 1797, p. 141, pl. 71, as *Phalæna furcula* — believed by Smith to be identical with the *furcula* of Europe; but to this insect it bears no greater resemblance than to *C. occidentalis*.

It is characterized by its white head and collar, thorax in front marked with a conspicuous transverse black line, abdominal segments broadly banded with fuscous dorsally. Primaries of a snow white ground color, a basilar black dot, followed by four other nervular ones, forming an angular line; a broad, centrally constricted, well-defined, mesial band, of about the same width on the two margins; between this and the subterminal band are two distinct costal spots, and below these on the nervules, seven black spots arranged in an oval, as follows: the two inferior ones on the first median nervule (vein 2), the two medial spots of the exterior four, at about the inner third of the second and third median nervules — veins 3 and 4; of the two medial spots of the interior ones, the lower is at or just before the bifurcation of veins 3 and 4, and the upper is on the discal cross-vein; the superior spot of the oval is on vein 5, equidistant from the two superior medial spots below it. The subterminal line is distinctly marked, and followed by the subterminal band, reduced to a line as it crosses veins 3 and 4, but again expanding on the inner margin.

Secondaries with a well marked discal spot, and with a broad marginal band; the latter in some examples is obsolete.

Expanse of wings: from 1.50 to 1.70 inch.

Habitat. — New York, Pennsylvania, Virginia, Georgia, Missouri (Aug. 26, at light, Riley).

From 3 ♂'s and 6 ♀'s, in the Collections of Messrs. von Meske, Tepper, Riley, Strecker and Lintner.

The seven black spots on the white ground intermediate to the bands, arranged in an ellipse as above described, readily distinguish this species from any other of the genus.

It is closely allied to the *C. bicuspis* of Europe. Mr. A. G. Butler, of the British Museum, to whom I communicated an excellent photograph of it, writes: "it precisely agrees with some of our European examples of *bicuspis*." Dr. Speyer who has received an example from Mr. von Meske, remarks of it: "it is very near to *bicuspis*."

Although quite dissimilar in color from *C. cinerea* Walker, yet it is closely related to that species in the form of the bands (often imperfectly defined in *cinerea*) and in the arrangement of the intermediate nervular spots.

The moth has been reared from larvæ found by Mr. F. Tepper of Flatbush, L. I., feeding on wild cherry, when near their maturity. I am indebted to him for the following note in regard to them. "They are of the same shape as *borealis* [*occidentalis*] but differently colored. Instead of the green of that species, the color is greenish-yellow, the dorsal patch is rather smaller and of a brighter shade, and the minute spots on the sides are more delicate and brighter. The examples met with have been larger than *borealis* and somewhat heavier in appearance. Three mature larvæ were taken by me between the 10th and 15th of July, 1875; one was ichneumonized; the other two spun up in the same manner as *borealis*, within a few days after their capture, and the moths emerged in from two to three weeks."

In Smith and Abbot's *Insects of Georgia* it is said of it: "The caterpillar was taken the latter end of July, feeding on that kind of poplar vulgarly called the cotton-tree. When disturbed, it shoots out of the ends of its forked tail two soft orange-colored threads. Early in August it shed its skin, and on the 10th of that month it inclosed itself in a case made of chips of wood and affixed to a branch. The moth came out April 24th. It likewise feeds on the wild cherry and willow, and is found also in Virginia, but it is a very rare species."

Cerura aquilonaris n. sp.

Head, collar and tegulæ white, the latter crossed anteriorly by a row of glossy purple-black scales; the collar bordered behind by a similar row. Thorax with elevated purple-black and orange scales, which are probably, when in perfect condition, arranged in transverse rows. Abdomen above black, with white borders to the segments, which increase in width as they recede from the thorax; a lateral row of black spots; beneath white.

Wings white as in *borealis*. Primaries with a black basilar spot on the subcostal; beyond, four black spots in a straight line, of which the superior one, under a magnifier, is shown to be triple and the remaining three, in perfect examples, double. Median band consisting of black, orange and pale ash scales and prominently bordered with shining purplish-black scales. The band, in the female, is twice as broad on the costa as on the internal margin, and in the male but one-fourth broader costally; twice equally constricted between the median and submedian; its inner border projected on the subcostal, median and submedian nervures, and slightly on the median fold, on either side of which the excavations are deeper than elsewhere, making the general course of the line a little indirect; the outer border projected on the median, median fold and submedian. Subterminal band less sharply excavated on vein 7 than in *C. occidentalis*; inner border less enlarged at internal angle than in *C. borealis*; outwardly with a black dash before the apex on veins 6, 7, 8 and 9 (the last, costal). Of the usual three lines crossing the wing between the median and subterminal bands, the anterior one is broken and the other two faintly continuous. The terminal intranervular spots are smaller than in *cinerea*, *occidentalis*, *borealis* or *multiscripta*.

Secondaries, without a border, but with traces of an obsolete outer margin near the apex and more distinctly at the inner angle; a few black scales on the discal cross-vein.

Beneath, the primaries have a distinct discal spot and are marked on the costa with black spots at the points where the lines of the opposite side commence, which lines are seen in transparency.

Expanse of wings: ♂ and ♀, 1.60 in.

Habitat. — Canada, Montreal.

From two examples in the Collections of Mr. C. W. Pearson and Mr. F. B. Caulfield, of Montreal, captured in that city. It is probably quite a rare species.

This species, which bears a general resemblance to *C. borealis*, may be distinguished from all others known to me by the black marking cf the veins sub-apically. The conspicuous black bands of the abdomen above, in one example (the ♀, the ♂ being without its abdomen) may also prove to be a good distinctive feature.

Cerura candida n. sp.

Antennæ white, with black pectinations of considerable length in the ♀. Palpi porrected, white, outwardly with black hairs. Front, patagiæ, thorax and collar white — the latter with a single fuscous band. Abdomen white, the segments on their anterior border with a few dusky hairs; beneath white; anal region, pale brown. Legs white, banded with black; tarsi black, banded with white.

Primaries, silvery white, with four interrupted black bands before the discal spot — the discal spot forming a small oval ringlet — followed by three interrupted black bands, and a fourth heavier one at the apical and anal region; the usual line of eight intranervular marginal blacks spots, extending on the fringe, less conspicuously marked than in *C. multiscripta.*

Secondaries wholly white, without marginal spots, showing faintly, by transparency, the discal dot of the under surface.

Beneath, primaries with the outer lines of the upper surface heavily marked on the costa, and a dusky cloud behind the cell. Secondaries with a fuscous spot on the outer third of the costal margin.

Expanse of wings, 1.75 inch; length of abdomen, .8 inch.

Habitat. — Kansas.

From a specimen in my Collection, received from Mr. H. Strecker.

This beautiful species is allied to *C. scitiscripta* Walk.,* and *C. multiscripta* Riley.† It cannot be the former, which it more nearly resembles, as that is described with three thoracic bands, the fore-wings with an ochraceous tinge, and the wings [the four] with black marginal dots. In a pen-and-ink sketch of the typical specimen in the British Museum, kindly sent me by Mr. Butler, the marginal dots of the secondaries are represented. *C. candida* is the only species of the genus which we have seen, in which these spots are absent from the secondaries, and in which the wings are entirely white.

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* *List Lep. Ins. Br. Mus.*, Pt. xxxii, p. 408. 1865.

† *Trans. St. Louis Acad. Sc.*, vol. iii, p. 241. 1875.

Mr. Strecker, to whom I communicated the MS. name of this species, together with its distinctive features as observed by me, expresses, in letter, his opinion that it may prove to be but a form of *scitiscripta*, inasmuch as some of his examples "show no thoracic band at all, not even traces of it, and again, others (four examples ♂ ♀) have the usual black marginal spots of the secondaries very distinct, so much so as any *scitiscripta* I ever saw; the veins on secondaries in some are also dark, like *scitiscripta*."

Should this species be shown to vary to the above extent, it would be an anomaly in the genus, for nothing approaching so great variation has come under my observation in the course of my critical study of the several species. To the contrary, I have found the species to be remarkably constant in their ornamentation.

I would not hesitate to refer examples so differently marked as indicated by Mr. Strecker to distinct species, in the absence of sufficient evidence of their identity.

The above descriptions are published at the present time, in advance of an extended paper on the species of CERURA — American and European — which, as is known to many of my correspondents, was commenced some time ago. It has been delayed, from my inability to obtain a few species which it seemed desirable to embrace in it, and from not having been able to arrange for the satisfactory illustration of the paper.

I avail myself of the present opportunity to express my obligations to my friends — to Messrs. Bowles, Caulfield, Grote, Hill, Hoy, Kuetzing, von Meske, Pearson, Riemann, Riley, Strecker and Tepper — who have freely loaned me all the examples contained in their collections, and have most generously permitted me to retain them for an unusual length of time.

XV. ON CARADRINA FIDICULARIA MORR.

This species was described as *Segetia fidicularia* by Mr. Morrison, in *Proc. Bost. Soc. Nat. Hist.*, vol. xvii, p. 145. In the Grote Check List (No. 456) this name is recorded as a synonym of *Caradrina ?multifera* Walker. In vol. viii, p. 188 of the *Canadian Entomologist*, Mr. Grote refers the species to the European *C. cubicularis* S. V., from a comparison made by him, with a male example of the latter, noting as the only difference between the American and the European forms, that the latter has the common line beneath more extended, and the hind wings white.

With four examples of *C. fidicularia* before me (three in nearly perfect condition), and two of *cubicularis*, I am compelled to differ from the reference made by Mr. Grote. I note the following points of difference, as my reasons for regarding them as distinct.

While in *C. fidicularia* the primaries are of a clear gray, in *cubicularis* they are of a peculiar pale brownish shade, difficult to designate, bearing what might be called an amber tint. In the former, the intranervular marginal black dots are more conspicuous than in the latter, and its subterminal line is not followed by whitish ; the posterior transverse line is farther removed from the reniform than in *cubicularis*. *C. fidicularia* has a well marked discal dot, which the other has not. The primaries of the American species are the broader.

The secondaries of *fidicularia* are of a fuscous shade, increasing in depth toward the margin ; in the other they are white, with the end of the nervules and extreme margin tinted with ochraceous. In the latter, no discal spot is seen from above, while in the former it is quite conspicuous — the heavily marked dot of the lower surface showing in transparency.

C. cubicularis is known to be a variable form, differing greatly, according to Guenée, in size, depth of color, and intensity of designs, having been described under the several names of *quadripunctata* Fabr., *segetum* Esp., *callisto*

Engr., *blanda* Haw., *superstes* Steph., and *leucoptera* Beck. But the difference of color between our form and the European does not come within the range of variation thus far shown in any of the species accepted as common to the two countries.

These colorational differences have been critically studied by Dr. Speyer, during the comparisons in which he has been for some time engaged, of the identical and closely allied Noctuidæ of Europe and America, and some of the results of which have been given in a series of papers, four in number, communicated to the *Entomologische Zeitung zu Stettin* for the years 1870 and 1875. In his second paper on *Europäisch-amerikanische Verwandtschaften*, p. 102, these differences (probable climatic modifications) are so admirably presented, that a translation of that portion of the paper, kindly furnished for the purpose by Mr. Grote, cannot but prove most acceptable to those engaged in the study of the Noctuidæ who may not be able to avail themselves of the original.

"In the gray and brown colors usual to the Noctuidæ, arising from a mixture of black, white and red, the American specimens, as a rule, show less red than the European, and more black.

"This appears generally in the color of the abdomen and the hind wings; the brown-gray of the European forms becomes clear gray or blackish-gray in the American. The red cast which shows on the gray undersurface of the wings of many brown species, especially on the edges, becomes very faint in American varieties, and is even, at times, wanting. The red brown of the back and fore-wings becomes more gray, blackish or bluish. A stronger mixture of black darkens the colors of many American forms. The ornamentation (such as costal marks and sagittate points) is often made more distinct and coarser; the transverse lines and discal spots are thrown more into relief by their deeper black defining lines.

"But, in opposition to this rule, with regard to gray and brown colors, those arising from a mixture of yellow and red, show more red in American specimens; and where there is a mixture of black with these latter colors, producing a rust-color, the black is less perceptible, as for example, in the case of *Orthosia ferrugineoides*, *Hydrœcia nictitans*, *Plusia Putnami* and *Brephos infans*.

"If there is any change in the shape of the wings, it seems to be more usual for the American specimens to have them broader and shorter than the European.

"Only to the first-named modification in the mixture of gray and brown colors, might some importance be attached, since it seems to pertain, although not without exception, to the majority of compared species, and may therefore be referred to a common cause, arising from the different climates of continental eastern North America and insular western Europe. Which of the many climatic factors influences this modification of color — whether it is due to the more intense heat and dryness, or to the severe winter of the transatlantic faunal territory, or to both combined and as opposed to the cooler and damper summers and milder winters of the cis-atlantic — cannot now be determined. It is well known that the coloration becomes generally darker and blacker as we approach the pole or ascend in elevation; but it is doubtful if the greater cold of the winter is the real cause of this effect."

C. fidicularia appears to be a rare species with us. Mr. von Meske has taken it, at sugar, at Sharon Springs, N. Y., on August 15th, in two examples. Mr. W. W. Hill has captured it in Lewis county, N. Y., on August 1st, also at sugar. I have taken it on but one occasion, at Schoharie, N. Y., on 5th of September. It has not made its appearance, at sugar, during my two years' collecting by that method at Schenectady. Mr. Morrison's example was from the Adirondack region. A species, believed to be the same, and referred to *C. multifera* Walker, in Vol. I, of the *Canadian Entomologist* (page 84) was captured at Coburg, Ontario. Mr. Walker's specimen was from Nova Scotia.

C. cubicularis is stated by Guenée to be very common in the months of June and September. Wood (*Index Entomologicus*, p. 44) refers to it as common in gardens and meadows during the middle of June. Dr. Speyer in his *Fauna of Waldeck*, represents it as common throughout the month of May, and with a second generation, less abundant, extending from the latter part of June to the last of August.

A delay in the printing of these papers enables me to add to the manuscript as above prepared, a comparison made by Dr. Speyer, at my request, of *C. fidicularia* with the European species. He writes as follows:

"Of *C. fidicularia* I have but a single specimen, and I should not dare to give an opinion as to its distinctness, were it not, fortunately, for a decided difference presented in the antennæ. In *C. cubicularis* the antennæ are short and evenly clothed with cilia which are only one-half so long as in *C. fidicularia;* in the latter species their length is about equal to the diameter of the antennal stem. Furthermore, my example lacks the rust-brown bordering of the subterminal line, which is so conspicuous a feature in *cubicularis*. The apex of the wing in *fidicularia* shows a lighter shade between the subterminal line and the margin, while in *cubicularis* this portion is equally dark with the rest of the subterminal region. With these exceptions, I find no difference, except in the very different colors of the two. The white spots of the reniform, are also more or less distinctly seen in *cubicularis*. Whether the differences above stated are reliable, could only be determined by an examination of a number of examples. But the decided difference in the antennæ cannot be questioned, and this feature will sufficiently establish the specific distinction of the two forms. Their comparative size is of little importance, as CARADRINA varies very much in that respect."

XVI. THE LARVA OF HOMOHADENA BADISTRIGA.

Hadena badistriga GROTE: in Trans. Amer. Ent. Soc., iv., p. 20. 1872.
Homohadena badistriga GROTE: in Bul. Buf. Soc. Nat. Sci., i. p. 180. 1873.

The young larvæ, three-eighths of an inch in length, were discovered on May 30th, at Schenectady, N. Y., feeding on the leaves of the honeysuckle.

The mature larva measures 1.12 in. long, by .18 in. diameter. Head small, about one-third the breadth of the central segment, flesh-colored, spotted with dull green and with the frontal triangle bordered within and without by black; ocelli black.

Body cylindrical on segments 3–9, the last three rapidly tapering, the last one being less than half as broad as the central ones; the second segment (head not counted) slightly smaller than these, and the first a little broader than the twelfth; surface smooth, without hairs, except the usual minute setæ of the setiferous spots, conspicuously striped as follows: a broad substigmatal band, traversed by longitudinal waved lines, limited above by a black line on the thoracic segments which becomes obsolete on the fourth segment; a somewhat narrower stigmatal band of dull green — a whitish line traversing the stigmata, dividing the band equally in different shades of green; a subdorsal pale band limited above by a black line which is more distinct on the central segments where also the band is paler; above this a black stripe commencing on the fourth segment, becoming more marked on the central segments, and terminating on the ninth — this line bordered above by a corresponding one of white; dorsal stripe geminate, whitish on the thoracic and terminal segments — intermediately, expanding between the middle of each segment and its posterior portion to inclose a mesial black spot or spots resting on the incisure — bordered outwardly by olive-green, which by being broken at the incisures gives the conspicuous dorsal feature of two oblique dashes traversing the segments and approximating anteriorly; the four trapezoidal spots of each segment which rest on these dashes anteriorly, are white — the front ones the larger and marked with black on nearly one-half of their outer portion; on the second segment a large white spot rests on each green line bordering the subdorsal.

Stigmata small, broadly oval, black ringed.

Legs spotted with brown.

Several of the young larvæ were found during the month of May, at Schenectady, feeding on the leaves of the trumpet honeysuckle — the woodbine of Europe (*Lonicera periclymenum*). They were secured in a tin box and supplied daily with fresh food. Toward the latter part of the month and early in June, larvæ nearly full grown, were taken from the vines. They were generally found extended at rest upon some portion of the stem which so closely resembled their markings, that, added to their tapering extremities, they were with difficulty detected — appearing rather as enlargements of the vine.

From about twenty larvæ collected, twelve matured and formed their cocoons between the 9th and 16th of June.

The cocoons are elongate-oval in form, and five-eighths of an inch long by nearly one-fourth inch broad. They are of rather a slight texture, inclosed by leaves drawn around them, and were attached by their flattened under surface to the bottom and sides of the paper box to which they had been transferred; one cocoon, only, was fastened to a twig.

The remains of the pupa-cases found within the cocoons are of a chestnut-brown color, but were too much broken to afford any special features for description.

The first imago emerged on June 29th, having been twenty days in its cocoon. June 30th, five of the moths emerged, followed by others on July 3d and 4th.

Prof. Grote, in the *Buffalo Bulletin*, ut cit., mentions the larvæ as occurring on the common honeysuckle — *Lonicera sempervivum*.

XVII. DESCRIPTIONS OF TWO NEW SPECIES OF XYLINA.

Xylina lepida n. sp.

Anterior wings plumbeous gray ; lines distinct, pale gray. Demi-line in two elongated teeth, bordered on each side with black. Anterior transverse line bordered behind by black, quite angulated, united with the orbicular, sharply toothed (more than in *X. Thaxteri*) on the submedian fold. Posterior transverse line bordered before with black, distinctly toothed on the veins, touching the reniform beneath in two of its inward inflections, and connected with the anterior transverse by a black line on the submedian fold. Subterminal line less sharply projected inward opposite the cell and on submedian fold than in *X. Thaxteri*, and bordered outwardly by a series of connected black lunules which are heavier than elsewhere against its more prominent inward inflections.

Discal spots distinct, gray, paler just within their black border, making almost a double annulation: orbicular large, oval, oblique, very near to reniform beneath: reniform elongate, nearly straight outwardly, quite exserted inwardly, with a black line within it on the median vein, distinctly bordered on all sides with black, but more heavily below; in *X. Thaxteri* the spot is more broadly edged beneath with black, and more deeply exserted outwardly; the two spots are connected at their extremities by a black line. A brown shade-band traverses the median space between the discal spots, terminating on the internal margin midway between the transverse lines.

Posterior wings pale fuscous, with a discal spot and an indistinct fuscous band before the outer margin.

Thorax, color of primaries, sprinkled with gray and prominently tufted. Frontal tuft and shoulder covers bordered with a black line followed by white. Abdomen untufted, reddish.

Beneath, wings reddish: primaries with a heavy discal spot and partly crossed by two extradiscal bands: secondaries with a distinct discal spot and median line.

* *Lithophane lepida* Lintner MS. GROTE. in Bull. U. S. Geolog.—Geograph. Surv. Terr., iv, no. i, p. 181. February, 1878.

Expanse of wings from 1.50 to 1.56 inch.

Habitat.—New York ; Maine.

Described from 2 ♂'s and 3 ♀'s, taken, at sugar, at Center, N. Y., on October 1st, 8th, 9th 12th and 15th, by Mr. W. W. Hill. The types are in Mr. Hill's cabinet.

This species has more resemblance to *X. Thaxteri*, than to any other of our known species. It lacks, however, the marked contrasts presented in paler ground color, the heavier black markings and the red dashed reniform of that species. The black line on the submedian fold is not so long or so heavy, and its posterior wings are not so dark.

It resembles more closely the *X. conformis* of Europe, but it has not the distinct basilar line, the claviform spot, or the broad reniform of that species. Its transverse lines are also more sharply angulated, and it is apparently a shorter-winged species.

Xylina unimoda n. sp.

Head and thorax cinereous. Abdomen above brownish, darker than the posterior wings.

Primaries glossy, bluish-cinereous, slightly paler at the costo-basal space, and with a few white scales on costal and basal regions. Transverse lines inconspicuous, scarcely visible without a magnifier, pale gray, faintly bordered by a darker shade. Median band faintly visible, angulated on the lower portion of the reniform. Anterior transverse band prominently toothed ; the cellular teeth separated from the orbicular ; the two small teeth inclosing the submedian fold, with some whitish scales interiorly, and outwardly continued in an acute claviform mark. Posterior transverse line dentate, removed from the reniform. The obsolete subterminal line preceded by intranervular fuscous sagittate spots. Orbicular spot pale gray, darker scaled interiorly, either connected with or detached from the suborbicular, which is gray-bordered above. Reniform inconspicuous, cinereous, with a black border more heavily marked below, and edged within by gray.

Secondaries pallid, slightly darker along the margin, with paler fringes, which are almost white near the anal angle, a distinct cellular spot, and faint median line.

Beneath, secondaries paler than in *X. laticinerea* and less thickly sprinkled with fuscous scales.

Size intermediate to *X. cinerea* and *laticinerea*.

Habitat.—Center, N. Y.

Described from seven examples — 3 ♂'s, 4 ♀'s — taken at sugar, by Mr. W. W. Hill on the 5th, 8th and 12th of October, 1877. Types in Mr. Hill's Collection.

This species can be separated from *X. laticinerea* to which it is closely allied, by its uniform cinereous shade, without black lines or spots; by the absence of the black basilar line on the submedian fold edged above by white, and of reddish-brown scales in the reniform. Its orbicular is nearly round, and lacks the extension and obliquity seen in *laticinerea*.

XVIII. NOTES ON CUCULLIA LÆTIFICA LINTN.

In the *Check List of the Noctuidæ of America*, by A. R. Grote, I had described (on page 24), the above species from a male specimen received by Mr. O. von Meske from a correspondent in Bastrop, Texas, as follows :

Closely allied to *C. Speyeri*. The anterior wings are narrower and less curved anteapically than in that species ; they are of a paler gray shade. The subobsolete reniform and orbicular spots are marked with ochraceous-yellow dashes ; a streak of the same color rests on the subcostal nervure at its base and another within the inferior tooth of the anterior transverse line. This line is more acutely toothed than in *Speyeri*. The oblique black streak in cell 1 b, is faintly bordered above with ochraceous-yellow ; the two small teeth of the posterior tranverse band, which are divided by the submedian fold are of nearly equal length, while in *Speyeri* the one below the fold is much the longer ; between these teeth and the opposed teeth of the anterior transverse line is a white spot, resting on the fold and reaching nearly half way to the nervure on each side. Terminal margin lined distinctly with black, interrupted by the nervules.

Posterior wings hyaline, with a very narrow lustrous brown border, and nervules covered with brown scales. Cilia white.

Expanse of wings 1.90 in. Length of body exclusive of anal tuft, .80 in.

Through the kindness of Mr. E. L. Graef, I have been permitted to examine three females of this species, received from Texas, one of which had been sent to him under the name of *Speyeri*. While closely allied to *Speyeri*, as above indicated, the distinctive features of narrower and less apically-rounded primaries, a lighter gray shade, ochraceous markings, et cet., are fully sustained by this additional material. The posterior wings of this sex have a narrower marginal brown border than in *Speyeri*, where it occupies, opposite the cell, nearly one-third of the wing, but in this, less than one-fourth. The wings in this species are more hyaline than those of *Speyeri*.

The nervular-interrupted black terminal line of the posterior margin of the primaries, is a good feature to distinguish this species from *Speyeri*.

In none of the four examples of *lætifica* before me, can the outlines of the orbicular and reniform spots be traced, or even approximately lined by comparison with congeneric examples. (It is proper to state that they are all in a somewhat imperfect condition.) In each, the lower portion of the reniform is so well defined, that, from its position and extent it might readily be mistaken for a portion of the posterior transverse line. It can be followed as a black line from vein 5, curving downward over 4 and 3, and then upward over the median at about the anterior third of the space between 3 and 2. In *C. intermedia* this line has the same extent but is less curved over 4 and 3.

In the type specimen of *lætifica*, traces of the orbicular are visible as two pale brown dashes, separated by a tooth of the anterior transverse line lying above and back of the point of bifurcation of the median and vein 2. It is believed that the form of the orbicular of *lætifica* (and also of *Speyeri*), should it hereafter be traceable in perfect examples, will prove to be that of a figure 8, or two contiguous ellipses of which the lower is the larger — quite unlike the quadrate form in *postera* and *asteroides*, and in *absynthii* and *asteris* of Europe.

Expanse of wings of ♀, from 1.58 to 1.88 inch. Length of body from .7 to .78 inch.

From 1 ♂ in the Collection of Mr. Otto von Meske, 2 ♀'s in the Collection of Mr. E. L. Graef, and 1 ♀ (through the favor of Mr. Graef) in my Collection.

Previous to the detection of this species, I had determined a Texan CUCULLIA of Mr. Morrison, as *Speyeri*. Since then, it has not been convenient for me to review the determination, but I think it probable that a re-examination would show it to be a *lætifica*, and consequently that *Speyeri* has not been received from Texas.

XIX. NOTES ON CATOCALA PRETIOSA LINTN.

This species is closely allied to *C. polygama* Guen. Its distinctive features may be more clearly appreciated by a differential comparison with that species. The basal region is conspicuously and broadly shaded with black, deepening toward the anterior transverse line; in *polygama*, shaded with ferruginous. The anterior transverse line is geminate, moderately oblique in its general direction, tending to the posterior third of the internal margin, distinctly separated by white below and slightly above the submedian: in *polygama* the line is quite oblique, tending to, or very near to, the internal angle, and is preceded below the submedian by gray and ferruginous scales.

The posterior transverse line has the extra-cellular teeth moderate, unequal, the lower one in cell 4 being improminent; moderately angulated outwardly (not toothed) on the submedian fold before the sinus; the sinus short, not extending to the middle of the wing, the line narrow with ferruginous and white below it; from the sinus, running direct and slightly oblique outwardly to the internal margin, followed by a white line. In *polygama* the two teeth are conspicuous and nearly equal; sharply toothed outwardly on the submedian fold, as in *C. cratægi;* sinus long, reaching the middle of the wing, the line broad, with ferruginous on each side and without white below; below the sinus, a long and sharp tooth bordering the internal margin.

The two transverse lines are separated on the submedian nervure by a space equal to the width of cell 2 on the terminal margin, whence they run parallel to the internal margin; in *polygama*, they are nearly or entirely united on the submedian, beyond which they widely diverge and again wholly or nearly unite on the internal margin.

The reniform is broadly surrounded by white; in *polygama* narrowly. The subreniform is round, its outline defined by black scales; it touches outwardly the median shade-line on vein 2; of the two transverse lines, it is nearer to the posterior, or midway between them: in *polygama* it is subquadrangular, defined by ferruginous scales, is quite removed from the median shade-line, and is nearer to the anterior transverse line, sometimes quite approximate to it.

The subterminal line is dark brown; in *polygama*, pale gray. The posterior wings have the marginal band slightly narrowed on the submedian fold: in *polygama*, it is separated or quite constricted; beneath, the cellular fold is shaded with black (not in *pretiosa*).

In size it is smaller than *polygama*, five examples of which before me measure in expanse of wings, males 1.80, 1.85 and 1.90 inch; females 2 and 2.1 inches. *Pretiosa* males 1.60 and 1.70 inch; females 1.80 inch. The wings are proportionally broader than in *polygama*; they are more clouded with black basally, with more white medially, and with less ferruginous in the terminal region.

Three examples of the species were captured by me at sugar, at Schenectady, N. Y., last year — the two males, in perfect condition, on July 8th and 10th, and the female somewhat worn, on July 16th.

A fine example of *C. cratægi* Saunders was also taken by me at sugar, on the 17th of July. I had recognized it as an undescribed species at the time of its capture, and had so indicated it in my Collection. With the larval state of nearly all of our Catocalas unknown, it is very gratifying that Mr. Saunders has been so fortunate as to be able to accompany the description of the imago with that of its larva.

C. polygama was taken but once by me last season, viz., on the 7th of July, in perfect condition. The examples which I have seen of this species present very little variation. The variability which has been ascribed to it probably arises from the confounding with it of *cratægi*, *pretiosa*, and perhaps some other species. — *Canadian Entomologist* for July, 1876.

Since the publication of the above, through the favor of Mr. G. W. Peck, of New York, I have been able to see additional examples of the species, which show some variation from my type specimens. In those, the marginal black band of the secondaries is continuous, presenting only a constriction on the submedian fold, acute in the female, and approaching to a separation, but slighter in the male. In a pair received from Mr. Peck, the band is disconnected on the fold, to the same extent in each sex. They also show variation in the shape of the subreniform, — that of the female being more oval than in the type, and of the male, subquadrangular.

It is believed that the tawny band of the primaries beneath, separating the marginal and median black bands, may afford valuable differential features in closely allied species of CATOCALA. Thus, in the four examples above referred to, the band is sharply and almost rectangularly reflected on vein 4, thence running direct with regular contraction to the internal margin.

In *C. cratægi*, the form and course of this band are similar to that of *C. pretiosa*, but its breadth is less.

In one example of *C. præclara*, the band is less acutely bent between veins 3 and 4, and again sharply between veins 1 and 2, from which point the lower portion of the median black band is continued very narrowly to the inner margin.

In one *C. fratercula*, female, the tawny band is regularly curved, with the exception of a moderate outward bending on the submedian fold.

Mr. Peck informs me that he captured a number of examples (12) of *pretiosa* last year (1876) at Morristown, N. J. For several years the species had been in his collection under the name of *polygama*. This latter species had never, to his knowledge, been taken in the vicinity of New York, but he had received it (not identified at the time) from Canada. Two examples of *C. pretiosa* were also taken by Mr. F. Tepper, at Flatbush, L. I., during the season of 1876.

C. polygama, thus far, has proved to be comparatively rare.* Its name is probably misapplied in many collections. The reference of *pretiosa* as a variety of that species may be presumed to arise from erroneous identification of one or both species.

* Both *C. pretiosa* and *C. polygama* were collected, at sugar, at Center, in quite a number of examples, during July and August of 1877. The former species was not at all rare throughout the month of July. *C. polygama* was less common, but of longer continuance, extending into August.

XX. ON A NEW SPECIES OF HYPOCALA.

Among the unequaled collections in number, variety and rarity, made at the famous Center locality during the season of 1877, perhaps the most interesting capture is that which gives us, for the first time, representation of a genus of tropical insects of marked beauty, rivalling the Catocalas, to which they are closely allied.

Of the eight species of HYPOCALA described by Guenée (two of which are Fabrician species), five are from the East Indies, one from Africa, one from Honduras (N. Lat. 15°) and one from Hayti (N. Lat. 19°). That a species, typical of the genus, should occur in the State of New York (N. Lat. 42°), is a discovery of exceeding interest, adding, as it does, to our list of Noctuas, a peculiar and beautiful form, which, there is reason to believe, will long remain a rarity in our collections.

In consideration of the peculiar characters of these moths, Guenée, in his Noctuelites, Tome III, has arranged them in a separate family which he designates as Hypocalidæ, consisting of the single genus of HYPOCALA. The genus he defines as follows:

"Caterpillars unknown. Moths — Antennæ, medium, more or less pubescent in the ♂. Palpi very projecting, quite large, compressed, contiguous, with joints indistinct and ordinarily of triangular form—the last as scaly as the preceding. Tongue moderate. Eyes large and projecting. Frontal tuft elongated, carinated, thick and close (*serré*). Thorax oblong, scaly, stout. Abdomen long, swollen, not carinated above, somewhat hairy, yellow with black spots, bearing a small tuft at the base. Legs strong, slightly hairy. Wings subdentate; the superiors pulverulent, the subterminal line in part distinct: the inferiors yellow with a black border, having the nervule-independent [disco-central nervule — vein 5], inserted near the three others, opposite the 4th inferior [1st median nervule — vein 2]."

Guenée remarks: "The species of this genus are of medium size, and very similar to one another, so that their varieties would be absolutely confounding if the difference in the ciliation of their antennæ was not evident. The following is their general description:

"The superior wings are subdentate, of a powdery gray, bordering on a yellow, and usually dotted or striated with brown atoms. The orbicular is wanting, but the reniform is usually present, of an oval form and blackish. All the lines are indistinct except the subterminal, of which the inferior portion is always visible, blackish, slightly dentate, and followed by a contiguous, parallel, ferruginous line. The inferior wings are yellow, with a large cellular spot and a black border, irregular and interrupted near the anal angle by a spot of the color of the ground, as in CATOCALA. The under side of the same wings have the designs black and more distinct, and the costa gray. That of the superior is also yellow, with two black bands extending from the costa and terminating before the internal margin. The abdomen is not annulated with yellow and black as in HYBLÆA, but all yellow with some black bands occupying only the upper side of the segments, with the anus equally black above.

The Hypocalas inhabit India, Africa and America. They are not common in collections, where they are almost always found in a bad state."

The honor and credit of the discovery of this moth is due to Mr. W. W. Hill, of Albany, N. Y. I do not deem it an accidental discovery, but rather the direct consequence of so persistent and thorough a "working up" of a favorable locality by the aid of a greatly improved method of sugaring, that I believe I may venture the assertion that not even an approximation to it has hitherto been made in the annals of Lepidoptera collecting. While, therefore, I most earnestly deprecate the frequent introduction of names of individuals in our Entomological nomenclature,—often on no other ground than as a pretty compliment, an incentive to the enlargement of an amateur collection, or as a means of securing the favor of a collector, and while I would guard the honor as a just tribute, (valuable only from its rare bestowal), to those whose labors constitute a portion of the history of our science,—in the present instance, I have no hesitancy in proposing the name of the discoverer for association with the insect below described. The results obtained at Center during the year 1877, hereafter to be given to the public, will assuredly constitute an epoch in the collection of Noctuidæ, and an important chapter in their history.

Hypocala Hilli n. sp.

Antennæ scaled; under a microscope clothed with numerous short cilia on each joint, and with fascicles of longer ones, of the length on the basilar joints of about one-half of their diameter. In proceeding from the base toward the tip, these fascicles are less marked, until at about midway of the antennæ they have become changed into spinules, of which there may be three or more on each joint; toward the tip these spinules extend beyond the numerous short cilia to about once and a half the diameter of the joints, and are visible, as are also the fascicles, under an ordinary magnifier.

Palpi triangular, porrected, pointed, slightly beaked, pale brown sprinkled with black scales, as are also the head, prothoracic tufts and thorax: these latter tinged with ochraceous.

Abdomen yellow, the basal segments bearing some long dusky hairs. Segments 8–11, with a fuscous or black spot (black on the posterior ones) on their anterior two-thirds, approaching in form two mesially connected small segments of a circle. On the last segment a large black spot, triangular in front, extending on the sides and on the long anal tuft, of which the terminal portion is yellow, tipped with dusky. Sides of the abdomen with a row of five small black spots, and with its under surface pale yellow, sprinkled with black scales.

Wings: primaries sprinkled with black scales on a pale brown ground, which shows a distinct violet shade in a certain light, especially on their outer half, with a slight pale green reflection near the base on the inner portion of the wing. Costa delicately striated transversely with darker brown. Median lines and discal spots absent; the reniform traceable in a scarcely perceptible encircling line when sought for with a magnifier. Subterminal line ferruginous, bordered on each side with black, extending from opposite the cell just above vein 4, outwardly in two or three teeth to near the margin, then bending backward, and with some gentle curves, reaching the internal margin near the angle. The terminal line black, waved, and a yellowish one at the base of the fringe. The fringe brown, tipped with a darker shade. Secondaries of a luteous yellow, with their greater portion black, as follows: costal region blackish; apical portion broadly bordered with black, continued along the margin to vein 2, dividing at vein 3 where it runs inward, occupying somewhat the place of the median band in Catocala, bending downward to the internal angle, whence it runs along the internal margin to the base; within this, resting on the submedian, a broad black ray not reaching the band; a large black cellular spot, connected in its upper half with the black of the base and costal region, but disconnected from the submedian ray. Beneath, the black border and its inner continuation are better defined and narrower; the cellular spot is contracted to a narrow elongated subquadrangular black spot between veins 2 and 8; the submedian ray is wanting; costal region of both wings dotted with black. The under surface of the primaries is yellow, with a broad black straight band extending from below the costa to the submedian interspace, and another of the same length and of nearly twice the breadth, lying in the outer third of the wing, slightly indented on vein 5; apex and margin beyond this band, fuscous; costa slightly striated with black.

This species resembles *H. filicornis* Guenée, from Honduras, from which it is separable by its larger size, its non-striated primaries, etc. In its antennal structure, it is similar to *H. Pierreti* Guenée, from Hayti.

Expanse of wings, 1.90 in.; length of abdomen, .95 in.

From 1 ♀, taken at sugar at Center on Oct. 15, 1877. In the Collection of Mr. W. W. Hill.

Soon after the capture of the above, Mr. von Meske received from Texas, and has now in his Collection an example, which, notwithstanding some differences, should in all probability be referred to the above species. It was taken at Bastrop, Tex., (N. Lat. 30), by Mr. Heiligbrodt, on Sept. 2d, in perfect condition. It is of the same sex with the Center specimen — a fact deserving special mention, since all the descriptions of Guenée in which the sex is indicated (seven species), were drawn from ♂'s.

Both the reniform spot and the transverse lines are present in it: the former is conspicuously outlined in black, of an oval form, inclosing an oval ring of pale scales, of which the half toward the base of the wing is more distinct. Transverse lines single, brown, toothed: the anterior line moderately toothed, its general course nearly direct across the wing, except as strongly exserted outwardly below the median: the posterior line more prominently dentate, with three teeth between costa and vein 3, above which vein it is strongly bent inward so as to touch the lower end of the reniform and to extend beyond it for a space equal to its transverse diameter, thence curving outwardly, and with two angulations reaching the internal margin. There is a faint trace of a median shade running as a continuation of the lower half of the posterior transverse line. The thorax is concolorous with the wings, and together with the prothoracic tufts and head, is marked with a median brown line. The two basal segments have each a small black median tuft, a trace of one of which is visible in the Center example, the other having probably been lost in the partial denudation of the superior portion of the thorax. The antennal structure of the two examples is the same, and no material difference is noticeable in a comparison of the posterior wings.

XXI. ON THE IDENTITY OF HOMOPTERA LUNATA AND H. EDUSA.

Phalæna (Noctua) lunata DRURY. Illus. Nat. Hist., App. vol. ii. 1773.
" " *edusa* " Illus. Nat. Hist., App, vol. ii. 1773.
Noctua lunata WESTW.-DRURY. Illus. Exot. Entomol., v. i, p. 37, pl. 20. f. 3. 1837.
Erebus edusa, WESTW.-DRURY. Illus. Exot. Entomol., v. ii, p. 46, pl. 24, f. 4. 1837.
Homoptera lunata GUENÉE. Sp. Gen. Lep. Noct., vol. iii, p 12. 1852.
" *Edusa* " Sp. Gen. Lep. Noct., vol. iii, p. 14. 1852.
" *Saundersii* BETHUNE: in Proc. Ent. Soc. Phil., vol. ii, p. 215. 1865.
H. lunata and *edusa* BEAN: in Canad. Entomol., vol. ix, p. 174. 1877.

More than a century ago (in 1770), Drury, in the first volume of his admirable work cited above, illustrates a large and beautiful Homoptera from examples received from Virginia and Carolina, to which, in the appendix to the second volume, he applies the name of *Phalæna* (*Noctua*) *lunata*. In the second volume (in 1773), he describes and figures *Phalæna* (*Noctua*) *edusa*, a form from New York, differing from the preceding in having the subterminal space of the brown wings of a grayish or bluish white, which, on the superiors, is gathered in two lunulated spots.

From their wide distribution through several of the United States, their comparative abundance and their marked beauty, these two forms have found place in nearly every one of our collections of Lepidoptera, under the above names, and not unfrequently associated with their presumed companions of the opposite sex. Very recently, the interesting discovery has been made that the two constitute but a single species.

I was led to suspect the above relationship two years ago from the study of a few examples in my collection, and accordingly requested of some of my friends the careful inspection of their future captures, with a view of determining this point.

Since that time numerous examples of the two forms have come under our observation, in all of which the females are *lunata* and all the males "*Edusa*." As no other differences except sexual are perceptible, beyond the colorational features, there is no longer reason for questioning the identity of the two forms, and the necessity of henceforth dropping the name of "*edusa*" from our lists.

It is fortunate that the specific name which is to be retained will now indicate a marked feature of the species.

There has always been an annoying incongruity in designating as *lunata* that one of the two closely allied supposed species which was without the lunulated spots.

In consideration of the suggestion and careful observations of Mr. Bean, given in a late number of the *Canadian Entomologist* (ut cit.), I have included, with doubt, *H. Saundersii*, in the synonymy of *H. lunata*. My two examples of this form are both males, but with only these at my command (the form appears to be quite rare in the Albany district), it would not be proper to form an opinion as to its relations.

XXII. ON THE IDENTITY OF TWO FORMS OF HYPENIDÆ.

In the *Transactions of the American Entomological Society* Vol. IV, pp. 105, 106, Sept. 1872, Mr. Grote describes *Tortricodes bifidalis* and *T. indivisalis*, provisionally as two species. He indicates the principal difference between the two, to lie in a cleft in the outer margin of the primaries of *bifidalis*. Although designating them by different specific names, he remarks, "I am inclined to consider the two forms merely as sexes of one species, with the fore-wings cleft in the male. And with four specimens of *T. bifidalis* before me, and eight of *T. indivisalis*, I cannot but be sure that most, if not all, of my *T. bifidalis* are males, and of my *T. indivisalis*, females. * * * I shall then not be disappointed if the two should prove to be sexual forms of one species."

Subsequently, same vol., page 308, Jan. 1873, Mr. Grote writes: "Mr. J. A. Lintner informs me that he has both sexes of *Tortricodes bifidalis* with cleft primaries. I then refer *T. indivisalis* to HETEROGRAMMA *Guenée*, believing our species not to differ generically from the Brazilian species which M. Guenée uses for his type."

In accordance with the above reference, the two forms have been known up to the present as *Tortricodes bifidalis* and *Heterogramma indivisalis*.

In a recent study of a considerable number of examples of each of the above two forms, collected at sugar, during the months of June, July and August of 1875, I was surprised to find that among so many, all having the cleft wing were males, and all with the entire wing, females. Suspecting, from this discovery, that the two were but one and the same species, I examined my cabinet example of *T. bifidalis* "female," and found that I had been misled by an unnatural position which the frenulum had assumed, but that it was unquestionably simple, not yielding even to pressure after having been detached from the wing, and, therefore, indicating a male. There was, then, no doubt of the specific identity of the two differing forms.

As the description of *Tortricodes bifidalis* precedes that of *H. indivisalis*, the latter must give way as a synonym.

In some of its features this species does not conform to the definition of the genus to which it has been referred. It will probably need a new genus for its reception.

That a single species has at the same time been given place in two genera, should not in the least degree reflect upon Mr. Grote. The author of the erroneous information conveyed to him, as above quoted, is alone responsible for the mistake. That two forms, so very unlike in construction of wing, should have been believed, at the first, to be identical, gives assurance that the difficult task of identification of species often imperfectly described, description of new forms, and systemization of the North American Heterocera, has been undertaken by one peculiarly fitted for the work.

XXIII. DESCRIPTIONS OF TWO NEW SPECIES OF PHALÆNIDÆ.

Acidalia lacteola n. sp.

Antennæ, vertex of head and thorax white. Abdomen white, sprinkled with pale brown scales and with bands of the same color.

Wings white, thinly sprinkled with pale brown scales, marked with sinuous dark brown bands and following shade lines, and with elongated black discal spots; inner margins with long white hairs, of which those opposite the bands are black tipped and spatulate.

Primaries with three transverse lines dividing the costa into four nearly equal parts — the two interior ones somewhat the shorter: the extrabasilar band runs outwardly from the costa to within the cell, where it is acutely reflected to the submedian fold, then with an outward angle on the submedian to the internal margin: the interior line is strongly reflected outwardly to the subcostal, thence, outside of the discal spot, with sharp angles and followed by brown scales to the inner margin: the outer line is more sharply defined, less sinuous, having but three prominent outward reflections, and is marked by a transverse black spot on each vein. The shade-line beyond this consists mainly of brown scales between the veins, arranged in a sagittate form, especially seen between the median nervules — veins, 2, 3 and 4. Terminal margin marked with brown scales between the veins (the fringes absent in the example).

Secondaries: the inner and outer band of the primaries are continued, and present much the same character; they divide the wing on the median vein in three nearly equal parts.

Expanse of wings, .87 in. Length of body, .25 in.

Described from one example, a female, not in very good condition, in the collection of Mr. Otto von Meske. Received from Mr. L. Heiligbrodt.

Habitat.— Bastrop, Texas.

Cidaria Packardata n. sp.

This name is proposed for the species described and figured by Dr. Packard on p. 124, Pl. viii, fig. 52, of the *Monograph of the Phalænidæ.* It is regarded by him as identical with the European *Phalæna populata* Linn., and a generic name applied to it and to several allied species, taken from the Tentamen list of Hübner's Stirps — PETROPHORA.

The two forms are so very different in contour of wings, markings and color, that it is difficult to understand how they could have been united. In *Packardata*, the primaries are quite excavated from the apex to vein 4, at which point, in one of the males before me, they are distinctly angulated; the secondaries are slightly angulated on vein 4. In *populata*, a scarcely perceptible excavation may be seen below the apex of the primaries, and the margin of the secondaries is regularly rounded.

In *Packardata*, the broad basilar band is composed of three lines, the first and second of which approximate, and are separated by pale yellow; the second and third are distant, with dark yellow between. In *populata*, the band consists of but two lines with pale yellow between, or a third line may be faintly seen *near the third.*

In our species, the whitish band between the basilar and mesial bands is more sharply angulated toward the costa above the median vein, and its outer border is more strongly toothed. The outer border of the mesial band differs very materially in its course from the same line in *populata*, in its running in a nearly direct line, with only a slight bending backward between veins 5 and 7, to near the outer margin of the wing, whence it proceeds to form two prominent produced teeth in cells 2 and 3. In *populata*, these teeth are comparatively improminent; they are at nearly twice the distance from the outer margin as compared with the other species; the excavation on vein 5 is deep and rounded, and thence, the course of the line to the costa is nearly parallel to the hind margin instead of quite oblique to it. The distinctly marked, lunulated, subterminal line of this species is barely indicated at its extremities in our form, in which there seems to be no place for it medially, from the approximation of the dentations of the mesial band to the outer margin. The subapical patch is large, uniformly dark, subsemicircular in outline, while in *populata* it is reduced to nearly a blackish oblique streak, behind which is the uniform shade of the terminal margin.

In color, *Packardata* is of a pale yellow, with great contrast between the ground color and the interior bordering of the two bands: *populata* is more uniform in its darker ochraceous shading, with the darker yellow tending to a diffusion over the whole of the mesial band. Our species is also of a larger size than the European, two examples measuring respectively 1.50 in. and 1.38 in., while the examples of the latter before me are but 1.25 in. in expanse.

Material under observation: One male of *C. Packardata*, from Collection of Otto von Meske, made at Sharon Springs, N. Y., August 14, 1875; one male from Collection of W. W. Hill, taken in Lewis county, N. Y., July 27, 1876. Of *C. populata*, two males and one female received from Dr. Speyer, of Germany, from Collections of Mr. von Meske, Mr. Hill and my own.

C. populata is very well represented on Pl. 22, fig. 590 of Wood's *Index Entomologicus*, in its characteristic shape of wings and disposition of bands. Its habitat and apparition are there given as "common in the north of England and in Scotland, in July." It is referred by Stephens to the genus ELECTRA.

XXIV. A NEW LOCALITY FOR BREPHOS INFANS MŒSCH.

This beautiful moth, possessing peculiar interest from its abnormal characters, its northern habitat, and from its close resemblance to the *B. Parthenias* of Europe, is rarely captured by the collector, and has been observed, so far as we know, in only few localities in the United States. Mr. Grote, in *Trans. Amer. Ent. Soc.*, I, p. 189, gives as its range, Labrador, southward through the Eastern States. In the *Canadian Entomologist* for 1875, VII, p. 40, we have the statement that "Mr. Kuetzing, of Montreal, has discovered a locality for *B. infans*, in a clump of white birch, north of the village of Hocheloga—the first record, it is believed, of its occurrence in this province [Quebec]." It was subsequently taken, in a number of examples, at Hyde Park, Mass., among white birch.

Its association in the above instances with the white birch, coupled with the knowledge that the European species *Parthenias*, *vidua* (notha), and *puella* (that of the Siberian *Middendorfii* not stated), also feed on birch, rendered it almost certain that our species would be found to have the same food-plant.

At the Center locality, and extending a mile or more in either direction, the N. Y. Central Railroad is bordered or has recently been, with a thick growth of white birch. It occurred to me that this would make a very fitting home for *B. infans* if its range extended to New York, and I accordingly suggested the probability of its presence there, to one of my entomological associates, Mr. W. W. Hill, who, I had reason to believe, would discover and capture it, if my surmises were correct. At about the time when it might be expected to appear, Mr. Hill visited the locality, found the moth, and was able to secure examples for his cabinet.

At my request, he has kindly furnished me with a statement of its discovery and capture, which I find to contain so many interesting particulars of the habits of the moth, as also of another extremly rare species (previous to 1876), that instead of extracting from it, I present it in full:

"In accordance with your suggestion that *Brephos infans* might be found at Center, on the 3d of April last [1876], I took the early train for that place. From 7. 30 A. M. to 12 M., I searched through the white birch swamps without meeting with one, but on emerging in a clearing on the west of the timber, I was at once brought in view of a half dozen or more, sailing around, at a height of from ten to twenty feet above the ground. In striving to capture a specimen, I observed that it would manage to keep from fifty to a hundred feet distant from me, except when flying swiftly by. They were evidently well aware of my presence. At 1.30 P. M. when moving very slowly and scanning closely the ground and brush, a *B. infans* rose from an open spot surrounded by some newly cut birches. To my great delight, I captured it. It proved to be a fresh and perfect specimen — taken, perhaps, in its first flight. Although they continued to fly for some time afterward, I failed to secure another.

April 17th, I again visited Center, but searched in vain for more of the *infans;* not a single example was to be seen. The day was colder, with more wind and but little sunshine. As the weather became more unfavorable, I left the birches and devoted the remainder of the day to examining the fences along the railroad, and was well rewarded by the capture of three examples of the rare *Xylina fagina.*

April 20th, visited the locality for the third time. At 1 P. M., I captured my second *infans* — this time resting on a small white birch — the wind blowing freshly toward me, with the sun bright and warm. I observed at least a dozen others, but did not succeed in taking another, although the chase was perseveringly continued for several hours. I repeatedly saw them alighting on small birch trees, but the moment a movement was made toward them, although at a distance of a hundred feet, it was noticed, and the moth at once took wing again. Later in the afternoon, the fine weather changed to cold and blustering, with snow, and as not a single *infans* was to be seen, I went in search of *Xylina fagina.* My examination of the fences was rewarded by the capture of nine specimens of the species — including those previously taken, twelve in all. Of these, ten were found at rest on the upper edge of the fence-boards (very singularly, none were on the upper board), the other two were on the more exposed north side of the fence. It seemed as if these little creatures had come out to enjoy the cold and driving snow-storm, which certainly failed to add to my comfort. At a late hour in the afternoon (5 P. M.) I also had the good fortune to secure a *Lobophora geminata* (Grote).

Neither of the above three species had before been found in this locality.

Subsequent trips gave me no additional examples of *B. infans*, although I saw it in flight — quite wild — so late as May 7th."

Guenée, in his Noctuelites, II, makes some interesting remarks on the habits of the European species of BREPHOS, which is here transcribed:

The caterpillars live on the tall trees, from which, letting themselves fall, they hang suspended by a thread, after the manner of many of the Geometers. They are found in autumn, in woods of considerable extent, and their moths fly in the first days of spring, or as might better be said, at the end of winter, about the leafless birches. Their flight is lively, jerky (*saccadé*) and rapid, but the sun is indispensable to draw them from their torpor. Hardly do its rays veil themselves, even for an instant, when the Brephos arrest their flight, to resume it as soon as it commences to shine. In these habits, they bear much resemblance to the Phalænidæ which like them fly in the early spring; and there is also a resemblance in the habits and forms of the caterpillars.

Mr. C. P. Whitney, of Milford, N. H., writes me in relation to the habits of *B. infans:* "I take it very early in the spring (this year [1877]) about the middle of April, only in the vicinity of the white birch (*Betula populifolia.*) Its season is about two weeks. Their flight is rapid and irregular, so that it is almost impossible to capture them except when resting on the ground, when almost every one discovered can be easily taken. Late in the season they fly high and alight on the twigs of the birches."

XXV. NOTES OF CAPTURE OF LEPIDOPTERA IN 1876.

RARE TO THE VICINITY OF ALBANY.

Argynnis Idalia Drury — quite rare in this vicinity — was captured at Center on September 16th.

Phyciodes Batesii Reak., was abundant at Center, on the 17th of June, when twenty-five examples were collected in a short time — the sexes in about equal number.

This is apparantly quite a local species, and so far as known, occurring in limited localities in New York, Pennsylvania and Virginia. It may usually be found in Center during the first half of June — my earliest recorded observation of it being May 31st, and latest June 22d. It has also been taken by me in limited numbers at Schoharie, N. Y.

Several specimens of *Pholisora Catullus* were collected in Bethlehem on the 12th and 13th of July. This species had been so diligently sought for in former years that it is difficult to see how it could have escaped detection if it had been a habitant of the locality for any considerable length of time. Its ascribed food-plant, *Monarda punctata*, is not known to the State Botanist to occur in this portion of the State. Mr. Scudder records *P. Catullus* as "very rare in New England, found in southern portions." (*Proc. Ess. Ins.*, III, p. 170.)

Eudamus Lycidas (Sm.-Abb.), was taken by Mr. W. W. Hill, at Center, on June 15th. It had previously been found by Mr. Edwards at Newburgh, N. Y., ninety miles south of Albany.

Sphinx luscitiosa Clem.— One of the most rare of our New York sphinges — was captured in perfect condition, at Center, on the 3d of June.

Euchætes Oregonensis Stretch, was not at all rare at Center during the month of May — a single collector taking thirty-three examples of it, viz : eight examples on the 10th, four on the 13th, twelve on the 16th, four on the 19th, three on the 20th, and two on the 24th. Mention of the collection of two examples of the species at the same locality is made in the 26th *Report of the N. Y. St. Mus. of Nat. Hist.*

Spilosoma latipennis Stretch (see Report ut cit., p. 144), occurred in a single example at Center, on June 10th.

Nephelodes violans Guen., in forty examples were taken at Bath-on-the-Hudson, between August 30th and September 15th, by Mr. Hill. It had not been observed in this vicinity for several preceding years.

Among the above are several examples which conform to the description given of *N. minians*, but its separation seems to rest on no other ground than depth of color, and in these, all the intermediate grades are to be found.

It is worthy of mention, that not a perfect example of *N. violans* has thus far been captured, or is present in any of the Albany collections.

Mr. R. Thaxter, in his list of Noctuidæ, taken at Newton, Mass. (Psyche, II, p. 36), states the fact, that the examples of *N. minians* (probably the same above recorded as *N. violans*), were almost always in poor condition.

Mr. William Grey, a collector of Lepidoptera for many years, has been rewarded for the additional attention which he has recently given to Entomology, by the capture of four species of CATOCALA, never before taken in the vicinity of Albany, viz. : *C. Epione* West., *C. flebilis* Grote, *C. Robinsoni* Grote and *C. coccinata* Grote — a single example of each species.

That graceful and beautiful Sphinx, *Chœrocampa tersa* (Linn.), not previously taken so far north as this, it is believed, is also one of the rarities captured by Mr. Grey.

The above were taken upon the grounds of Mr. Erastus Corning, at Kenwood, near Albany.

COLLECTIONS IN 1877.

In advance of a more extended notice of the extensive and interesting collections recently made near Albany, the following species may be mentioned, as of special interest from their rarity. Not one of the number had previously been taken in the Albany district, and less than half the number were represented in the Albany collections, from other localities. With few exceptions they are from the Center locality.

Thyatira pudens *Guen.*
Charadra propinquilinea *Grote.*
Diphthera fallax *H.-S.*
Acronycta grisea (*Barn.*).
Acronycta tritona (*Hubn.*).
Acronycta lobeliæ *Guen.*
Acronycta Radcliffei (*Harvey*).
Acronycta dactylina *Grote.*
Acronycta luteicoma *Grote.*
Acronycta subochrea *Grote.*
Acronycta ovata *Grote.*
Acronycta albarufa *Grote.*
Acronycta exilis *Grote.*
Acronycta lithospila *Grote.*
Agrotis turris *Grote.*
Agrotis albipennis *Grote.*
Agrotis perpolita *Morr.*
Agrotis opacifrons *Grote.*
Agrotis dilucida *Morr.*
Agrotis badicollis *Morr.*
Agrotis janualis *Grote.*
Agrotis phyllophora *Grote.*
Agrotis mimallonis *Grote.*
Agrotis Bostoniensis *Grote.*
Agrotis fumalis *Grote.*
Agrotis cupida *Grote.*
Agrotis Hilliana *Grote.*
Agrotis pressa *Grote.*
Mamestra lubens *Grote.*
Mamestra lilacina *Harvey.*
Mamestra assimilis *Morr.*
Mamestra vindemialis (*Guen.*).
Mamestra congermana (*Morr.*).
Dianthœcia modesta *Morr.*
Hadena leucoscelis (*Grote*).
Hadena arna (*Guen.*).
Hadena algeus *Grote.*
Polia diffusilis *Harvey.*
Dryobata stigmata *Grote.*
Morrisonia evicta *Grote.*
Morrisonia vomerina *Grote.*
Conservula anodonta *Grote.*
Phlogophora v–brunneum *Grote.*
Gortyna appassionata *Harvey.*
Gortyna nebris *Guen.*
Gortyna purpurifascia *Gr.-Rob.*
Caradrina bilunata *Grote.*
Crocigrapha Normani *Grote.*
Orthosia euroa (*Gr.-Rob.*).
Glæa tremula *Harvey.*
Glæa apiata *Grote.*
Glæa venustula *Grote.*
Glæa pastillicans *Morr.*
Xanthia togato (*Esp.*).
Scopelosoma ceromatica *Grote.*
Scopelosoma Græfiana *Grote.*
Scopelosoma devia *Grote.*
Scopelosoma vinulenta *Grote.*
Scopelosoma tristigmata *Grote.*
Xylina ferrealis (*Grote*).
Xylina signosa *Walk.*
Xylina semiusta (*Grote*).
Xylina Georgii (*Grote*).
Xylina unimoda *Lintn.*
Xylina Thaxteri (*Grote*).*
Xylina tepida (*Grote*).
Xylina pexata (*Grote*).
Xylina Baileyi (*Grote*).
Xylina querquera (*Grote*).
Xylina lepida *Lintn.*
Xylina capax (*Gr.-Rob.*)
Calocampa nupera *Lintn.*
Calocampa cineritia *Grote.*
Calocampa curvimacula *Morr.*
Lithomia germana (*Morr.*).
Xylomiges tabulata *Grote.*
Abrostola ovalis *Guen.*
Plusia formosa (*Grote*).
Lygranthœcia brevis *Grote*
Hypocala Hilli *Lintn.*
Catocala tristis *Edw.*
Catocala minuta *Edw.*
Homoptera unilineata *Grote.*
Homoptera obliqua *Guen.*
Homoptera benesignata *Harvey.*
Homoptera Woodii *Grote.*

* Stated by Dr. Speyer to be a well marked variety of *Xylina lambda* Fabr.

XXVI. NOTES ON SOME LEPIDOPTERA.

Grapta Satyrus Edw.: in Trans. Amer. Ent. Soc., II, p. 374.

An interesting discovery, and addition to our New York Fauna, is the recognition of the above species, among the collections made by Mr. W. W. Hill, at Fenton's, Lewis Co., (Adirondack region) during the season of 1877.

The type specimens, described as above cited, were from the Rocky Mountains in Colorado. In 1871, the butterfly was reared by Mr. Henry Edwards, from examples of the larvæ found by him on a species of Urtica, at Congress Springs, Santa Clara Co., Cal. The larva is described and figured, from a MS. and drawings by Mr. R. H. Stretch, in Edwards' *Butterflies of North America* I, p. 120, pl. 40. On the same plate, the butterfly is beautifully represented in both surfaces and sexes. Mr. Edwards also credits the species to New Mexico, Oregon and British America.*

The occurrence of this species in Northern New York is believed to be but the second instance of its collection east of the Rocky Mountains. The larvæ were found by Mr. C. W. Pearson, of Montreal, Quebec, feeding on nettle, at Chateaugay Basin, about fifteen miles south of Montreal. The butterflies emerged after a pupation of ten or twelve days.†

Lycæna Lucia Kirby and **L. pseudargiolus** Bd.-Lec.

In consideration of the interest attaching to these species, from the identity shown by Mr. Edwards, of *L. violacea*, *L. pseudargiolus* and *L. neglecta*, (see *Canadian Entomologist*, vol. x, pp. 9, 10), and the suggestion by the same author, that *L. Lucia* may prove to be but a northern form of the same, I give below some memoranda kindly furnished to me by E. C. Howe, M. D., of Yonkers, N. Y., of observations made at that locality:

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* Catalogue of the Diurnal Lepidoptera of North America, p. 28. 1877.

† Canadian Entomologist, vol. vii, p. 216 1875.

"*Lycœna Lucia* was first observed on April 17th [a month earlier than its Albany record — see p. 55], and lasted until May 17th. *L. neglecta* first appeared May 21st, and continued throughout June, quite common. It afterward appeared in September.

"During the latter part of August, two specimens of *L. Lucia* were taken, unless they were the var. *violacea*. The markings on the underside of the wings were dark and heavy, exactly like those collected in the spring. It was not observed again."

The occurrence of *L. Lucia* or the form *violacea* in the month of August has never before been recorded, and it would seem at variance with the idea entertained of their being but spring forms. Mr. Scudder records that one example of *violacea* has been taken at Walpole, N. H., so late as the 7th of July, but it has ordinarily been confined, in this latitude, to the months of May and June.

Do not the observations of Dr. Howe of the August examples rather indicate that they were an exceptional second appearance of *L. Lucia*, and lend additional confirmation to the belief hitherto entertained of its being distinct from *L. pseudargiolus*.

Agrotis nigricans Linn., var. **maizii** Fitch.

Of this moth, figured and described at considerable length in Dr. Fitch's Ninth Annual Report (pl. 4, figs. 2 and 3, pp. 237–249, Sixth–Ninth Reports : 1865), there are five examples, labelled as above by Dr. Fitch, in the collection of the Museum of the New York State Agricultural Society, and bearing also the additional popular name of the corn dart moth.

No one else has recognized *A. nigricans* in any of our American forms, nor, very strangely, has this determination of Dr. Fitch been referred as a synonym to any other species.*

A critical examination of the examples above mentioned has enabled me to refer them unhesitatingly, although much faded from ten or more years' exposure to strong sunlight in an exposed table-case, to the typical form of *A. tessellata* Harris, as recognized in the collections at Buffalo and Albany. The specific name "*A. tessellata*" embraces at present a variety of forms, which seem to me to vary too much among

* Since the above has been in type, the reference of "*A. nigricans*" to the *A. tesselata* of Harris, made by Prof Grote in the *Canadian Entomologist*, vol. vi, 118 (1874), has come to my notice.

themselves to really constitute a single species. I do not doubt but that, from these, other species will eventually be separated, and it is probable that ample material has already been accumulated for the purpose, in the two hundred or more "tessellata forms" in my possession which are awaiting a convenient time for their critical study.

Agrotis perpolita *Morr.*

From a cursory inspection of the female of this species, it would probably be referred to *A. velleripennis*, with which it is compared in the original description. A closer examination, however, would disclose several points of difference, the more prominent of which are the following:

The head, wings and thorax are nearly black, having only a brown reflection: in *A. velleripennis*, although described as coal-black, they are of a dark brown shade in all the examples before me, some of which are quite fresh.

The usual transverse lines in velvety-black, which are distinctly to be seen in *A. velleripennis*, are in this entirely wanting. Its orbicular spot differs from the ordinary shape, in that it is elongated in the direction of the cell, and, in two of the three examples examined, pyriform in outline, having the contracted portion directed toward the base of the wing: in its elongation, it resembles that of *A. clandestina*, but the normal shape of the spot in that species is acutely ellipsoidal.

The legs and spines, which in *A. velleripennis* are distinctly annulated with pale scales, are much less conspicuously ringed in this.

The males of the two species — from the contrast presented in their secondaries — are not liable to be confounded; those of *A. velleripennis* being white, subhyaline, with a median line of nervular spots, more or less distinct, and a very narrow terminal bordering of brown, and in *A. perpolita* smoky brown, with a broad darker border. There is also a marked difference in their antennal structure — the serrations in the latter species being not half so long or so strong as in the former.

This species seems to be quite rare. The original specimen was from Orono, Maine. It was unknown to Prof. Grote, previous to his identification, from the published description, of the examples from Mr. Hill's collection. Three examples were taken by Mr. Hill at Center, N. Y., on August 16th, 30th and 31st. No other examples of it have occurred among the very large collections made at this locality.

Agrotis cupida Grote.*

A correspondent of the *Country Gentleman*, from Erie Co., O., has recently discovered the food-plant of the larva of this species. From his communication we obtain the following facts: In 1874, $200 worth of grape-buds were destroyed by some unseen enemy. Repeated and careful examinations for many days throughout the season failed to bring to light the depredator. The following year, upon examining the vine at night with a lantern, a caterpillar was seen crawling along the vine, and to stop at a bud and commence eating it. After this discovery, searches were made each night, by six or eight persons bearing lanterns, during the continuance of the caterpillar, and two thousand caterpillars were taken and destroyed. It was calculated, on the basis of one caterpillar eating a single bud in a night, that the buds destroyed by the two thousand which were killed, might have produced eight tons of grapes.

As one bud a night would be a very small allowance for a half-grown cut-worm, it would be safe, we think, to double the above estimate of possible resulting damages.

Nothing is stated of the appearance or habits of the larva, except that it is of the color of the vine, and commences its depredations as soon as the buds begin to start.

During my sugaring operations at Schenectady, larvæ were occasionally seen upon the grape-trellis at night, feeding upon the bait, but from my recollection of them, they had not the aspect of such of the Agrotis forms as I have seen.

A single example of the moth occurred among my collections at Schenectady, on the 7th of August, 1876. It had been a rare species in this vicinity, until the remarkable Center collections of 1877 made it a common form. It occurred abundantly at this locality during the latter part of August and through most of September.

Mr. George Norman (*Canadian Entomologist*, 7, p. 5) records it frequent at sugar, at St. Catharines, Ont., from 17th July to August. Mr. Westscott (op. cit., 8, p. 12), notes a

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* *Noctua cupida* Grote: in Proc. Ent. Soc. Phila., vol. iii, p. 525, pl. 5, fig. 7. 1864.

Agrotis cupida Grote: in Trans. Amer. Ent. Soc., vol. ii, p. 309. 1869.

A new grape-insect: The Cultivator and Country Gentleman, vol. xliii, p. 166. Albany, N. Y., March 14, 1878.

single example at Maywood, Ill., on September 15. Mr. Thaxter, in his List (*Psyche*, II, p. 36), mentions it as rare, at light, in August.

The moth is very variable in its features, in the color of its wings, form and coloring of its discal spots, etc., or different species are included under that name. The varieties which Mr. Grote has referred to this species, seem to me to differ too much to really constitute a single species. Another season's collections may enable us to determine the value of these differences.

Mr. Grote has referred, with some doubt, an Agrotis received from California, to this species.

Agrotis brunneicollis Grote. (*Noctua*) Proc. Ent. Soc. Phila., III, p. 524, pl. 5, f. 5. 1864.

This species has been captured for the first time in this district, by Mr. S. C. Waterman, at Ten Eyck's woods, near Albany, on the 15th of June, 1877. An example has also been taken at Kenwood during the same month. Mr. Thaxter records it among his Newton (Mass.) collections, as rather rare, at light, in August.

Cucullia intermedia Speyer.

Several examples of the larva of this species were taken at Center, N. Y., during the last of June and first of July, in their second, third and fourth stages, feeding on *Mulgedium leucophæum*, popularly known as false or blue lettuce.

The young larva is striped laterally and dorsally, and bears a strong resemblance to that of *C. lucifuga* in its early stages, as described by Dr. Speyer in the *Stettiner Entomologische Zeitung* for 1870, and in *23rd Rep. St. Mus. Nat. Hist.*, p. 222.*

I regret that I have only the following brief notes of the appearance of the larva — a part of what was intended to be a detailed description. "The lateral stripe is white, of about one-third the diameter of the body, traversed by a yellow stripe of about one-half the breadth of the white, on which are the

* To the kindness of Dr. Speyer I owe it, that the two specimens of the *lucifuga* larvæ prepared by Mr. O. Schreiner of Weimar, Prussia, from which his descriptions above referred to are drawn, have place in my collection. The specimens show the life-like appearance which may be imparted to larvæ when prepared by inflation (see Scudder in *American Naturalist*, vol. viii, p. 321), and also illustrate the service which they may render in the comparison of forms from widely separated localities and countries.

stigmata and a number of black spots, as follows: on the first segment, a black spot precedes the stigma; on segments 4–9 and 11, a black spot behind the stigma, bearing a black hair; on segments 4–9 each, on the white portion of the band, a larger, rounded black spot above, and a little in advance of, the stigma, having within it a longer black hair."

It is probable that the larva may again be found the coming season, to afford the means of completing the above description, which is quite desirable in consideration of its close resemblance to that of the European *C. lucifuga.* The mature forms taken at Center bore a closer resemblance to *C. lucifuga* than did my Schoharie examples. Dr. Speyer (*St. Mus. Rep.* ut cit., p. 222), in indicating the difference between the two, states "the first [*intermedia*] has thirteen dorsal spots, the other twenty-five." The examples collected as above, show that the number, shape and division of these spots are not constant, and that therefore, from such numerical or geometrical features, no reliable specific characters are to be drawn. I am able to recall my enumeration of eighteen dorsal orange spots on one of the larvæ.

In some notes on this larva, published by me in 1873, in the 23*rd Rep. St. Mus. Nat. Hist.*, p. 213, its probable food-plant is given as the common burdock (*Lappa officinalis*), as inferred from finding several examples near this plant, and some of the larvæ having fed upon it in confinement. I now incline to the belief that their eating the burdock was under the provocation of hunger, and that their range of food under natural conditions would not extend to a plant so different in character from that of the blue lettuce. It is an interesting fact that in its systematic arrangement, the genus Mulgedium stands between Lactuca and Sonchus, the two genera which embrace, in Europe, the food-plants of *C. lucifuga* (see loc. cit., p. 214). As two of these plants, *Sonchus oleraceus* and *S. arvensis* have been introduced in this country from Europe, and the former has become quite common around dwellings and by roadsides in New York, it is not improbable that the *C. intermedia* larva may hereafter be discovered upon them. I have repeatedly examined the burdock for the larvæ, but without success.

Xylina lambda (Fabr.), var. **Thaxteri** Grote.

The reference of *X. Thaxteri* as a variety of *X. lambda*, by Dr. Speyer, has been noted on page 120. From the examination of the photograph of *X. Thaxteri* given in the Grote Check List, Pt. ii, fig. 3, Dr. Speyer was led to express his opinion* that it was but a variety of the European *X. lambda*. Mr. Grote, in its description (*Bul. Buf. Soc. Nat. Sci.*, ii, p. 196), had instituted a comparison between it and *Zinckenii*, under which name *X. lambda* was formerly known.

The recent examination by Dr. Speyer of a number of examples of *X. Thaxteri* has confirmed the opinion above expressed. He finds it to "correspond with the European species in all particulars except in that its primaries are a little broader, and its secondaries somewhat more excavated on vein 5. *X. lambda* had heretofore been known under three varieties; *Zinckenii* Treits., *rufescens* Mén., and *somniculosa* Hering. *Thaxteri* is now the fourth well marked variety; in its sharp markings, it resembles *Zinckenii* var., and in its color, *rufescens* var."

Hypena humuli Fitch.

In Harris' *Report on the Insects of Massachusetts*, p. 345 (Edition of 1841), the author, after describing some caterpillars infesting the hop-vine, says of the moths proceeding from them, that "they have been named [by him] the *Hypena humuli*, on the supposition that they are distinct from the *Hypena rostralis* or hop-vine snout-moth of Europe."

"These moths are readily known by their long, wide, and flattened feelers, which are held close together, and project horizontally from the fore part of the head in the manner of a snout. The antennæ in both sexes are naked and bristle-formed. The wings vary in color, being sometimes dusky or blackish brown, and sometimes of a much lighter rusty brown color. The fore-wings are marbled with gray beyond the middle, and have a distinct oblique gray spot on the tip; they are crossed by two wavy blackish lines, one near the middle, and the other near the outer hind margin; these lines are formed by little elevated black tufts, and there are also two similar tufts on the middle of the wing. The hind wings are dusky brown or light brown, with a paler fringe, and are without bands or spots. The wings expand about one inch and a quarter."

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* Stettiner Entomologische Zeitung, for 1876, page 203.

The above description is inapplicable to the *Hypena humuli* of our collections ; it applies fully to *Hypena scabra* Linn., and to no other species with which we are acquainted. In *H. scabra*, the fore-wings are marbled with gray beyond the middle" — in *H. humuli*, not : "the two wavy blackish lines, one near the middle, and the other near the outer hind margin, are formed by little elevated black tufts ;" in *humuli* these lines do not consist of elevated scales or tufts, even in examples just emerged from pupæ. The "two similar tufts on the middle of the wing" of *scabra*, are replaced in *humuli* by four. Of the former species, " the wings expand one inch and a quarter ;" of the latter, no specimen of large numbers under my observation, have equaled that expanse.

From the above it seems evident that the description of Harris was drawn from examples of *H. scabra* before him: from the general resemblance of the two species, *scabra* examples may have accidentally replaced those which he had reared from the hop, and which he intended to describe.

An earlier reference to the species is made by Harris in his *Catalogues of the Animals and Plants of Massachusetts*, 1835, page 74, where it is included among the Tineidæ as *Crambus humuli*.

The description of "*Hypena humuli*" is also given in the subsequent editions of Dr. Harris' Report.*

In 1855, in the *Transactions of the N. Y. State Agricultural Society*, vol. xv, pp. 555–558, pl. 1 fig., 1, Dr. Fitch describes and figures the moth obtained from the hop-vine larvæ as the *Hypena humuli* of Harris, in the event of its not proving identical with the European *H. rostralis* L. This being the first description of the species, the name of Dr. Fitch will hereafter have to be associated with it. The above is also to be found in the volume of the *First and Second Report on the Noxious Insects of New York*, pp. 323–326, pl. 1, fig. 1, printed in 1856.

In the *Annals of the Lyceum of Natural History of New York*, ix, p. 311 (1870), Mr. Coleman T. Robinson describes a form as *Hypena evanidalis*. This form proves to be the female of *H. humuli* — the sexes differing so much that for a long time they were regarded as distinct species.

* Insects of New England Injurious to Vegetation, p. 373. 1852. Insects Injurious to Vegetation, p. 477, f. 273. 1862.

Depressaria Le Contella Clem., etc.

Through some misunderstanding, the captures of the following named species, which were added to the proof of the short list of Microlepidoptera given on p. 51 of these papers, were omitted in the printing:

Depressaria Le Contella *Clem*	Aug. 10
Acrobasis nebulo (*Walsh*)	July 8
Tortrix furvana *Rob*	June 27
Tortrix limitata *Rob.*	July 10
Tortrix Pettitana *Gr.-Rob*	July 1
Sericoris campestrana *Zeller*	June 19
Ditula blandana *Clem*	June 26

The following species of New York Tortricidæ have also been taken by me, at the date stated, but were not captured at sugar, as were the preceding species. With a few exceptions they were collected at Schoharie, Schenectady and Center. Most of the determinations were made for me by Prof. Fernald:

Tortrix gurgitana *Rob*	July 14
furvidana *Clem*	July 15
fumosa *Rob*	July 4
discopunctana *Clem*	June 30
incertana *Clem*	July 18
lævigana *S.-V.*	June 15
nigridia *Rob*	June 21
puritana *Rob*	Aug. 5
sulfureana *Clem*	Aug. 21
Penthina albeolana *Zell*	June 18
chionosema *Zell*	June 13
nimbatana *Clem*	Aug. 18
Steganoptycha flavocellana *Clem*	Aug. 15
Phoxopteris mediofasciana *Clem*	May 16
nubeculana *Clem*	June 10
spireæfoliana *Clem*	June 13
Pædisca dorsisignatana *Clem*	Sept. 14
otiosana *Clem*	July 12
Sericoris coruscana *Clem*	June 12
constellatana *Zell*	June 18
Exartema fasciatanum *Clem*	July 30

XXVII. ON SOME SPECIES OF COSSUS.

Cossus reticulatus n. sp.

Allied to *C. robiniæ* in shape of wings and markings, having the stronger scales and reticulated ornamentation of that species, in which it differs from the minute and sparse scales and transverse lines of *C. querciperda* and *C. Centerensis.*

Primaries reticulated with black on a pale ash ground, the wings lighter than n *C. robiniæ*, from the absence of the conspicuous intranervular black spots and streaks which characterise that species, and are well represented in fig. 205, p. 413, of Harris' *Insects Injurious to Vegetation.* In this species, only between the internal, submedian and 1st median nervule (veins 1a, 1b, and 2), at the outer third of the wing, do the reticulations coalesce so as almost to form spots. In the terminal and subterminal portions of the wing, the small ash spots (sometimes ocellated with a black dot or line) for the greater part rest upon the veins; between 2 and 5, there are other spots intermediate to these venular ones — elsewhere, with a few exceptions, the spots are venular, forming two intranervular rows. The costal region is pale ash, traversed by black lines rather than reticulated. The median portion of the wing is imperfectly reticulated. The terminal margin, and the unicolorous fringe is conspicuously marked with a black spot on each vein.

Secondaries thinly clothed with fuscous hairs, permitting the reticulations of the lower surface to be seen in transparency, except between the margin and costal nerve, where it is scaled in pale ash as the primaries. Terminal margin and the pale fringe, black spotted as the primaries.

Beneath: primaries much as above, with these differences: There is an accumulation of blackish elongated scales in the basilar region, in the interspaces of the internal, submedian and median nerves; also between veins 2 and 3 at their origin, and a triangular spot having its apex on the costa at its outer third. Costa with about fourteen black lines between the base and vein 12, and three lines between veins 12 and 11, of which the outer, at the junction of vein 11 with the costa, is broad and extends inwardly to vein 10; another broad, black costal line each at the junction of veins 10 and 9 with the costa — these last three spots (also shown on the upper surface of the wings) are the equivalents of the three anteapical costal white dots of many of the Noctuidæ, designated by Guenée as the virgular spots (*traits virgulaires*).

Secondaries, from inner margin to vein 1 b, clothed with fuscous hairs as above; thence to costal margin with ash scales, nearly plain between 1b. and 2; reticulated between the median nervules (veins 2–5) and to vein 7 as on the primaries above; thence to costal margin, the interspaces barred by black lines, of which about eighteen are seen on the margin. A fuscous cloud borders the median nerve from the base to within its branches. Thorax above and beneath covered with pale ash scales. Tibiæ and tarsi ash, annulated with black. Abdomen above, apparently (the body of the example is much greased) concolorous with the secondaries above. Antennæ black, strongly bipectinate, like those in *C. robiniæ*.

Expanse of wings, 3.35 inches; length of body, 1.75 inch.

Habitat, etc., Texas, Rio Grande. Described from one female, in the collection of Mr. B. Neumœgen, New York city

Cossus undosus n. sp.

A Cossus was taken by Mr. S. H. Scudder, at Green River Station, Union Pacific Railroad, Wyoming, resting on a "cotton-wood" (*Populus balsamifera*, probably), together with a pupa case projecting from the same trunk. Through the kindness of Mr. Scudder, these have been placed in my possession. The moth unfortunately is a wreck, in no condition for accurate description, having lost its antennæ, one-half of one pair of wings, and one-third (the apical portion) of the other.

It differs from any of our known species in markings and squammation. Both pair of wings in their ground color are white, and are crossed by numerous, narrow, black, transverse lines. Of these the most prominent one crosses the outer third of the cell, with an outward inflection from the costa to the subcostal nervure, an inward inflection in the cell to the first median nervule which it follows for a short distance, and thence proceeds in a double curve to the internal margin. Another black line, less heavily marked, runs irregularly from the costa to the internal margin, passing over the middle of the cell. Between the stronger transverse lines are fainter ones, which sometimes reticulate with the former. The thorax, abdomen, basal and internal portion of the hind wings, are thickly clothed with pale gray hairs or elongated scales: the remaining portion of the hind wings (the portion preserved in the example) is as thickly scaled as the primaries, and nearly as distinctly lined; beneath they are stronger lined than above. Palpi barely extending beyond the eyes, clothed with white scales interspersed with narrow black ones. Thorax beneath, with long gray hairs. Legs similarly clothed, with their tibiæ and tarsi banded with black.

Length of body, with extruded ovipositor, 1.50 inch. Expanse of wings, entire, unknown; from one discal cross-vein to the opposite, 1.85 inch.

The pupa-case projecting from the tree, was that of a moth differing in sex from the captured example, but presumably of the same species. It measures 1.40 in. in length and 0.3 in. in its broadest diameter. Its color is about that of the ♀ of *C. robiniæ*, but of a paler brown than the ♂ of that species. Its terminal segment and rows of teeth on the segments are darker brown, approaching fuscous, but presenting quite a contrast with the black terminal segment and wing-cases of *C. Centerensis*. Its armature (transverse rows of teeth) is much stronger than in the ♀ *C. robiniæ*, and a little more so than in the ♂. It is stronger than in *C. Centerensis* (in which the armature is nearly equal in the sexes), having the teeth longer, although not so broad at their base: on the 8th, 9th and 10th segments, the teeth continue quite prominent in their extension below the stigmata, where in *C. Centerensis* they are weak.

The armature of the pupa-cases of Cossus, unquestionably presents excellent specific characters. From its study, I am able to announce the existence, in the State of New York, of another species of Cossus, boring in the white birch (*Betula populifolia*), the imago of which has not yet been detected.

From near the base of a prostrate birch at Center which had been extensively mined, I took, in 1876, a pupa-case, clearly differing from any known species. Unfortunately the specimen has been mislaid, or I should not hesitate, from the characters it presented to describe it and give the species a name. Other trunks of birch have been observed by me, similarly mined, and evidently by the same Cossus.

The species above described as *Cossus undosus*, may possibly be the *C. populi* of Walker (*Cat. Lep. Br. Mus.*, vii, p. 1515), from Hudson's Bay, which has not yet been identified. The very general terms in which its brief description is given, will not admit of its separation from allied forms, and unless the type is preserved in the British Museum, and comparison be made, it must be handed over to the long list of undetermined and indeterminable species of Walker.

It cannot be the *Cossus nanus* of Strecker, from its non-resemblance to *Cossus ligniperdi*, which *C. nanus* is said closely to resemble*; and from its differing markedly from a Colorado example of a ♀ Cossus which I refer to the ♂ *named* by Mr. Strecker but unfortunately accompanied by the mention of only a few specific features.

Cossus plagiatus Walker.

This species, briefly indicated, loc. cit., p. 1515 (1856), is another unknown species. Mr. Grote in his *List of the North American Platypterices, Attaci*, etc., p. 8 (1874),† refers it as a synonym of *Mac Murtrei* (Boisd.), Icon. Règne An., pl. 85, f. 2,— marking it, however, as an unrecognized species. It does not appear why this reference is made, and we may presume that it is based on a citation of Dr. Packard, in his *Synopsis of the Bombycidæ of the United States*,‡ where under the synonymy of *Xyleutes plagiatus*, he quotes from the *Systematic List of Canadian Lepidoptera* by W. S. M. D'Urban, § the following :

**Cossus nanus* n. sp.—Expands $1\frac{1}{4}$ inches. Has the appearance of a minature *Cossus ligniperda*, is gray, of lighter and darker shades, and reticulated with black lines which are most noticeable across the disk and on the terminal part of wing. Secondaries uniform grayish. Beneath grayish, faintly reticulated.—Hab. Colorado. Proc. Acad. Nat. Sci. Phila., 1876. p. 151.

† Read before the American Philosophical Society, Nov. 20th, 1874.

‡ Proc. Ent. Soc. Phila., vol. iii, p. 390. 1864.

§ Can. Nat. and Geol., Aug. 1860, p. 247

"*Cossus plagiatus* Walk. Rare, July.

"In 1857, Mr. T. R. Peale, of the U. S. Patent Office, named this species *Cossus McMurtrici* [sic], and informed me that it was common south of Pennsylvania, but rare in the Middle States."

Cossus crepera Harris.

This name appears in Dr. Harris' *Catalogues of Animals and Plants of Massachusetts*, p. 72. 1835, but is not continued in his subsequent reports. In 1839, Doubleday, having suspected its true relationship, writes to Dr. Harris of this species: "There is a true *Cossus* with mottled upper wings, and yellow under wings, black at the base and inner margin, —*Robiniæ* ♂?" It is decribed by Dr. Packard, loc. cit., p. 388, as *Xyleutes crepera*, and catalogued by Grote in his List above cited, as an unrecognized species, under the new generic name proposed by him of Xystus. It is now known to be but the ♂ form of *C. robiniæ*, from the ♀ of which it differs so greatly in the angulated form of its posterior wings and their yellow color, as to have been mistaken for another species.

Cossus querciperda Fitch.

The species described under this name by Dr. Packard, loc. cit., p. 389, is not the one so named and briefly described by Dr. Fitch,* but some other form — possibly *C. Centerensis*.† The types are the only pair, so far as known, in existence, and are in my Collection. A male and female were taken in copulation, June 27, 1857, at Schoharie, on the trunk of a young black oak (*Quercus tinctoria*), four inches in diameter. A second male was taken at the time, from the same tree, a short distance from the attached pair. One of these, together with the female, it is believed, were subsequently given to Mr. J. W. Weidemeyer, of New York, with other duplicates from my boxes, without statement of their rarity, which at the time was not known. As Mr. Weidemeyer's Collection is no longer in his hands, the examples have probably been destroyed.

In March following the capture of the above examples, two Cossus larvæ were found in burrows in some pieces of black

* Trans. N. Y. State Agricul. Soc., vol. xviii, p. 790. 1859. Fifth Report of the Insects of New York, p. 10 (section 294 of the volume of the Third, Fourth and Fifth Reports).

† Canadian Entomologist, vol. ix, p. 129. 1877.

oak which had been prepared for fuel. They were both frozen rigidly when discovered. One was lying in a cell, in its burrow, formed by some slight threads in which its cuttings had been thinly woven above and below it: the other had constructed a cell of about the capacity of its body, branching off from its main burrow—its entrance closed by a thin wall of the cuttings.

The smaller of the two larvæ measured one inch and a half in length. It was of a pale green color, with a darker green dorsal stripe, bordered faintly with yellow. Head flat, subtriangular, dark brown, clouded with black. First segment with two brown spots extending across it, narrowed laterally, and of nearly the length of the segment medially, where they unite to inclose on the dorsal line an elongate-elliptical green spot. The anterior segments are flattened, and broader than the following, which gradually diminish in breadth toward the posterior end. The segments are marked dorsally with four rose-colored elevated points — the trapezoidal spots of Guenée; on the 10th and 11th segments they form a square: a similar spot is present above each stigma, a smaller one below, and another in front—each of these bearing a short brown hair. The stigmata are oval, orange colored, centered with dark brown. The legs are tipped with chestnut brown, and the prolegs armed with brown plantæ.

One of the larvæ escaped from its burrow by gnawing through the stick of wood in which it was inclosed and its paper box, and was found some weeks thereafter, dead within a roll of clothing. The other disclosed a perfect imago on the 29th of April—the female type of the rare *C. querciperda* of my Collection. The larva had constructed within its burrow a very slight cocoon of delicate silk. The long ovipositor of the moth was a marked feature of it, when alive, measuring in its full extrusion, three-tenths of an inch. It displayed a tenacity of life remarkable even in a gravid Bombycid, as it lived for twenty-four hours after a strong solution of cyanide of potassium had been pricked in its thorax.

The most interesting character of this species is not referred to in its description, viz.: the great disparity in the size of the sexes. The ♂ measures in length of body 0.55 in., and in expanse of wings, 1.23 in. The body of the ♀, exclusive of its ovipositor, is 1.25 in. long, and the expanse of wings is 2.62 in. Their comparative weight is as one to four, even after the removal of the eggs and viscera from the female—its weight being twelve grains, and that of the male three grains. Were it not for the capture of a second male at the same time, of the same diminutive size, it might have been supposed that the example was a dwarfed individual. This disproportion in size is the more interesting, from the fact that in a congeneric species—*Cossus Centerensis*, the size affords no indication of sex, for the males of this species are often larger than the females.

Dr. Fitch has erred in representing the hind wings of the male *querciperda* as colorless. They are pale yellow on the disc beyond the fold at vein 1a—the color of the delicate scales showing more plainly when their surface is viewed in line with the eye. Within vein 1a to the inner margin, the wing is covered with black hairs.

The yellow coloring of these wings, together with the angle on vein 1, and the antennal structure, ally this species to *C. robiniæ*.

INDEX TO ENTOMOLOGICAL CONTRIBUTIONS.

NOTE ON THE GENUS PLUMALINA.

BY JAMES HALL.

In the final publications of the Geological Survey of New York (Reports of the Third and Fourth Districts), Mr. Vanuxem, on page 175 of his report, figured a fossil consisting of a simple stipe or rachis, with narrow, linear pinnulæ arranged in rigid order upon each side; and on page 273 of the Report of the Fourth District, Mr. Hall gave a figure of a similar form, as a group or tuft of simple fronds, with the pinnulæ in a good state of preservation. Both authors expressed the opinion that the fossil was not a plant; though a comparison was made with FILICITES, and it was referred to FILICITES? in an explanation of figures in the Tables of Fossils, 4th District.

At a subsequent period, 1855, Dr. B. F. Shumard described and figured, as *Filicites gracilis*, a species congeneric with that of the New York Reports.*

In 1858, the writer, in a review of certain genera of the Graptolitidæ, proposed for the fossils here referred to, the generic name PLUMALINA, and *Plumalina plumaria* for the New York species, regarding it as the type of the genus,† and recognizing the species of Dr. Shumard as *P. gracilis*. The New York fossil has subsequently been described by Dr. Dawson as *Lycopodites Vanuxemi*.‡

Since that period other forms have come under the observation of the writer, to whom, at the present time, at least six species are known. These will be illustrated in a future report.

In all the species observed, the usual form is that of a simple frond, or hydrocaulus, with narrow, linear pinnulæ diverging from each side, essentially in the same plane, and more or less ascending. Rare examples are bifurcating or otherwise branching, and the specimen shown on plate 4, fig. 1, is the most remarkable example of this kind observed. Although

* Report on the Geological Survey of Missouri: Part II, p. 208, pl. A, fig. 11. 1855.
† Canadian Naturalist and Geologist, vol. iii, p. 175. 1858.
‡ Quarterly Journ. Geolog. Soc., vol. xviii, p. 314. 1862.

usually occurring singly, it is evident from the figure given in the *Report of the Fourth Geological District*, as well as from other specimens known, that they may grow in tufts. No evidence of fertile cells or hydrothecæ has been seen, and no distinct serration of the pinnulæ can be made out in the specimens examined. From certain appearances upon some specimens, I infer that the pinnulæ were cylindrical, and probably tubular, their present appearance being due to extreme compression.

From the general aspect of these fossils, they appear to be referable to the family PLUMULARIDÆ, and their forms and mode of growth may be compared with some species of PLUMULARIA and AGLAOPHENIA.

EXPLANATION OF PLATES.

EXPLANATION OF PLATE I.

Agaricus graciloides Peck.

Page 42.

Fig. 1. Two plants of ordinary size ; one showing the striatulations of the moist pileus.

Fig. 2. Vertical section of a pileus.

Fig. 3. Transverse section of a stem.

Fig. 4. Four spores × 400.

Helotium caricinellum Peck.

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Fig. 5. Piece of a sedge leaf bearing the fungus.

Fig. 6. Two plants magnified.

Fig. 7. Two paraphyses and an ascus containing spores × 400.

Fig. 8. Three spores × 400.

Peziza distincta Peck.

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Fig. 9. Piece of a culm bearing six plants.

Fig. 10. A plant with the mouth expanded, magnified.

Fig. 11. A plant with the mouth contracted, magnified.

Fig. 12. A paraphysis and an ascus containing spores × 400.

Fig. 13. Four spores × 400.

Excipula lanuginosa Peck.

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Fig. 14. Piece of a stem bearing several plants.

Fig. 15. A young unexpanded plant, magnified.

Fig. 16. An expanded plant, magnified.

Fig. 17. Three hairs × 400.

Fig. 18. Several spores × 400.

Peziza Warnei Peck.

Page 59.

Fig. 19. Three plants of unequal size.

Fig. 20. A paraphysis and an ascus containing spores × 400.

Fig. 21. Three spores × 400.

Cladosporium depressum B. & Br.

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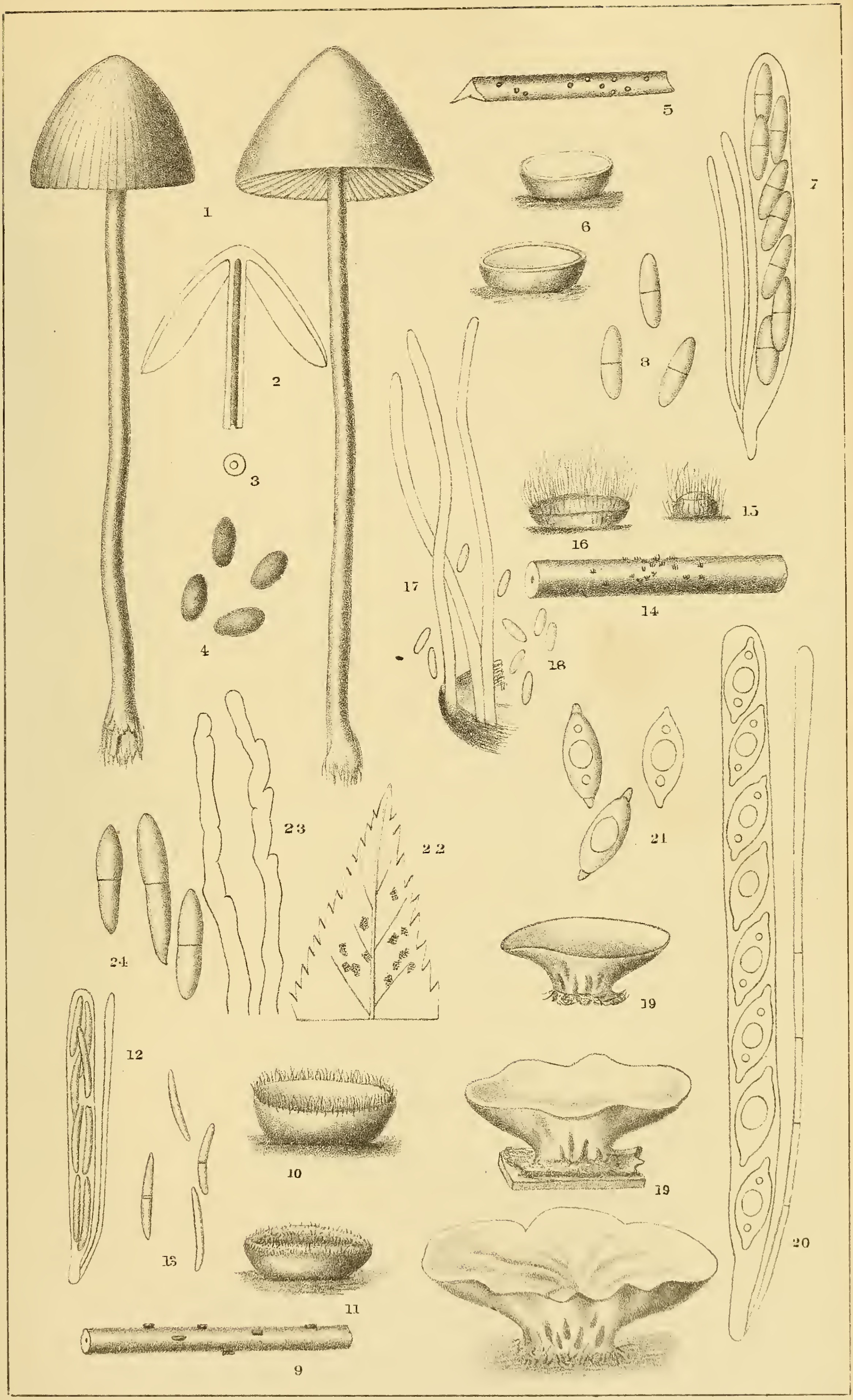
Fig. 22. Part of a leaf bearing the fungus.

Fig. 23. Two flocci × 400.

Fig. 24. Three spores × 400.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EXPLANATION OF PLATE II.

Diachæa splendens Peck.

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Fig. 1. Part of a leaf bearing several plants.
Fig. 2. Two plants magnified, one with part of the peridium removed to show the capillitium and penetrating stem.
Fig. 3. A fragment of the capillitium × 400.
Fig. 4. Four spores × 400.

Physarum albicans Peck.

Page 50.

Fig. 5. A piece of bark bearing several plants.
Fig. 6. Two plants magnified, one with most of the peridium removed to reveal the capillitium and slightly penetrating stem.
Fig. 7. A fragment of the capillitium × 400.
Fig. 8. Four spores × 400.

Sphæronema aurantiacum Peck.

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Fig. 9. A piece of bark bearing the fungus.
Fig. 10. A piece of the matrix and two perithecia with globules at the apex, magnified.
Fig. 11. Six spores × 400.

Clavaria typhuloides Peck.

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Fig. 12. Piece of a stem bearing six plants.
Fig. 13. Two plants, magnified.
Fig. 14. Five spores × 400.

Physarum luteolum Peck

Page 50.

Fig. 15. A leaf bearing a cluster of the plants.
Fig. 16. A plant magnified, showing the stellately ruptured peridium.
Fig. 17. A fragment of the capillitium × 400.
Fig. 18. Four spores × 400.


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PLATE II— (*Continued*).

Sphæria Clintonii Peck.

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Fig. 19. A piece of wood bearing the fungus.
Fig. 20. A perithecium, magnified.
Fig. 21. A seta of the perithecium × 400.
Fig. 22. An ascus containing spores × 400.
Fig. 23. Four spores × 400.

Sphæria scapophila Peck.

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Fig. 24. Piece of a scape bearing the fungus.
Fig. 25. A piece of the matrix with two perithecia, magnified.
Fig. 26. An ascus containing spores × 400.
Fig. 27. Three spores × 400.

Helminthosporium Absinthii Peck.

Page 54.

Fig. 28. A leaf bearing patches of the fungus.
Fig. 29. Two flocci × 400.
Fig. 30. Four spores × 400.

EXPLANATION OF PLATE III.

ASTRÆOSPONGIA MENISCUS Roemer.

Page 111.

Fig. 1. The convex upper side of an individual of somewhat irregular form.

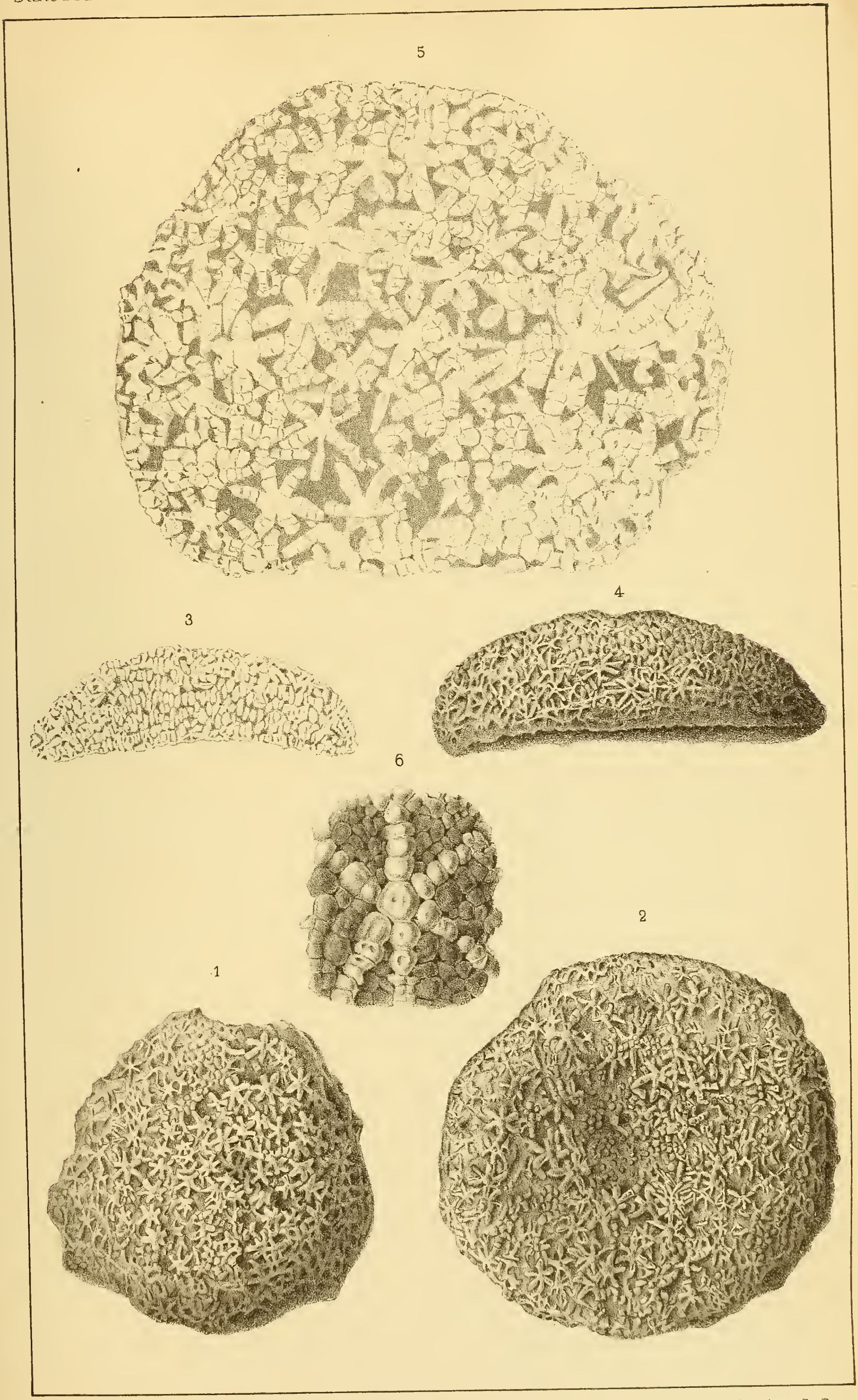
Fig. 2. The lower side of another individual which is flat or slightly concave in the center

Fig. 3. Vertical section of the ordinary concavo-convex form.

Fig. 4. Lateral view of a specimen of ordinary size and form.

Fig. 5. Horizontal section magnified, showing the character and construction of the stars.

Fig. 6. A single star highly magnified.



E. Emmons. del.

Ph. Ast, lith.

EXPLANATION OF PLATE IV.

Plumalina plumaria Hall.

Page 255.

Fig. 1. A branching frond, which apparently has been imbedded while in a growing and vigorous condition; all the pinnulæ holding their position and attachment.

Fig. 2. Enlargement of a specimen showing a portion of the rachis denuded of its pinnulæ, except two at the upper extremity.

The apparent annulation is an exaggeration of the characters of the rachis and incorrectly represents the fossil.

Fig. 3. A frond which is somewhat dilapidated, apparently from maceration and decay, while lying upon the sea bottom. The midrib and pinnulæ show the attachment of numerous germs and young (some of them perhaps still in the form of eggs) of a Brachiopod of the genus Rhynchonella or Stenocisma. The smaller forms present merely flattened spheroidal or ovate bodies, which in farther development show slight evidence of inequalities of the surface, which in a later stage become obscure plications. The pinnulæ, from maceration, gradually fall off, leaving the rachis free, when these germs acquire a farther development, as shown in figures 4 and 5.

Fig. 4. A part of the rachis of a specimen denuded of its pinnulæ, and preserving the young brachiopod still attached. Natural size.

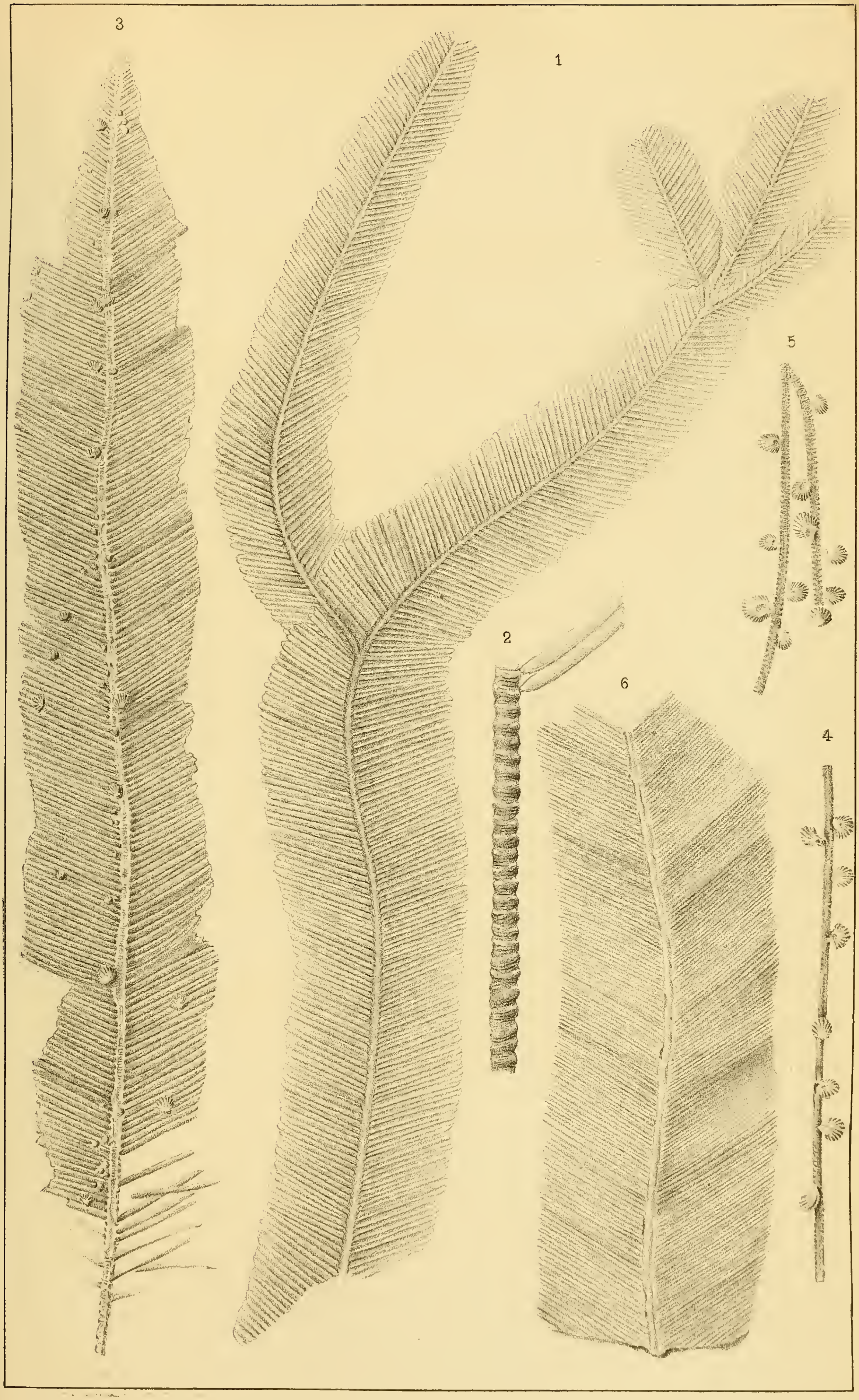
Fig. 5. A similar specimen where the rachis, has been bent and recurved upon itself, preserving the brachiopods still attached.

These specimens are from the shales of the Portage group.

Plumalina densa n. sp.

Fig. 6. A fragment of a frond, natural size, in which the rachis is less rigid and distinct, the pinnules narrower, proportionally longer, and more crowded than in the preceding form.

From the shales of the Hamilton group.



E. E. & P. R. del.

Ph. Ast, lith

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BY

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OF THE

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