

















THE  
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TWELVE years ago, when the Perthshire Society of Natural Science decided to take the bold step of issuing a new Magazine devoted to Scottish Natural History in the widest sense, it is probable that not one of the originators anticipated for their venture a longer career than one or two years. It met, however, with a very kind reception, and not only continued to exist but to receive increasing support, and, it is hoped, fulfilled in some measure the object of its existence—the promotion of the study of the Natural History of Scotland. Yet, the *Scottish Naturalist* has shared the common fate of such magazines in its vicissitudes of fortune, and more than once it has seemed as if the time had come when it must be brought to a close ; but in confessing this to our friends it is with the confident hope that they will extend the same kind aid in the hour of need, should that come, that they have so readily given in the past.

The time has come when from personal reasons I must resign the editorship ; but not, I trust, sever all connection with the Magazine. In its pages I still hope to meet in the spirit the friends with whom my intercourse has been so pleasant during the past twelve years ; and with them I still hope to labour in a common field and for a common object. With this hope I now resign the Magazine into the hands of my successor.

One duty alone remains to be discharged, and that is the pleasant one of thanking most heartily all the friends (though some dear ones alas ! have passed from among us), by whose kindness alone I have been enabled to conduct the *Scottish Naturalist* till now.

F. BUCHANAN WHITE.

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IT will be admitted by all lovers of the natural sciences in Scotland that the *Scottish Naturalist* has attained in no small degree the object of which its originators aimed, and that in all future labours in the field of Scottish Natural History in the widest sense frequent reference must be made to its pages.

In the new series, just commenced, the promotion of the study of the Natural History of Scotland will continue to be the chief aim ; an aim that it is hoped will be fully attained by the continuance in future, no less liberally than in the past, of contributions based on original observations and investigations by the Naturalists of Scotland. Much still requires to be done ere we can imagine that our knowledge of the Natural History of the country is approaching completeness. By such support alone can this Magazine continue to fill worthily the place that it has gained in the past ; and the present editor ventures confidently to appeal to all students and lovers of science in Scotland, or that feel an interest in its progress among us, for their aid.

As far as possible reports of the proceedings of the various Natural History Societies and Field-Clubs of Scotland will form a regular feature of the new series ; and it is hoped that the Secretaries will favour the editor with such reports, and with abstracts of the articles of general interest, or, if agreeable to the authors, with the more important papers for publication in this journal.

It is also proposed to give occasional short reviews or abstracts of the more interesting new works and magazine-articles, English and foreign, in the various departments of Natural Science ; and specially where they can render aid in the study of any branch of Natural Science in Scotland.

It is hoped that our readers will approve the attempt to give a short record of those Scotchmen that have extended the knowledge of any branch of Biology or of Geology, as well as of all that have done good service to these studies in Scotland, though not themselves Scotchmen. The editor will feel it an obligation if the well-wishers of the *Scottish Naturalist* will kindly assist him in making the record as complete as possible of all such as these, who, when they pass from among us, "leave behind them foot-prints on the sand of time." He trusts that any errors or important omissions will be excused, if such should by inadvertence be made. To render the *Scottish Naturalist* as widely and thoroughly fitted as possible for promoting the advance of all departments of Natural Science in Scotland, and to conduct it to the satisfaction of its well-wishers, will be the constant aim of its present editor.

JAMES W. H. TRAIL.



IN MEMORIAM—DR. GEORGE DICKIE.

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THOUGH now nearly a year has elapsed since the death of Dr. Dickie, our readers will feel with us that the new series of this Magazine cannot be more fittingly opened than with a brief sketch of the life and work of one that for many years held a foremost place among British Biologists, and that added to the well-earned fame of Scotland in the Natural Sciences by labours worthy to be ranked with those of Greville and other masters in science.

In his knowledge of the Marine *Algæ*, to which group he had for many years paid close attention, latterly almost to the exclusion of other departments of Botany, he stood unrivalled in Britain; and his death must long be felt as a grievous loss by all students of those plants; yet may we not hope that a successor will arise among us to occupy the vacant place, and so to pay the truest and best tribute to the memory of one of the most devoted and least self-seeking students of the works of the Creator.

He was born in Aberdeen on the 23rd November, 1813, in the house in which he passed most of his life, and in which he did most of the work that gained him distinction. After the usual course of education at school, he entered Marischal College as a student in the Arts Faculty in 1826, at the early age of 13, and took the degree of Master of Arts in 1830.

It may be well to state, for the information of those not familiar with the former history of Aberdeen, that in 1830, and until 1860, there were two distinct and rival Universities (afterwards united to form the existing University of Aberdeen),—viz., King's College in Old Aberdeen, and Marischal College in Aberdeen.

Though keen rivals as regarded the classes in Arts and in Theology, to some extent they united for common interests, and they shared in supporting a medical school. There was, however, no properly equipped medical school; and the deficiencies had to be made up as far as possible by the appointment of lecturers.

After completing his arts course, he entered on the study of medicine, and spent the two next years in that study in Aberdeen; but thereafter he went to Edinburgh, and entered the Brown Square School of Medicine, in which he gained the medal for

Pathology and Practice of Medicine, in 1833. In 1834 he became M.R.C.S. of London.

He at one time intended to enter the naval medical service, but relinquished that intention and returned to Aberdeen, where he undertook for a time private medical practice. However, his tastes from early life had tended very strongly in the direction of scientific research, especially in Botany, and he found medical practice therefore uncongenial and incompatible with his favourite studies. In 1839 he was appointed lecturer on Botany in King's College, and continued in that office till 1849. For a part of that period he also lectured on *Materia Medica* and on Zoology, and held the post of librarian of the University. In 1842, the honorary degree of M.D. was conferred on him by the University; and on his resigning his various appointments in 1849, he received the thanks of the Senate "for the excellent manner in which he had discharged the duties of these offices."

In 1849 he left Aberdeen, having been appointed to the chair of Natural History in the new University of Belfast. While there, he had to deliver lectures on Botany, Zoology, Geology, and Physical Geography.

In 1860, Marischal College and King's College were united to form the new University of Aberdeen, and several new professorships were instituted, among them one of Botany, for which Dr. Dickie was a candidate, and being successful, became the first professor of Botany in the University. Not long after his return to Aberdeen he spent some days with his students botanising among the hills and corries of Braemar. The weather was most unfavourable during almost the whole of the time, and the exposure injured his health so much, that on his return home he suffered from a very severe and dangerous illness, which resulted in more or less chronic bronchitis and deafness, becoming worse during the rest of his life, though with occasional remissions. In 1877, he felt unable to continue to discharge the duties of the professorship, and resigned them in the spring of that year. The relief had a beneficial effect on his health, and he was able to continue his work among Marine *Algæ*, though with occasional hindrance from attacks of illness, till within a short time of his death. In the spring of 1882 he was confined to his room for some weeks, but in June had become considerably stronger; and his friends were hoping that he had still some years of life before him. To their sorrow, he was again prostrated by illness; and after about a week of gradual loss of strength, attended with great suffering, borne



with Christian fortitude and patience, he died on 15th July, 1882.

In August, 1856, he married Miss Agnes Low, of Aberdeen, and is survived by her and by six of a family.

Of him it may be truly said that he was born a naturalist. At an early period he began to examine for himself the flora and fauna, both terrestrial and marine, of his native district; and to keen and unwearied powers of observation in the field, he added a wide and accurate knowledge of the literature of not the biological sciences alone, but of the other natural sciences also, as well as of a still wider range. The love and pursuit of truth as truth was a marked characteristic of his disposition, not alone in his researches in science, but in all things that he entered on. Another characteristic of a true naturalist, displayed by him in an eminent degree, was the pleasure that he felt and showed in assisting to the utmost of his power the progress of any student of science, whether with advice, information, or aid of a more material kind. To his instruction and assistance not a few of his pupils can trace much of their success in later years, while their success seemed to give him as great pleasure as if it had been his own. To him any advance in the knowledge of truth was always a source of pleasure, and not less so when made by another than when the result of his own labours.

He studied botany as a medical student in 1830, and again in 1833, under Dr. Knight, who was professor of Natural Philosophy in Marischal College, but also lectured on Botany; to his zeal as a botanist Dr. Dickie bears testimony in his *Botanist's Guide*, but in this case the pupil soon excelled his teacher. During the earlier years of his life, Dr. Dickie was assiduous and unwearied in his study of the flora around Aberdeen, and of the Braemar Highlands; and he added several flowering plants to the British flora, as well as largely extended the knowledge of the species found in the districts examined by him. Among the cryptogams his labours were still more successful, and peculiarly so among the *Algæ*. The value of his researches among these plants is evidenced, among other proofs, by the assistance from him acknowledged in Harvey's *Phycologia Britannica*, Ralf's *British Desmideæ*, and Smith's *British Diatomaceæ*, as also by the fact that several species were named by these authors in his honour (*Staurastrum Dickiei*, &c.), and one genus (*Dickieia*).

But besides increasing the number of known species, he devoted considerable attention to the morphology and physiology of various

plants, and to the study of the reproduction and development of various groups of cryptogams, and also to viviparous reproduction in phanerogams. Nor did he leave unstudied the allied science of zoology, as shown by several articles on the morphology and the physiology of animals.

The first article published by him of which there is any record appeared in 1837, in Jardine's *Magazine of Zoology and Botany*, and is entitled, "Remarks on the Reproductive Organs of *Pilularia globulifera* and the Globules of *Chara Vulgaris*." After that year he published numerous articles in the *London Journal of Botany*, the *Annals and Magazine of Natural History*, the *Reports* and the *Transactions of the Edinburgh Botanical Society*, and the *British Association Reports*, and other journals; but latterly restricted his articles for the most part to the *Journal of the Linnean Society*. In the latter, of late years, numerous papers by him appeared, dealing chiefly with the *Algæ* of the "Challenger" expedition, but also giving an account of collections of fresh-water *Algæ* from tropical regions.

A list of his articles, previous to 1873, is contained in the Royal Society's *Catalogue of Scientific Papers*, and its appendix.

He published his first paper on *Algæ* in 1844, in the *Annals and Magazine of Natural History*, the title being, "On the Marine *Algæ* of the Vicinity of Aberdeen;" and at intervals he continued to publish papers on them, as well as on other plants, till 1871, after which year he restricted his published articles to *Algæ*. He also wrote the botanical appendices to the works of various Arctic travellers, and reported on the *Algæ* of the "Transit of Venus" expeditions. The botanical appendix to Macgillivray's *Natural History of Deeside and Braemar* was also drawn up by him, and his assistance is also frequently acknowledged in that book by its author. Dr. Dickie's longer works are, *A Flora of Aberdeen* (1838), *The Botanist's Guide to the Counties of Aberdeen, Banff, and Kincardine* (1860), and *A Flora of Ulster* (1864). In these works are included the results of his personal investigations, and of information supplied to him by various friends and former pupils, whereby he was enabled to give more fully the distribution of the species in the areas treated of. In the first and last-mentioned books he restricts himself to the vascular plants; but in the *Guide* he includes the cellular cryptogams also. For the latter he had to depend on his own labours and on information from only one or two friends, hence the lists, though of much interest, are less complete than among the vascular plants, except



for the Marine *Algæ*. The results of careful and systematic observations on the altitudinal ranges of plants in Aberdeenshire are also given in the latter work.

The evidences of design in creation possessed a great attraction for him, as manifested alike in the general principles that pervade the universe, in the homologies of structure that may be traced in the various groups of animals and of plants, and in the special adaptations of each individual species of living organism, fitting it for existence amidst its special environments. His studies in this field found expression in a work by him and Dr. M'Cosh entitled, *Typical Forms and Special Ends in Creation*, to which Dr. Dickie contributed chapters on Zoology, Physiology, Botany, Geology, and Physical Geography. In this work various curious and interesting subjects are treated more or less fully—*e.g.*, amongst others, the relation between the modes of branching of trees and shrubs, and the venation of their leaves; also the arrangements and distribution of colour in plants both in healthy life and in the autumnal changes of leaves.

Dr. Dickie became a member of the Edinburgh Botanical Society in 1838, and contributed numerous articles to the *Transactions*. In 1877 he was elected an Honorary Fellow of the Society. In 1863 he was elected a Fellow of the Linnean Society, and in 1881 had the honour of being received into the Royal Society of London. He was also a member of the "Société des Sciences Naturelles de Cherbourg."

He was one of the original members of the Scottish Cryptogamic Society, instituted in 1875, and was several times a member of the Council of the Society. The annual meeting in 1882 was to have been held in Aberdeen under his presidency, in the autumn, but his death anticipated the desire of the Society to show honour to the foremost Scottish algologist. In consequence of his death, the place of meeting was changed to Kenmore, in Perthshire, and the visit of the Society to Aberdeen was deferred till a future year.

He was also a member of the first Natural History Society known to have existed in Aberdeen, about 1845, and was a member of the present Natural History Society of Aberdeen from its origin in 1863 till his death. He was also a member of the Philosophical Society of Aberdeen, and of the Natural History and Philosophical Society of Belfast. To these various societies he communicated numerous papers, taking a warm interest in the success of the meetings so long as his health permitted him to venture out in the evenings.



By those who had the pleasure of personal acquaintance with him, Dr. Dickie will be remembered as a most kind and obliging friend, on whose kindness and goodwill full reliance could at all times be placed. The state of his health, and the deafness that troubled him in the later years of his life, almost precluded interviews with strangers for some years; but he enjoyed seeing his friends, and retained his interest in the progress of science, and especially of Botany, to the end of his life.

The *Algæ* collected during the "Challenger" expedition, as well as other collections received at Kew, were submitted to his examination, and only a very short time before his death he completed the investigation of one of these collections, and reported on it. As a professor, he was very successful in gaining and in retaining the confidence, respect, and esteem of those whom he taught. Those students that showed a love of science always found him a true friend, ready to advance their wishes to the utmost of his power, whether by affording them facilities for continuing their studies, by aiding them to overcome the difficulties in their way, or by obtaining for them situations of a kind such as to give the opportunities required for future success. He continued to correspond with and encourage not a few of his former students after they had left the University, and had entered on the active duties of life.

To him the writer, in common with others, owes a debt of gratitude for his instructions, his example, and his unfailing kindness, and for recommendations and assistance by which in great measure his course in life has been shaped. Though he is gone from among us, his memory will be cherished by many of those whom he taught, and most by those that knew him most intimately.



## ZOOLOGY.

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### LIST OF DIPTERA TAKEN IN THE NORTH OF SCOTLAND, CHIEFLY IN THE PROVINCE "DEE."

BY W. ARMSTON VICE, M.B.

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IN Scotland, as elsewhere, the Diptera have been so much neglected by entomologists that but little is known of their distribution and abundance or rarity; and it may without rashness be assumed that any thorough examination of almost any locality in the country will add largely to what is yet on record in regard to Scottish Diptera. Hence I have thought that it may prove of interest, in the present lack of information, to give in systematic form the results of collections made by myself among some of the groups of Diptera in the north of Scotland, chiefly in the counties of Aberdeen and Kincardine, and to a less extent in the north of Forfarshire, in Sutherlandshire, and in Orkney.

In the *Scottish Naturalist* for 1874, there are some articles on Diptera of the districts treated of in the following list—viz., at p. 199, by Mr. G. H. Verrall, on "Diptera at Braemar, Aberdeen, and Aberlady, including six species not hitherto recorded as British;" and by myself on "A new British Dipteron (*Laphria flava*)," p. 120, on "Syrphidæ of the Dee district," p. 203, and on "Diptera in the North of Scotland," p. 275, this last paper dealing only with those insects taken by me in Orkney and Sutherlandshire. Since these were published, no additions have been made, so far as I am aware, to the recorded lists from Scotland north of the Tay. Mr. Verrall's paper was the result of a few days spent in the localities named in it in July, 1873, and though of much interest, is of course limited because of the shortness of time spent in each; while my own papers either treat only of particular families of Diptera, or were also results of only a very brief stay in the localities treated of. Hence the following list, though making no pretensions to completeness, includes a number of



species not previously recorded, so far as I am aware, from the north of Scotland.

My collections were made almost altogether during the years 1872 to 1875, mostly at Aberdeen or in its neighbourhood, while attending medical classes in the University. In the present list I have incorporated with my own observations the species enumerated in the article by Mr. Verrall referred to above, to render the list as nearly as possible complete for the north-east of Scotland.

Except in some families, we have little yet but a commencement to our knowledge of Scottish Diptera, while not a few families have as yet not been touched; and how few are the localities from which even the most fragmentary information about their Dipterous fauna can be as yet obtained. An approach even to satisfactory and complete knowledge regarding them cannot be made without such continued and careful investigation as has already been made in many localities for the larger Lepidoptera. Unfortunately, systematic works on Diptera in English are both hard to obtain, and by no means satisfactory when obtained. Assistance in the form of specimens from any locality, with locality and date noted, will be very acceptable in order to aid me in extending the knowledge of the Diptera that are native in Scotland. They do not require to be carefully set, but may be put into spirits of wine or pinned unset, or will keep well in a little sawdust well sifted to free it from dust, and thereafter moistened with a few drops of carbolic acid. I shall also, as far as I can, be willing to name specimens sent me, (to 5 Belvoir Street, Leicester), from any part of Scotland.

In regard to the gall-making Diptera, belonging to the Trypetidæ and the Cecidomyidæ, notes of their occurrence will be found scattered in the papers on "Scottish Galls," that have appeared in the earlier volumes of this Magazine, from Professor Trail.

In the nomenclature I have followed Walker's *Insecta Britannica* for most families, but in the *Syrphidæ* and the *Dolichopidæ* Verrall's lists, published in the *Entomologist's Monthly Magazine* have been adhered to. I am much indebted to the latter gentleman for assistance in naming species undescribed or ill-described in Walker's work, or about which I was in doubt.

The localities in which the species enumerated below were taken extend from the sea-level to about 1200 feet above the sea in Braemar. Mr. Verrall's additions to those captured by myself are distinguished by his initials affixed to them. Where no special locality



is mentioned, the insect has been taken in the province "Dee," as defined in the *Scottish Naturalist*, Vol. I., p. 161.

**STRATIOMIDÆ.**

Beris chalybeata Ftr.	Strathdon, Aberdeenshire.
„ Morrisii Dale,	Ballater.
Stratiomys viridula Fb.	near Aberdeen.
Sargus iridatus Spl.	„ „
Chrysomyia formosa Shr.	common.
„ polita L.	near Aberdeen.
„ pallipes Mg.	not rare.
„ flavicornis Mg.	Keith.

**TABANIDÆ.**

Tabanus luridus Fln.	Ballater.
„ tropicus L.	Braemar (G. H. V.)
Chrysops cæcutiens L.	„ (G. H. V.), Montrose.
Hæmatopota pluvialis L.	common in "Dee" and in Sutherland.

**ASILIDÆ.**

Laphria flava L.	one female in Strathdon (see above).
Asilus cingulatus Fb.	on sand-hills near Aberdeen.
„ fimbriatus Mg.	near Montrose.
Dioctria rufipes Dg.	Ballater and near Aberdeen.
„ Reinhardi Wd.	Culter and Fyvie.
„ cothurnata Mg.	Fyvie.

**LEPTIDÆ.**

Leptis scolopacea L.	common, "high upon Cairn Taggart" (G. H. V.)
„ tringaria L.	common.
„ notata Gurtl.	Kincardineshire.
„ lineola Fb.	at Banchory and in Sutherlandshire.
„ strigosa Mg.	Strathnaver in Sutherlandshire.
Chrysopila holosericea Sp.	common in north-east of Scotland.
Atherix Ibis Fb.	at Banchory, one female.
Sympheromyia crassicornis	at Fyvie and in Sutherlandshire.

**BOMBYLIDÆ.**

Thereva bipunctata Mg.	
„ annulata Fb.	common on sea-coast of "Dee."
Phthiria gibbosa Ol.	along with last species.

**EMPIDÆ.**

Empis tessellata Fb.	very common.
„ livida L.	near Montrose and in Sutherland.

<i>Empis opaca</i> Fb.	common.
„ <i>brunnipennis</i> Mg.	near Aberdeen.
„ <i>chioptera</i> Fln.	common.
„ <i>pennaria</i> Fln.	near Old Aberdeen.
„ <i>grisea</i> Fln.	Culter, near Aberdeen.
„ <i>stercorea</i> L.	frequent.
„ <i>trigramma</i> Hms.	very common.
„ <i>punctata</i> Fln.	near Old Aberdeen.
„ <i>bilineata</i> Lw.	common.
<i>Hilara matrona</i> Hal.	frequent.
„ <i>maura</i> Fb.	„
„ <i>nigrina</i> Fln.	Culter and at Keith.
„ <i>chorica</i> Fln.	near Aberdeen.
„ <i>pilosa</i> Ztt.	on Donside.
„ <i>interstincta</i> Fln.	on Deeside and on Donside.
„ <i>fuscipes</i> Fb.	near Aberdeen.
„ <i>lurida</i> Fln.	Ballater.
„ <i>nana</i> Mq.	common near Aberdeen and in Orkney.
„ <i>litorea</i> Fln.	} Braemar (G. H. V.)
„ <i>quadrivittata</i> Wd.	
„ <i>nitidula</i> Ztt.	
<i>Ardoptera irrorata</i> Fln.	Braemar (G. H. V.) and at Pittodrie.
<i>Heleodromia fontinalis</i> Hal.	Culter and in Orkney.
<i>Rhamphomyia nigripes</i> Fb.	Woods, near Aberdeen.
„ <i>sulcata</i> Mg.	near Aberdeen and in Braemar (G.H.V.)
„ <i>spinipes</i> Fln.	„ „ and on Donside.
„ <i>cinerascens</i> Mg.	„ „ and at Keith.
„ <i>cæsia</i> Hms.	near Old Aberdeen.
„ <i>dentipes</i> Ztt.	near Aberdeen.
„ <i>variabilis</i> Fln.	common at Culter and in Orkney.
„ <i>tarsata</i> Mg.	near Aberdeen.
„ <i>albosegnata</i> Ztt.	on Donside.
„ <i>geniculata</i> Mg.	near Old Aberdeen.
„ <i>æthiops</i> Ztt.	at Banchory.
„ <i>pennata</i> Mq.	on Donside.
„ <i>flava</i> Fln.	common at Culter and in Orkney.
<i>Ædalea minuta</i> Fln.	Pittodrie.
<i>Cyrtoma spuria</i> Fln.	Pittodrie and in Orkney.
„ <i>nigra</i> Mg.	near Aberdeen.
<i>Ocydromia glabricula</i> Fln.	near Old Aberdeen.
„ <i>rufipes</i> Mg.	near Aberdeen.

Hybos grossipes L.	common near Aberdeen, at Fyvie, and in Sutherlandshire.
„ femoratus Mlr.	near Stonehaven.
Platypalpus flavipes Fb.	Kincardineshire.
„ bicolor Fb.	common.
„ pallidiventris Mg.	
„ candicans Fln.	on Benachie, Aberdeenshire.
„ divisus Wlk.	Culter.
„ comptus Wlk.	near Aberdeen.
„ dissimilis Fln.	Culter.
Hemerodromia precatoria Fln.	near Aberdeen and in Sutherland.
Hemerodromia monostigma Hms.	near Aberdeen, in Sutherland, and Orkney.
Sciodromia immaculata Hal	} all in Braemar (G. H. V.)
Tachista albitarsis Ztt.	
„ nervosa.	
Tachydromia pallipes	
Microphorus clavipes Mg.	
Phyllodromia melanocephala Fb.	
Phyllodromia vocatoria	

**DOLICHOPIDÆ.**

Dolichopus atripes Mg.	at Banchory, near Old Aberdeen, and in Sutherlandshire.
„ vitripennis Mg.	near Old Aberdeen.
„ atratus Mg.	„ „
„ planitarsis Fln.	„ „
„ rupestris Hal.	„ „ and in Sutherland and Orkney.
„ nubilus Mg.	common along the valleys of the Dee and Don.
„ discifer Stn.	common near Aberdeen and in Braemar.
„ plumipes Scop.	common from coast to Braemar.
„ popularis Wd.	along with last.
„ pennatus Mg.	common with last.
„ urbanus Mg.	at Muchalls, in Kincardineshire.
„ longicornis Stn.	Culter.
„ simplex Mg.	Stonehaven and Fyvie.
„ trivialis Hal.	Stonehaven and Sutherlandshire.
„ brevipennis Mg.	coast near Old Aberdeen.



- Dolichopus equestris* Hal. at Banchory.  
 „ *æneus* Dg. very common.  
 „ *griseipennis* Stn. in Orkney.  
 „ *signatus* Mg. near Old Aberdeen and in Braemar.  
 (G. H. V.)
- Gymnopternus germanus* Wd. in Sutherlandshire.  
 „ *nigripennis* Fln. common.  
 „ *cupreus* Fln. near Old Aberdeen.  
 „ *ærosus* Fln. „ „  
 „ *parvilamellatus* Mq. along with last.  
 „ *celer* Mg. Braemar (G. H. V.)
- Tachytrechus notatus* Stn. near Old Aberdeen.  
 „ *consobrinus* Wlk. Braemar (G. H. V.)
- Argyra diaphana* Fb. Banchory and Braemar.  
 „ *argentina* Mg. Orkney.
- Syntormon tarsatum* Fln. common near Old Aberdeen.  
 „ *pumilum* Mg. Scotston Moor (G. H. V.) and Orkney.
- Synarthrus pallipes* Fb. near Old Aberdeen.
- Xiphandrium appendiculatum* Ztt. near Aberdeen.
- Porphyrops nemorum* Mg. „ „  
 „ *consobrinus* Ztt. Braemar (G. H. V.)
- Chrysotus neglectus* Wd. Scotston, near Old Aberdeen.  
 „ *viridulus* Fln. „ and in Sutherlandshire.  
 „ *gramineus* Fln. Braemar (G. H. V.)
- Sympycnus annulipes* Mg. Orkney.
- Campsicnemus curvipes* Fln. Culter and Scotston.  
 „ *scambus* Fln. Sutherlandshire.
- Liancalus virens* Scop. Muchalls, in Kincardineshire.
- Scellus notatus* Fb. near Stonehaven and Aberdeen.
- Hydrophorus nebulosus* Fln. Muchalls.  
 „ *borealis* Lw. Sutherlandshire.
- Medeterus truncorum* Mg. common on walls at Old Aberdeen.
- Psilopus platypterus* Fb. common at Banchory.

**LONCHOPTERIDÆ.**

- Lonchoptera punctum* Mg. common in “Dee” and in Orkney.

**PIPUNCULIDÆ.**

- Pipunculus sylvaticus* Mg. near Old Aberdeen.  
 „ *campestris* Mg. Pittodrie.

**SYRPHIDÆ.**

- Bacha elongata* Fb. in woods at Ballater.

<i>Sphegina clunipes</i> Fln.	Kintore.
<i>Ascia podagrica</i> Fb.	very common in marshes.
„ <i>floralis</i> Mg.	less common than last in marshes.
<i>Sphærophoria scripta</i> L.	near Aberdeen and in Sutherland.
„ <i>picta</i> Mg.	Braemar.
„ <i>menthastri</i> L.	Orkney
<i>Syrphus pyrastri</i> L.	near Aberdeen.
„ <i>laternarius</i> Muel.	Culter.
„ <i>glaucius</i> L.	Fyvie and Monymusk.
„ <i>vitiger</i> Ztt.	Ballater, Donside, and Keith.
„ <i>ribesii</i> L.	common in “Dee” and in Sutherland.
„ <i>vitripennis</i> Mg.	common near Old Aberdeen ; also in Orkney.
„ <i>corollæ</i> Fb.	common.
„ <i>luniger</i> Mg.	Scotston.
„ <i>arcuatus</i> Fln.	with last.
„ <i>lasiophthalmus</i> Ztt.	Culter and Scotston.
„ <i>barbifrons</i> Fln.	along with the last.
„ <i>compositarum</i> Ver.	Sutherland.
„ <i>punctulatus</i> Ver.	near Aberdeen.
„ <i>maculicornis</i> Ztt.	Scotston.
„ <i>auricollis</i> Meig.	Kintore.
„ <i>cinctellus</i> Ztt.	common.
„ <i>cinctus</i> Fln.	Scotston.
„ <i>balteatus</i> Dg.	common at Fyvie and in Orkney.
„ <i>grossulariæ</i> Mg.	Braemar (G. H. V.)
<i>Platychirus manicatus</i> Mg.	common.
„ <i>albimanus</i> Fb.	common in “Dee” from coast to Braemar, in Sutherland, and in Orkney.
„ <i>latimanus</i> Whlly.	Muchalls.
„ <i>peltatus</i> Mg.	common in “Dee” up to Braemar, in Sutherland, and in Orkney.
„ <i>scutatus</i> Mg.	Strathdon.
„ <i>clypeatus</i> Mg.	common.
„ <i>scambus</i> Ztt.	in “Dee” from coast to Braemar.
<i>Cheilosia œstracea</i> L.	frequent.
„ <i>flavimana</i> Mg.	near Aberdeen and at Ballater.
„ <i>grossa</i> Fln.	at Muchalls and near Aberdeen.
„ <i>chloris</i> Mg.	common.
„ <i>antiqua</i> Mg.	at Banchory and Ballater.
„ <i>vernalis</i> Fln.	near Aberdeen.

<i>Leucozona lucorum</i> L.	at Stonehaven, at Keith, in Sutherland, and in Orkney.
<i>Rhingia campestris</i> Mg.	very common in "Dee," Sutherland, and Orkney.
<i>Volucella bombylans</i> L.	not rare in valley of the Dee.
„ <i>pellucens</i> L.	not rare in "Dee."
<i>Sericomyia borealis</i> Flin.	very common in] "Dee," Sutherland, and Orkney.
„ <i>lappona</i> L.	Stonehaven and Scotston.
<i>Arctophila mussitans</i> Fb.	one female taken in Strathdon.
<i>Eristalis tenax</i> L.	very common.
„ <i>intricarius</i> L.	common in "Dee" and in Sutherland.
„ <i>arbustorum</i> L.	in "Dee" and Orkney.
„ <i>rupium</i> Fb.	Strathdon.
„ <i>nemorum</i> L.	common in "Dee," Sutherland, and Orkney.
„ <i>horticola</i> Dg.	at Alford and at Fyvie.
„ <i>pratorum</i> Mg.	
<i>Helophilus trivittatus</i> Fb.	Sutherland.
„ <i>pendulus</i> L.	very common in "Dee" and Orkney.
„ <i>lineatus</i> Fb.	numerous at Scotston.
<i>Xylota segnis</i> L.	Ballater.
„ <i>sylvarum</i> L.	Monymusk and Rothiemay.
<i>Syritta pipiens</i> L.	very common in "Dee," also in Orkney.
<i>Orthoneura elegans</i> Mg.	Muchalls and Keith.
„ <i>nobilis</i> Flin.	Aberdeen Links and Braemar (G. H. V.)
<i>Chrysogaster splendida</i> Mg.	near Aberdeen.
„ <i>metallina</i> Fb.	very common in "Dee" and Sutherland.
„ <i>viduata</i> L.	common in "Dee," Sutherland, and Orkney.
„ <i>chalybeata</i> Mg.	Kintore.
„ <i>splendens</i> Mg.	with last.
<i>Pipiza noctiluca</i> L.	common at Keith.
„ <i>bimaculata</i> Mg.	near Aberdeen.
<i>Cnemodon acuminata</i> Lw.	at Keith.
<i>Chrysotoxum arcuatum</i> L.	near Aberdeen.
„ <i>bicinctum</i> L.	Montrose.

**CONOPSIDÆ.**

*Conops quadrifasciata* Dg. near Aberdeen.

**BIBIONIDÆ.**

*Bibio Marci* L. common in "Dee."



<i>Bibio Pomonæ</i> Fb.	
„ <i>Johannis</i> L.	Old Aberdeen.
„ <i>lanigerus</i> Hfm.	near Old Aberdeen.
„ <i>nigriventris</i> Hal.	very common.
„ <i>hybridus</i> Hal.	near Aberdeen.
<i>Dilophus spinatus</i> Muel.	Scotston.
„ <i>femoratus</i> Mg.	very common in “Dee.”
<i>Scatopse notata</i> L.	woods near Old Aberdeen.

**TIPULIDÆ.**

<i>Anisomera nigra</i> Latr.	near Aberdeen.
„ <i>vittata</i> Mg.	Banchory.
<i>Erioptera fuscipennis</i> Mg.	Stonehaven.
„ <i>ochracea</i> Mg.	with last.
<i>Limnobia leucophæa</i> , Hfm.	„
„ <i>disjuncta</i> Walk.	near Aberdeen and Ballater.
„ <i>tripunctata</i> Fln.	„ „
„ <i>marmorata</i> Hfm.	„ „ and at Ballater.
„ <i>discicollis</i> Mg.	Ballater.
„ <i>punctum</i> Mg.	„
„ <i>flavipes</i> Fb.	near Aberdeen and at Ballater.
„ <i>nubeculosa</i> Mg.	Banchory.
<i>Pedicia venosa</i> L.	Deeside from coast to Ballater.
<i>Dolichopeza Chirothecata</i> Scop.	near Aberdeen.
<i>Tipula lutescens</i> Fb.	Muchalls, common.
„ <i>gigantea</i> Schr.	with last.
„ <i>longicornis</i> Schm.	coast at Stonehaven and near Aber- deen.
„ <i>varipennis</i> Hfm.	near Aberdeen.
„ <i>vernalis</i> Mg.	Ballater.
„ <i>oleracea</i> L.	near Aberdeen.
„ <i>pruinosa</i> Hfm.	Muchalls.
„ <i>lunata</i> L.	near Aberdeen.
„ <i>fascipennis</i> Hfm.	near Old Aberdeen.
„ <i>annulicornis</i> Mg.	Ballater.
„ <i>scurra</i> Hfm.	near Aberdeen.
„ <i>flavescens</i> L.	Old Aberdeen Links.
<i>Ctenophora atrata</i> L.	on birch-stumps, Braemar (G. H. V.)
<i>Ptychoptera albimana</i> Fb.	near Aberdeen and at Ballater.
„ <i>lacustris</i> Mg.	Ballater.
„ <i>fasciata</i> Scop.	Scotston.

## MUSCIDÆ.—Sect. Calypteræ.

Ochthera mantis.	Braemar (G. H. V.)
Echinomyza grossa L.	Links near Aberdeen and in Sutherland.
Tachina vulpina Fln.	in Sutherland and in Orkney.
„ spinipes Mg.	in Sutherland
„ detracta Walk.	„
Dexia canina Fb.	„
Gonia capitata Dg.	Links near Aberdeen.
Sarcophaga carnaria L.	common.
„ (Cynomyia) mortuorum L.	„
„ alpina Ztt.	near Old Aberdeen.
Musca (Calliphora) vomitoria L.	} all common.
Musca (Calliphora) erythrocephala Mg.	
Musca (Lucilia) Cæsar L.	
„ „ cornicina Fb.	Old Aberdeen Links.
„ illustris Mg.	Strathdon.
„ nitens Ztt.	Culter and Fyvie.
„ rudis Fb.	Fyvie.
„ domestica L.	abundant everywhere.
„ corvina Fb.	Old Aberdeen Links.
„ lasiophthalma Mg.	near Aberdeen.
„ (Morellia) hortorum Fln.	Muchalls.
„ (Graphomyia) maculata L.	Fyvie.
„ (Mesembrina) meridiana L.	
Anthomyia lardaria Fb.	very common.

## MUSCIDÆ.—Sect. Acalypteræ.

Cordylura liturata Wd.	near Aberdeen.
„ spinimana Fln.	Old Aberdeen.
Scatophaga merdaria Fb.	common.
„ stercoraria L.	„
„ lutaria Fb.	} all on beach among sea-weed at Muchalls.
„ squalida Mg.	
„ litorea Fln.	
Coelopa frigida Fb.	
Orgyia luctuosa Mg.	

Actora æstuum Mg.	} sea beach at Aberdeen.
Sciomyza obtusa Fln.	
Heteromyza flava Mg.	Banchory.
Dryomyza flaveola Fb.	common.
Tetanocera rufifrons Fb.	
„ cucullaria L.	
„ lineata Fln.	Scotston.
„ aratoria Fb. ?	Ballater.
„ umbrarum L.	Scotston and Braemar ? (G. H. V.)
„ Hieracii Fb.	Banchory.
„ punctulata	Braemar (G. H. V.)
„ ? elata	Scotston (G. H. V.)
Borborus nitidus Mg.	„
„ equinus Fln.	near Aberdeen.
„ ater Mg.	„ „
Lauxania lupulina Fb.	
„ aenea Fln.	Old Aberdeen and Ballater.
Sepsis punctum Fb.	Aberdeen and Ballater.
Nemopoda cylindrica Fb.	Stonehaven, Aberdeen, and Ballater.
Themira Leachi Mg.	near Aberdeen.
Loxocera ichneumonea L.	coast near Aberdeen.
„ sylvatica Mg.	Muchalls and Pittodrie.
Psila Rosae Fb.	Aberdeen.
Meromyza pratorum Mg.	Links near Old Aberdeen.
Chlorops hypostigma Mg.	
„ glabra Mg.	
„ Cereris Fln.	Ballater.

#### RHYPHIDÆ.

Rhyphus cinctus Fb.	near Aberdeen.
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#### HIPPOBOSCIDÆ.

Ornithomyia avicularia L.	Braemar (G. H. V.)
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*The following species are also in Mr. VERRALL'S lists, viz. :—*

Spilomyia fallax L.	Braemar.
Clinocera stagnalis.	Scotston.
Elgiva albiseta.	with last.
Limnia lineata.	„
„ unguicornis.	Braemar.





## PHYTOLOGY.

### A NEW LIST OF THE FLOWERING PLANTS AND FERNS OF ORKNEY.

{EDITED BY W. IRVINE FORTESCUE.

(Continued from Vol. VI., p. 375.)

#### CLII. LYSIMACHIA L.

- 273 nemorum L. Swanbister Burn and Ramsdale, 1875; also  
Gills at Scalpa, B., Quoys Burn, Høy, H. The only  
stations.

#### CLIII. ANAGALLIS Tour.

- 274 arvensis L. Fields at Westness, H.  
275 tenella L., B. Not uncommon on the Mainland.

#### CLIV. GLAUX Tour.

- 276 maritima L., B. Not uncommon.

#### PLUMBAGINACEÆ.

##### CLV. ARMERIA Willd.

- 277 maritima Willd., B. Common by the sea-shore. Summits of  
Hills, D. and H.

#### PLANTAGINACEÆ.

##### CLVI. PLANTAGO L.

- 278 major L., B. Common.  
279 lanceolata L., B. Common.  
280 maritima L., B. Common.  
281 Coronopus L., B. Common.

##### CLVII. LITTORELLA L.

- 282 lacustris L., B. Common.

#### CHENOPODIACEÆ.

##### CLVIII. SUÆDA Forsk.

- 283 maritima Dum., Fidge at Swanbister, 1849, B. Bay of Wood-  
wick, D.

CLIX. SALICORNIA L.

- 284 herbacea L., Fidge at Swanbister, 1849, B. Peerie Sea, Kirkwall, D. Eus, Firth.

CLX. CHENOPODIUM TOUR.

- 285 album L., B. Swanbister. Scarce.

CLXI. ATRIPLEX TOUR.

- 286 angustifolia Sin. Stennes, B.  
287 erecta Huds. Fidge, Swanbister, B.  
288 Babingtonii Woods, B. Common.

POLYGONACEÆ.

CLXII. RUMEX L.

- 289 conglomeratus Murr. Reported by Lowe.  
290 obtusifolius Auct., B. Common.  
291 pratensis M. and K. 1873, B. Scarce.  
292 crispus L., B. Common.  
293 aquaticus L., B. Common.  
294 acetosa L., B. Common.  
295 acetosella L., B. More abundant than acetosa.

CLXIII. OXYRIA Hill.

- 296 reniformis Hook. Hoy Hill, B.

CLXIV. POLYGONUM L.

- 297 Convolvulus L., B. A weed. Scarce. Fields in Harray and Birsay, J. W. H. T.  
298 aviculare L., B. Common.  
    *a.* agrestum.  
    *b.* vulgatum.  
    *d.* microspermum.  
299 Hydropiper L. Reported by Lowe.  
300 Persicaria L., B. "In many places," D. and H. Harray and Birsay, J. W. H. T.  
301 lapathifolium L. Swanbister. Introduced, B.  
302 amphibium L., B. Scalpa; Skail. Local. North Ronaldshay, Dr. Traill.  
    *b.* terrestre, Harray, J. W. H. T., B. Crantit; the Bridge of Broigar; Skail.  
303 Bistorta L., Neill. "In all probability in the castle garden," H. Now extinct there. Certainly not native.  
304 viviparum L., B. West side of Rousay; Egilshay; Stronsay, D.

## EMPETRACEÆ.

## CLXV. EMPETRUM L.

- 305 *nigrum* L., B. Common. In one or two localities in such profusion as to scent the air.

## EUPHORBIACEÆ.

## CLXVI. EUPHORBIA L.

- 306 *Helioscopia* L., B. Common.  
 307 *Peplus* L. Swanbister, 1873, B. Gardens at Kirkwall, H.  
 MERCURIALIS Tourn.  
 308 *perennis* L. Recorded by Miss Boswell.

## CERATOPHYLLACEÆ.

## CERATOPHYLLUM L.

- 309 *aquaticum*, E. B. 3.  
*b. demersum*, Loch of Ayre. Hubbin at Kirbuster, H.

## URTICACEÆ.

## URTICA Tourn.

- 310 *dioica* L., B. Common.  
 311 *urens* L., B. Common D. and H. Kirkwall, Swanbister, Hoy. Rather local. Turmiston in Stennes, J. W. H. T.

## AMENTIFERÆ.

## CORYLUS Tourn.

- 312 *Avellana* L. Berriedale Hoy, B. Elsewhere in Hoy, H.

## BETULA Tourn.

- 313 *alba*.  
*b. glutinosa*, B. In several places in Hoy.

## MYRICA L.

- 314 *Gale* L. "Eday, J. R. Hebden." D. and H.'s list.

## POPULUS Tour.

- 315 *tremula* L., B. Hoy, Walls, Hobbister Cliffs, Flotta Calf.

## SALIX Tourn.

- 316 *acuminata* Sm. Moist places. Dearness, Neill.  
 317 *cinerea* L., B. Rather scarce.  
*b. aquatica* B.  
 318 *aurita* L., B. Common.  
 319 *Caprea* L., B. Walls and Hoy.  
 320 *phylicifolia* L., B. Rather common. This and the two last species are called *Rice* in Orkney.  
 321 *nigricans* Sm. I think a plant from Groundwater (Orphir) is this, B.



- 322 *ambigua* Ehrh., B. Occurs among *S. repens*.  
323 *repens* L., B. Not uncommon.  
    *b. fusca*. Common in many places, D. and H.  
    *g. argentea*. Downs in Sanday, Neill.  
324 *Lapponum* L.  
    *a. arenaria*, Hoy Hill, H. Doubtful.  
325 *Arbuscula* L., Hoy Hill, Neill. Doubtful.  
    *b. prunifolia*, valleys in Hoy Neill. Doubtful.  
326 *herbacea* L., Hoy Hill, B. Walls H. ; Rousay.  
327 *reticulata* L., Hoy Hill, H.

CONIFERÆ.

JUNIPERUS L.

- 328 *nana* Willd., B. Hoy. Dr. Traill, of Woodwick, tells me it occurs on Fair Isle.

TYPHACEÆ.

TYPHA L.

- 329 *latifolia* L. Loch of Aikerness Evie, D. and H. Doubtless introduced. It occurs only in one patch, covering perhaps half an acre of the swamp which once was the loch.

SPARGANIUM L.

- 330 *ramosum* Huds., B. Local, but common in the streams connected with Loch of Kirbuster, also Lurquoy Burn, Orphir, Harray, Scalpa, &c.  
331 *simplex* Huds. Burn of Scalpa, D.; Howan in Birsay, J. W. H. T.  
332 *affine* Schnizl., Hoy, B. Sandswater, Walls, H. Standing Stones of Stennis.

LEMNACEÆ.

LEMNA L.

- 333 *minor* L., B. "Dr. Macnab, extremely doubtful," D. and H.'s list. I have specimens from Tankerness gathered by Mr. Cowan.

NAIADACEÆ.

POTAMOGETON L.

- 334 *natans* L. Ditch near Maeshowe, and Loch of Harray, B.  
335 *Polygonifolius* Pour., B. Common.  
336 *heterophyllus* Schreb., B. Common.  
337 *nitens* Web. Loch of Harray 1873, B.  
338 *perfoliatus* L., B. Common.  
339 *crispus* L., B. Rousay H. Ditch draining Loch of Aikerness, Evie, 1882.

340 *pusillus* L. Loch of Kirbuster, B.

341 *pectinatus* L., B. Loch of Kirbuster, Loch of Harray. Very common in Harray and Birsay, J. W. H. T.

342 *filiformis* Nolte., B. Loch of Harray, Fidge, Swanbister Mil Pond, Pond at Hoxa Links, S. Ronaldshay. No doubt else where.

*I subjoin here a copy of notes on Orcadian Potamogetons by Mr. ARTHUR BENNETT, F.L.S., sent by him to me.*

*Potamogeton filiformis*, Pers. (Nolte !)

“Swanbister, Orkney, 1852, J. Boswell.”

“Loch of Harray, Dr. J. W. H. Trail, 1876.”

“Bridge of Broigar, L. of Harray, 1880.”

This last approaches *P. fasciculatus* Wolfgang, of which I have a specimen from the author.

*P. heterophyllus* Schreb.

“In a ditch of running water between Kirkwall and Stromness, Orkney, Sept., 1873, J. T. Boswell.”

*P. heterophyllus* Schreb.

“Kirbuster Loch, Orphir, Orkney, July, 1875, J. T. Boswell, form with broad bared submerged leaves.”

This answers to Swedish specimens of *P. intermedius* Tis., “ad interim.”

*P. nitens*, Weber.

“Birsay, Orkney, August, 1876,” Dr. Trail.

This is a remarkable plant, but seems best placed under *nitens*. It has the stem much branched, with elongated peduncles.

*P. crispus* L. is not mentioned in these notes by Mr. Bennett, but I sent him specimens, which he said were correct.—W. I. F.

*P. nitens*, Weber.

“Loch of Harray in ‘Bay of Islands,’ Orkney, August, 1873,” J. T. Boswell.

I believe this is correct: it is of course widely different from the *curvifolius* Hait., and comes between Weber’s type and *var. latifolius*, Tis!

*P. prælongus*, Wulf might occur. I have it from “Yarrow’s Loch, Caithness.”

*P. perfoliatus*, L.

“Loch of Stennis, Orkney, August, 1876,” Dr. Trail.

A small elegant form.

*P. pusillus*, L.

“Kirbuster Loch, Orphir, Orkney, August, 1880,” J. T. Boswell.

*Potamogeton pusillus*, L., var. *rigidus*, mihi (A. Bennett).

Plant rigid, fragile, leaves rigid,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  inches long, long bud acuminate, strongly 1 nerved, with 2 fainter nerves in some of the leaves, stipules long acute, peduncles 1 inch long, spike  $\frac{1}{2}$  inch long, fruit slightly smaller than in typical *pusillus*, and less carinated on the back.

A remarkable form of *pusillus*, gathered by Dr. Trail from the Loch of Stennis, Orkney, August, 1876. It has much the aspect of *P. rutilus*, *Wolfgang*, but differs by its elongated internodes, broader leaves, stipules and fruit.

*P. pectinatus*, L., *genuinus*.

“Loch of Kirbuster, Orphir, Orkney, August, 1880,” J. T. Boswell.

*P. rufescens*, Schrad.

Might occur. I have it from the Wick River, Caithness.

#### ZANNICHELLIA L.

343 polycarpa Nolte., B. Loch of Kirbuster, Mill Pond, Swanbister.

#### RUPPIA L.

344 spiralis Hartm., B. Bridge of Broigar.

345 rostellata Koch., B. Fidge, Swanbister.

v. nana. Eus Firth, B.

#### ZOSTERA L.

346 marina L., B. Common.

v. angustifolia. Eus at Firth, B.

#### ALISMACEÆ.

##### TRIGLOCHIN L.

347 palustre L., B. Common.

348 maritimum L., B. Common.

#### ORCHIDACEÆ.

##### ORCHIS L.

349 mascula L. Sea banks Birstane, Lingro, D. Above Westness, Rousay, Dr. Traill.

350 latifolia L., B. Common.

351 maculata L., B. Common.

##### GYMNADENIA Br.

352 conopsea Br. Scalpa B. ; Caldale, D. and H.



- 353 *albida* Rich., B. Scalpa, near mill of Sebay, Bridge at Crantit, 120 yards from H., Swanbister. Scarce, but apparently pretty generally distributed over the Mainland.

## HABENARIA Br.

- 354 *viridis* Br. Houton and Barnosie, B. Common D. I have seen it only at the Standing Stones of Stennis.

## LISTERA Br.

- 355 *cordata* Br., B. Hoy, Evie, &c., D.; Rousay, Orphir, H.; Walls, not rare.
- 356 *ovata* Br. "Pastures rare; between Seater and sea-shore D. Quendal, Rousay, G. Robson." D. and H.'s list. Harray, hardly rare, J. W. H. T.

## IRIDACEÆ.

## IRIS L.

- 357 *Pseudacorus* L., B. Common.

## LILIACEÆ.

## SCILLA L.

- 358 *verna* Huds., B. Common.

## NARTHECIUM Huds.

- 359 *ossifragum* Huds., B. Common.

NOTE.—B. stands for Dr. J. T. Boswell, of Balmuto; D. for Dr. A. R. Duguid; H. for Mr. Robert Heddle; and J. W. H. T. for Dr. James W. H. Trail, in the above list.

(*To be continued.*)

MEMORANDA OF A SUMMER'S WORK ON THE  
POTAMOGETONACEÆ IN PERTHSHIRE. 1882.

By A. STURROCK.

THE following extracts from my note-book may interest the botanical readers of the *Naturalist*. It will be seen that they fully bear out the opinion I expressed in these pages two years ago, that a rich harvest of plants remained to be gathered in our lochs and streams.

July 6th.—Glenballoch Moor, in the parish of Rattray.

*P. polygonifolius* Pour.

var. *ericetorum* Syme; *vide* Bennett.

A very tiny form. Abundant in the water-courses of a small bog on the moor.

July 10th.—Lunan Burn.

*P. nitens* Web.

var. *latifolius* Tis., not Fieber; *vide* Bennett.

A form with broader leaves than the normal *nitens*; the lower sub-cordate and half-clasping.

There are two fine beds of this rare plant in the Lunan Burn, a little way below Marlee Mill.

NOTE.—The Lunan Burn drains the chain of lochs in the Stormont district between Blairgowrie and Dunkeld, and falls into the Isla.

July 11th.—River Isla.

*P. nitens* Web.

There is a fine bed of this rare Potamogeton, some distance below the mouth of the Lunan Burn.

Aug. 1st.—Loch Ben-a-chally.

*P. rufescens* Schreb.

Near the head of the loch, I gathered an interesting form of this plant, with narrower leaves, and fruit much smaller and less acuminate than in the ordinary form. Mr. Bennett thinks it is probably Marsson's var. *lacustris*. Ovary, sometimes of five and even six carpels—a thing of very rare occurrence in the genus, as Mr. Bennett has justly observed.

Aug. 7th.—Lunan Burn, in the lade above New Mill.

*P. rufescens* Schreb.

Of this specimen Mr. Bennett says, "It is a good example of *P. spathulatus*, Koch et Key, which Tiselius has shown is really only a *state* of *rufescens*."

Same date.—Marlee Loch.

*P. pusillus*, L.

Sub-sp. *Sturrockii* Bennett.

This is *la grande trouvaille* of the season. On sending specimens to Mr. Bennett, he wrote: "As to the Marlee plant, it is most interesting; certainly not *P. obtusifolius*, M. et K., though I have seen specimens of that from N. Germany, with peduncles double the length of those as it usually occurs with us. I have nothing like it from Europe or N. America." And in a letter of recent date, he says: "I cannot let this pass as a variety. Many French authors would call it a species. I quite think it should bear *sub-specific rank*, and as this is now adopted in the best Floras, I think it would be well to so place it. We never shall, I suppose, get over the old difficulty of how far one is a species and the other not. It must remain a question of individual opinion to a great

extent; but I prefer a middle course to making species *ap libitum*."

My esteemed correspondent has kindly sent me the following description of the plant:—

"Stem much branched, 18 in. to 3 ft. long; leaves  $1\frac{1}{2}$  in. to 2 in. long,  $\frac{1}{8}$  in. broad, with the secondary veins indistinct. Stipules  $\frac{1}{2}$  in., blunt. Peduncles, 1 in. to  $2\frac{1}{2}$  in. long; spike,  $\frac{1}{4}$  in., very sparingly flowered; sepals, thick.

"A very elegant sub-species of *pusillus*, L., with somewhat the habit of *obtusifolius*, M. et K. Quite distinct from anything seen from Europe or N. America. Named after the discoverer, who has so successfully worked at the aquatic plants of Perthshire and Forfarshire."

It may be of interest to note that "winter buds," or "gemmae," occur freely on this plant. These are "hardened masses like leaves agglomerated together," which fall off in the autumn and become plants the next year. I have observed them also on *P. crispus*, *P. mucronatus*, the ordinary form of *P. pusillus* and *P. obtusifolius*, on the latter of which, in Marlee Loch, I found them on almost every shoot in September last.

Same date.—Lunan Burn.

*P. heterophyllus*, Schreb.

(*P. longipedunculatus*, Mérat, Flora Paris); *vide* Bennett.

This plant has larger submerged leaves than the typical *heterophyllus*, no floating leaves, and very long peduncles. Found in the stream at the head of Marlee Loch.

Aug. 8th.—Loch Bog or Stormont Loch, near Rosemount Station, Blairgowrie.

*P. pusillus*, L.

A very delicate form, with beautiful light green leaves, and short peduncles; fruits freely. Mr. Bennett is of opinion that this may be *P. Berchtoldi* Fieber. It also occurs in Marlee Loch.

August 11th.—Lunan Burn.

In the burn immediately below the point where it leaves Cluny Loch at Tullynedie Bridge, there is a fine bed of another most interesting Potamogeton, regarding which Mr. Bennett writes:—"Certainly nearer *nitens* than *heterophyllus*. These cannot be labelled *nitens* or *heterophyllus*; hence, as Dr. Tiselius justly observes, 'Why should they not have a name?' And your specimens will compare with his form 'k and h' of *borealis*, Tis."

Like *nitens*, this plant is occasionally stoloniferous even from the upper axils, which I have not observed in *nitens*.



Aug. 14th.—White Loch, near Blairgowrie.

*P. heterophyllus*, Schreb.

In two places there occurs a plant with leaves like *heterophyllus* (but without the floating leaves), of a pale green colour and undulated: peduncle and spike as in *nitens*. Mr. Bennett has no doubt that it is his var. *pseudo-nitens*. Also stoloniferous. In this connection I may also remark that in September last I gathered *P. perfoliatus* and *P. heterophyllus* with stolons.

I cannot conclude this paper without recording my great indebtedness to Mr. A. Bennett of Croydon for the infinite pains he has taken in identifying these puzzling plants for me.

RATTRAY, 25th November, 1880.

*P.S.*—I have just heard from Mr. Bennett that in a parcel of *characeæ* which I sent him lately, he has found *Nitella flexilis*, Ag. var. *crassior*, A. Braun, hitherto recorded from Sweden and N. America only. It is somewhat singular that this *Nitella* and my new *Potamogeton* were gathered on the same ground in Marlee Loch this year as *Naias flexilis* last year.

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## MYCOLOGIA SCOTICA.

By REV. J. STEVENSON.

(Continued from Vol. VI., page 221.)

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*The numbering of Species is continued with 2256, No. 32 being deleted.*

\* *Agaricus aurantius* Schaeff. *Mycol. Scot.*, p. 7. The plant from Forres figured in *Illustrations of British Fungi*, Pl. 33, under this name, is a form of *A. robustus*, A. & S. Dr. Cooke records this correction, with which Dr. Keith agrees. No. 32 *Mycol Scot.*, is therefore to be deleted.

2256. *Agaricus* (*Clitocybe*) *Trogii* \* Fr. *Hym. Eur.* p. 85.  
*C. Illust. Pl.* 102.

Pileus fleshy, *compact*, convex then expanded, obtuse, smooth, *becoming cinereous-white*, opaque; stem solid, firm, short, villous at the thickened base, and, as well as the somewhat decurrent crowded gills, white. Very fragrant.

Grassy avenue in wood. Sep.

East.	—	—	Tay	—	—	—
West.	—	—	—	—	—	—

Glamis. J. S.

England. Europe.

2257. *A. (Clitocybe) tumulosus* Kalchb. *Fr. Hym. Eur. p. 91.*  
*C. Illust. Pl. 105.*

Caespitose; pileus fleshy, conical then expanded, umbonate, even, smooth, *umber*, becoming pale; stem solid, *floccoso-pruinose*, pallid; gills slightly emarginate and decurrent, crowded, white, then becoming cinereous.

On thistle roots. Autumn.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith.

England. Europe.

2258. *A. (Collybia) ambustus* Fr. *Hym. Eur. p. 127.*

Very small, tough, entirely fuliginous, the pileus darker; pileus somewhat membranaceous, convexo-plane, *papillate*, *slightly striate*, *smooth*, hygrophaneous, at first even, fuscous, with the *margin involute*, at length livid, slightly striate, somewhat depressed; stem *somewhat stuffed*, short, when young *floccoso-pruinose*, then becoming smooth, tough, livid; gills adnate, crowded, lanceolate, becoming white-fuscous. Inodorous.

On ground where brushwood had been burned. Nov.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith.

England. Europe.

2259. *A. (Mycena) luteo-albus\** Bolt. *Fr. Hym. Eur. p. 134.*  
*C. Hbk. No. 176. C. Illust. Pl. 159.*

Among moss. Oct.

East.	—	—	Tay	—	—	—
West.	—	—	—	—		

Glamis. J. S.

England. Europe.

2260. *A. (Entoloma) Saundersi* Fr. *Hym. Eur. p. 192.* *A. majalis* Saund. & Smith t. 46.

Pileus fleshy, campanulate then expanded, obtuse, repando-lobate, *adpressedly tomentose*, *white*, when old becoming fuscous, 2-3 in. broad; stem solid, equal, silky fibrous, white, 3 in. long,  $\frac{1}{2}$  in. thick; gills slightly adnexed, broad, distant, reddish.

The pileus carries up and retains atoms of soil. Very different from *A. majalis* Fr.; rather allied to *A. sinuatus* Fr.

	In river sand.		June.			
East.	—	—	—	Dee	—	—
West.	—	—	—	—		

Drumoak, Aberdeenshire. Rev. David Paul.

2261. *Cortinarius (Inoloma) albo-violaceus* P. *Fr. Hym. Eur. p. 361.*

Pileus fleshy, *silky*, with innate fibrils, *at length broadly gibbous*, and, as well as the clavate or somewhat conical stem, which is somewhat zoned in the middle, and often peronato-annulate, *becoming violaceous white*; flesh juicy, azure blue-white; gills adnexed, somewhat distant, serrulate, at first *cinereous-violaceous*. Inodorous, insipid.

	In wood.		Sep.			
East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Altyre, Forres. Rev. Dr. Keith.

England. Europe.

2262. *C. (Telamonia) paleaceus* Weinm. *Fr. Hym. Eur. p. 386.*

Pileus somewhat membranaceous, conico-expanded umbonate (commonly acutely), *silky* with small white villous scales, *becoming fuscous* (tan); stem fistulose, flexuose, undulate, white-squamulose, and ringed at the apex, becoming pallid-fuscous; gills adnate, *truly crowded, whitish*, at length cinnamon.

	In wood.		Sep. — Oct.			
East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith.

England. Europe.

2263. *C. (Hydrocybe) scandens* Fr. *Hym. Eur. p. 396.*

Pileus somewhat membranaceous, conical then flattened, with a slightly fleshy umbo (acute, obtuse, or obsolete), *striate at the margin*,  $\frac{1}{2}$ -1 in. and more broad, tawny ferruginous then watery honey-colour, tan when dry, but the umbo becoming tawny; stem fistulose, flexuous, even, soft, thickened at the apex, *attenuated at the base, whitish*, becoming yellow when moist, and shining white when dry; the subulate base always dead white, 3-4 in. long, 2 lines thick; gills adnate, thin, somewhat distant, narrow, 1-2 lines broad, plane, tawny-cinnamon. of the same colour, edge. Veil thin, fibrillose, superior,

In pine wood. Oct.



East. — — — — Moray —  
 West. — — — —

Forres. Rev. Dr. Keith.

Europe.

2264. *Polyporus obducens* Pers. *Fr. Hym. Eur. p. 577. C.*  
*Hbk. No. 808.*

On beech stick. Sep.

East. — — — — Moray —  
 West. — — — —

Altyre. Rev. Dr. Keith.

England. Europe.

2265. *Septoria lysimachiae* West. *C. Hbk. No. 1336.*

On *Lysimachia nemorum*. Aug.

East. — — — — Dee — —  
 West. — — — — Argyle —

Aberdeen. Professor J. W. H. Trail. Tobermory. Dr.  
 B. White.

England. Europe.

2266. *Torula graminis* Desm. *C. Hbk. No. 1424.*

On grass. March.

East. — — — — Moray —  
 West. — — — —

Forres. Rev. Dr. Keith.

England. Europe.

2267. *Puccinia Baryi* Winter. *Rabenh. Krypt. Fl. No. 256.*  
*Epitea Baryi* B. & Br. *No. 755.*

Sori long remain covered with epidermis in brown, or nearly black, small linear spots, usually in rows, very inconspicuous. Uredo spores on yellow basis, mixed with clavate, and often curved paraphyses, spores roundish, orange yellow, rough, .02-.025 mm. diam. *Puccinia* spores brown, on very short stalks, smooth, very irregular in form, usually elliptic or wedge-shaped, broadest and truncate at apex, or (seldom) rounded or slightly pointed, cell wall at apex somewhat thickened, not constricted in middle, or but slightly so, lower cell narrowed into the stalk, .026-.035 × .017-.024 mm.

On leaves of *Brachypodium silvaticum*.

East. — — — — Dee — —  
 West. — — — —

Aberdeen. Professor J. W. H. Trail.

England. Europe.

2268. *P. oxyriæ* Fckl. *Symb. Myc. Nachtr.* III. p. 14. *Rabenh. Krypt. Fl. No.* 276.

Sori naked, usually oblong, on both surfaces of leaves and leaf stalks, in irregular groups. Uredo spores rounded or pyriform, light brown, surface covered with fine outgrowths,  $\cdot 023\text{-}\cdot 03 \times \cdot 02\text{-}\cdot 026$  mm. Puccinia spores brown, elliptic or oblong, somewhat constricted in the middle, rounded or narrowed at the base, rounded or pointed and slightly thickened at apex, smooth, on colourless stalks.

On *Oxyria reniformis*.

East.	—	—	—	Dee	—	—
West.	—	—	—	Ross		

Skye. Dr. B. White. Braemar. Professor J. W. H. Trail.  
Europe.

\* *P. stellariæ*. Adopted by Fuckel. See *Mycol. Scot. Supp. Scot. Nat. Vol. VI. p.* 119. Rev. Dr. Keith.

\* *P. lapsanæ* Fckl. This so-called species has been gathered by Rev. Dr. Keith and by Professor Trail on *Lapsana communis*. It should probably be included under *P. compositarum* Sch.

2269. *Protomyces pachydermus* Thüm. *Hedwigia*, 1874, p. 97.

Forming elongate or confluent swellings in the leaf stalk or midrib (or rarely in the lamina) of the leaves. Spores scattered in the intercellular spaces throughout the substance of the part, but chiefly in the outer layers. Rounded or elliptical, thick-walled  $\cdot 14\text{-}\cdot 28$  mm. diam. (in Germany  $\cdot 28\text{-}\cdot 36$  mm.). Epispore smooth, pale brown.

The warty swellings and form of spores are much as in *P. macrosporus*, but the spores are not over  $\frac{2}{3}$  the diameter of the spores of *P. macrosporus*, are relatively thicker-walled, and are more scattered through the tissue.

On *Taraxacum officinale*.

East.	—	—	—	Dee	—	—
West.	—	—	—	—		

Aberdeen. Professor J. W. H. Trail.

2270. *Synchytrium anemones* Woron. *Bot. Zeitung.* xxvi. (1868), p. 100.

Forms dark violet, or almost black, hemispherical warts, the size of a pin's head, which are gregarious and sometimes confluent. In the centre of each is a spherical or resting spore, the cell wall of which is dark brown and warty.

On leaves, leaf stalks, and sepals of *Anemone nemorosa*.

East. — — — Dee — —

West. Solway — — —

Aberdeen. Professor J. W. H. Trail. Colvend. Dr. B. White.

England. Europe.

\* *S. taraxaci* De By. & Wor. *Mycol. Scot. Supp. Scot. Nat. Vol. VI. p. 219.* The following description of this species, by Professor J. W. H. Trail, is fuller and more accurate than those previously recorded in English works :—

Orange warts, about .5 mm. in diameter, prominent on both surfaces of leaf blade, scattered or crowded ; during summer each wart consists of a sporangium of crowded spores, polygonal or rounded, but varying much in form and in size (.02-.06 mm. diam.), filled with granular orange protoplasm, which often breaks up into globose ciliated zoogonidia ; thicker-walled resting spores formed in autumn singly in the cells of the food plant.

In subdermal parenchyma of leaves of *Taraxacum officinale*.

2271. *Ustilago salveii* B. & Br. *C. Hbk. No. 1528.*

On leaves of *Holcus* and *Triticum*. June—July.

East. — — — — Moray —

West. — — — —

Forres. Rev. Dr. Keith.

England.

2272. *Isaria felina* Fr. *C. Hbk. No. 1638.*

On cat's dung.

East. — — Tay — — —

West. — — — —

Perth. Dr. B. White.

England. Europe.

2273. *Peronospora pygnea* Ung. *C. Hbk. No. 1776.*

On leaves of *Anemone*. May.

East. — — — — Moray —

West. — — — —

Dunphail. Rev. Dr. Keith.

England. Europe.

2274. *P. arborescens* Berk. *C. Hbk. No. 1785.*

On *Papaver dubium*. June.



East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith.  
 England. Europe.

2275. *P. affinis* Rossm. *Karst. Myc. Fenn. Pt. 4. p. 81.*

Fertile threads stout, regularly 5-7 times dichotomous; branches patent, ultimate ramuli short, subulate, straight or curving downwards. Acrospores obovoid, apex very obtuse, base rather acute, membrane pale and dirty violet. Epispore of oospores yellow-brown.

On *Fumaria officinalis*. July.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Greeshop. Rev. Dr. Keith.  
 Europe.

2276. *P. leptosperma* De By. *Karst. Myc. Fenn. Pt. 4. p. 83.*

Threads of mycelium slender, suckers small, vesicular, obovoid or globose. Fertile threads colourless, emerging singly or 2-3 together from the stomata of the leaves, dichotomous or trichotomous above, branches repeatedly dichotomous or trifurcate, all except the last thicker towards the top, the last from a broad base suddenly contracted to a subulate, straight or curved apex. Acrospores for the most part large, of various forms, ellipsoid, clavate, ovoid-cylindrical, often elongate-cylindrical, straight or curved, very obtuse at both ends, white. Oospores small, irregularly angled, pale brown.

On *Pyrethrum inodorum*. July.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith.  
 Europe.

2277. *P. alsinearum* Casp. *Karst. Myc. Fenn. Pt. 4. p. 79.*

Fertile threads stout, equally, rarely unequally 4-5-8 times dichotomous; branches spreading, the ultimate ones subulate, elongate, and for the most part arcuate. Acrospores ellipsoid very obtuse at both ends, more or less dirty-violet. Oospores somewhat regularly reticulated, with stout, thick, connected crests, bright brown.

On *Stellaria media*, *Cerastium triviale*, and *Scleranthus annuus*. Aug.

East.	—	—	—	Dee	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith. Muchalls and Aberdeen. Professor J. W. H. Trail.

Europe.

2278. *Ramularia pruinosa* Speg. *Grevillea*, Vol. xi. p. 15.

Spots ochraceous, at first small, round, soon occupying the entire leaf; tufts densely gregarious, covering the surface of the spots with a frosty whiteness. Threads hyaline, continuous ( $\cdot 04\text{-}\cdot 06 \times \cdot 003$  mm.), apex 1-3 toothed; conidia cylindrical, rounded at the ends ( $\cdot 02\text{-}\cdot 03 \times 003\text{-}004$  mm.), continuous or uniseptate, hyaline. Saccardo in *Michelia*, II. p. 170.

On *Senecio Jacobaea*.

East.	—	—	—	Dee	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith. Aberdeen. Professor J. W. H. Trail.

Europe.

2279. *R. malvæ* Fckl. *Symb. Myc.* p. 360. *Grevillea*, Vol. xi. p. 72.

Tufts lax, yellow-green on dried-up, white, orbicular or elongate spot; hyphæ erect, nearly simple; conidia as long as the hyphæ, fusiform, for the most part curved, obliquely and obtusely apiculate at each end, simple, for the most part 21-22 mik. long, 4 mik. thick, hyaline.

The spores in the specimens found by Dr. Keith become uniseptate.

On *Malva moschata*. Aug.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Castle Grant Gardens. Rev. Dr. Keith.

Europe.

2280. *R. veronicæ* Fckl. *Symb. Myc.* p. 361.

Tufts occupying almost the whole underside of the leaf, snow-white; threads long, branched; conidia cylindrical or elliptical, simple, varying in size, hyaline.

On *Veronica montana*. June.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith.

Europe.

2281. *R. calcea* Desm. *Ann. des Sci. Nat.* XVII. (1842), p. 95.

Hypophyllous; tufts small, round, thin, pulverulent,

chalky-white, encircled with a darker spot, spores rather large, straight, cylindrical, or somewhat fusiform, obtuse at both ends.

On *Glechoma hederacea*. July.

East.	—	—	—	Dee	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith. Aberdeen. Prof. J. W. H. Trail.  
Europe.

(To be continued.)

## LIST OF THE DESMIDS HITHERTO FOUND IN MULL.

By JOHN ROY.

THE following list has been drawn up from three small samples collected in July, 1878, by Mr. George Ross, Oban, and one collected by Dr. Buchanan White in September, 1881. Mr. Ross collected at Sarsta-beinn, at Loch Snail, and at Tobermory. These localities are indicated in the list by S., L.S., and T. respectively. Dr. White's locality was not specified; it is indicated by M.

The list contains 105 species, which a little investigation in other parts of the island would, no doubt, largely increase. With few exceptions, the species here noted are quite common. The rarer species are: *Cosmarium intermedium*, Delponde, hitherto found in Italy only; *Staurastrum Maamense*, Archer, Connemara, Deeside, Sweden; *St. Arcticon*, Ehr., a noble species, long known in Connemara, Sweden, North America, and recently found in North Wales; only one example found in Mr. Ross's Tobermory gathering; *Docidium sceptrum*, Kg. ? This is the second time this species, as limited here, has been gathered. It was previously found by Mr. Archer in Connemara, and sent by him to me. In the Mull gathering it was abundant, but not in good condition.

*Hyalotheca dissiliens* Sm.—T. ; M.

*Didymoprium Borreri* Ralfs.—M.

*Sphærozozma excavatum* Ralfs.—T.

*Gonatozygon Brebissonii* de Bary.—T.

*Micrasterias Jenneri* Ralfs.—T. ; M.

*M. denticulata* Breb.—L.S.

*M. truncata* Corda.—T. ; M.

*M. crenata*.—T.

*M. mucronata* Dixon.—T.

*Euastrum pectinatum* Breb.—M.

*E. oblongum* Grev.—M.

*E. crassum* Breb.—L.S. ; M. ; T.

*E. ventricosum* Lundell.—L.S. ; M.

*E. ampullaceum* Ralfs.—T. ; M.

*E. Didelta* Ralfs.—L.S. ; M.

*E. cuneatum* Jenner.—T.

*E. ansatum* Ehr.—L. S. ; T. ; M.



- E. insigne* Hassall.—T.  
*E. elegans* Breb.—T. ; M.  
*E. decedens* Reinsch.—T. ; M.  
*E. pulchellum* Breb.—M.  
*E. erosum* Lundell.—M. ; T.  
*E. binale* Turp.—T. ; M. Var. B.—M.  
*E. lobulatum* Breb.—T. ; M.  
*E. sublobatum* Ralfs.—T. ; M.  
*E. insulare* Wittrock.—T.  
*E. pusillum* Breb.—M.  
*Cosmarium margaritiferum* Turp.—T. ; M  
*C. reniforme* Archer.—T.  
*C. Botrytis* Bory.—T. ; M.  
*C. tetraphthalmum* Kg.—L. S. ; T.  
*C. Brebissonii* Menegh.—S.  
*C. Regnesi* Reinsch.—M.  
*C. cælatum* Ralfs.—M.  
*C. notabile* Breb.—M.  
*C. crenatum* Ralfs.—T. ; M.  
*C. calcareum* Wittrock.—T.  
*C. Bæckii* Wille.—M.  
*C. Nymannianum* Grunow.—M.  
*C. Phaseolus* Breb.—M.  
*C. pachydermum* Lundell.—S. ; M.  
*C. pyramidatum* Breb.—T. ; M.  
*C. pseudo-pyramidatum* Lundell.—S. M  
*C. variolatum* Lundell.—M.  
*C. granatum* Breb.—S. ; T.  
*C. gottlandicum*, Wittrock.—T.  
*C. melanosporum* Archer.—T.  
*C. venustum* Breb.—T.  
*C. tetragonum* Næg.—M.  
*C. exiguum* Archer.—T. ; M.  
*C. Meneghinii* Breb.—S. ; T.  
*C. angulosum* Breb.—M.  
*C. orbiculatum* Ralfs.—M.  
*C. quadratum* Ralfs.—M.  
*C. obliquum* Nordstedt.—T. ; M.  
*C. sinuosum* Lundell.—T.  
*C. homalodermum* Nordstedt.—T. ; M  
*C. cucurbita* Breb.—L. S. ; M. ; T.  
*C. cucumis* Corda.—M.  
*C. Ralfsii* Breb.—T.  
*C. intermedium* Delponte.—T.  
*Arthrodesmus Incus* Brib.—M.  
*A. octocornis* Ehr.— $\beta$ . *major* Ralfs.—M.  
*Staurastrum muticum* Breb.—M.  
*S. orbiculare* Ehr.—M.  
*S. inconspicuum* Nordst.—M.  
*S. dejectum* Breb.—T.

- S. O'Mearii* Archer.—M.  
*S. cuspidatum* Breb.—T.  
*S. pterosporum* Lundell.—M.  
*S. Avicula* Breb.—T.  
*S. margaritaceum* Ehr.—L.S. ; T. ; M.  
*S. dilatatum* Ehr.—M.  
*S. Brebissonii* Archer.—L.S.  
*S. cristatum* Næg.—T.  
*S. Maamense* Archer (*S. pseudo-crenatum* Lundell).—T.  
*S. scabrum* Breb.—M. ; T.  
*S. spinosum* Ralfs.—M.  
*S. Reinschii*, n. sp. (*Reinsch "Contrib. Alg. et Fung.,"* Tab. XVII., f. s.)—T. ; M.  
*S. polymorphum* Breb.—T. ; M.  
*S. cyrtocerum* Ralfs.—T.  
*S. paradoxum* Megen.—M.  
*S. tetracerum* Kg.—T. ; M.  
*S. pileolatum*.—T.  
*S. Arctiscon* Ehr.—T.  
*Tetmemorus Brebissonii* Menegh.—L.S. ; T. ; M. Var.  $\beta$ .—M. ; T.  
*T. granulatus* Breb.—L.S. ; M. ; T.  
*T. lævis* Kg.—T. ; M.  
*Closterium obtusum* Breb.—S. ; M.  
*C. didymotocum* Corda.—M.  
*C. cornu* Ehr.—M.  
*C. calosporum* Wittrock.—T.  
*C. Venus* Kg.—M.  
*C. attenuatum* Ehr.—M.  
*Penium Digitus* Ehr.—T. ; M.  
*P. oblongum* de Bary.—T. ; M.  
*P. Navicula* Breb.—L.S. ; M.  
*P. didymocarpum* Lundell.—T.  
*P. polymorphum* Perty.—T. ; M.  
*P. truncatum* Ralfs.—T. ; M.  
*Cylindrocystis Brebissonii* Menegh.—S. ; T. ; M.  
*C. crassa* de Bary.—T. ; M.  
*Docidium minutum* Ralfs (*Pen. minutum* de Bary).—T. ; M.  
*D. Ehrenbergii* Ralfs.—T. ; M.  
*D. Sceptrum* Kg.—M.

Some years ago Mr. Archer sent me this curious and very distinct species from the west of Ireland, as being possibly the *Docidium Sceptrum* of Kützing. It may be, but I fear it is impossible to identify his species with any certainty from his description in "Species Algarum, p. 168. From the swollen base the slender semi-cell tapers gradually to a sharply truncate apex, which is terminated by four small, acute, conical teeth. Surface smooth. Length of semicell, which has a slightly projecting ring at the base,  $\frac{1}{100}$  in. ; breadth of basal swelling,  $\frac{1}{100}$  in. ; do. immediately beyond,  $\frac{1}{200}$  in. ; do. at apex,  $\frac{1}{400}$  in. These measures are approximate only, the gathering containing this species not being in good condition by the time it came into my hands.

I find that Delponte, in his excellent work, "*Specimen Desmidiaceraum Alpinum*," supposes Kützing's species to be the same as Ralfs' *Docid. Baculum*, which may be; but in the absence of drawings or specimens from Kützing himself, I am quite convinced that it is impossible to identify his species, and as his name suits the one under consideration very well, I have taken the liberty of adopting it.

The following 26 species were found in a gathering made by Dr. Buchanan White in Skye, I think on Ben Blaven.

- Euastrum decedens* Reinsch.
- Eu. insulare* Wittrock.
- Cosmarium margaritifera* Turp.
- C. præmorsum* Breb.
- C. Botrytis* de Bary.
- C. tetraophthalmum* Kg.
- C. concinnum* Rabenhorst.
- C. angulosum* Breb.
- C. venustum* Breb.
- C. Nymannianum* Grunow.
- C. holmiense* Lundell, large form.
- C. pusillum* Breb.
- C. granatum* Breb.
- C. tinctum* Ralfs.
- C. Palangula* Breb.
- C. cucumis* Corda.
- C. galeritum* Nordstedt.
- Staurastrum orbiculare* Ehr.
- St. punctulatum* Breb.
- St. meriani* Reinsch.
- Tetmemorus Brebissonii* Menegh.
- Tet. granulatus* Breb.
- Tet. lævis* Kg.
- Penium closterioides* Ralfs.
- P. didymocarpum* Lundell.
- Closterium striolatum* Ehr.

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#### NOTE ON THE OCCURRENCE OF CERTAIN FERNS ON THE RAILWAY BETWEEN CARGILL AND WOODSIDE.

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HAVING heard that *Scolopendrium* and various other ferns were to be found at Woodside, on the railway between Coupar-Angus and Perth, I visited the place in the end of October last with a view to ascertain the facts of the case. As the season was so far advanced, I did not expect to verify what I had heard by personal observation; I, therefore, called upon Mr. Hopkirk, the intelligent station-master at Woodside, who furnished me with the following particulars, and also showed me the ferns growing in his garden, which he had himself gathered on the ground in question.

*Scolopendrium*, he told me, had been found on the line for the last fifteen years. At one time it was pretty plentiful, but the "hunters" had found it



out, and have almost, if not quite, eradicated it. In addition to the common *Lastreas* and *Athyrium*, which abound elsewhere in the neighbourhood, *Polypodium Dryopteris*, *Asplenium Trichomanes*, and *Cystopteris fragilis*, are confined to the railway. Naturally enough they occur only in the cuttings, of which there are three, the longest of them, where the ferns are found in greatest abundance, being about midway between Cargill and Woodside Stations. The ditches in these cuttings are all more or less wet, and the ferns grow in the retaining walls, which are built of sandstone from a quarry in the district. I am not so much surprised at the "Maiden-hair" and the Bladder-fern being found in such places, for they are in a manner ubiquitous, though Mr. Hopkirk assures me they are not found within miles of the railway, but where did the "Oak-leaf" and the "Harts-tongue" come from? I cannot think that "ballast," that capricious distributor of phanerogamous plants has had anything to do with the matter.

A. STURROCK.

RATTRAY, 27th November, 1882.

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### O B I T U A R Y.

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DURING the year 1882 several Scottish biologists died. They were:—ANDREW LEITH ADAMS, Professor of Natural History in the University of Cork; GEORGE DICKIE, ex-Professor of Botany in the University of Aberdeen; RICHARD PARNELL, M.D.; JOHN SADLER, Curator of the Edinburgh Botanic Garden; and Sir C. WYVILLE THOMSON, Professor of Natural History in the University of Edinburgh.

On 14th January, 1883, died WILLIAM A. FORBES, who, though less closely connected with Scotland, may yet be included in this obituary. An account of the life and labours of 'Dr. Dickie will be found in the beginning of this volume; a brief sketch of each of the others named follows below.

ANDREW LEITH ADAMS, A.M., M.D., was a graduate of the University of Aberdeen. His father was a medical practitioner in the valley of the Dee, at Banchory Ternan, not far from Aberdeen. Dr. Adams, senior, was himself an accomplished botanist, though he confined his published writings on that science to additions to the works of others, *e.g.*, in Murray's *Northern Flora*. His name is also frequently quoted in Dickie's *Botanist's Guide*, as the authority for localities of many of the rarer plants of the north-east of Scotland. Doubtless from him his son derived in great part his strong love for Natural Science.

Dr. A. L. Adams, on the completion of his medical studies,

entered the army, as assistant surgeon, in 1848; rising to be surgeon-major in 1861. The duties of his profession were always thoroughly discharged by him. His report on an epidemic of cholera in Malta in 1865, and his conscientious devotion to the care of the sick during the epidemic, won him high praise. In 1873 he retired from the army with the rank of Deputy Surgeon-General. The same year he was appointed to the professorship of Zoology in the College of Science in Dublin. In 1878, he became Professor of Natural History in the University of Cork; which post he held till his death in the summer of 1882. He became F.G.S. in 1870, F.R.S. in 1872, LL.D. of Aberdeen University in 1881, and D.C.L. of Queen's University, Ireland, a few weeks before his death.

During his service in the army Dr. Adams was stationed in various parts of the world, including Canada, the Maltese islands and Egypt, and the Western Himalayan mountains and Cashmere. In all these countries he spent as much of his time as he could spare from his official duties in field zoology, and in examination of the fossiliferous caves and fissures, from which he obtained many interesting fossil remains of vertebrates. After the year 1858 he published numerous articles in scientific journals on the habits and haunts of the birds and mammals of the countries visited by him; as well as on the geological formations and the fossiliferous caves of Malta, with their contained fossils. Among these fossils he met with numerous remains of a small elephant, which led to his making a special study of the elephants, and to a "Monograph of the British Fossil Elephants" published in 1877. During his residence in Ireland he assisted in working out the contents of fossiliferous caves in that country also, and wrote on the extinct mammals of Ireland.

His papers are scattered through the Reports of the British Association, the Annals and Magazine of Natural History, the Edinburgh New Philosophical Journal, the Proceedings of the Zoological Society, the Quarterly Journal of the Geological Society, the Transactions of the Royal Irish Academy, and various other journals.

Dr. Adams also wrote several longer works, which were published separately. These are:—"The Wanderings of a Naturalist in India, the Western Himalayas and Cashmere" (1867); "Notes of a Naturalist in the Nile Valley and Malta" (1870); "Field and Forest Rambles, with Notes and Observations on the Natural



History of Eastern Canada" (1873). He does not seem to have worked at the fauna or flora of Scotland.

RICHARD PARNELL, M.D., died at Edinburgh towards the end of the year 1882; but for many years previous to his death he had so completely abandoned the field of Science that probably few, save his personal friends, of the present generation of botanists and ichthyologists, knew that he still lived in Edinburgh, or thought of him but as of one of a bye-gone time.

In early life he was an assiduous student of the fishes and of the grasses of the district around the Firth of Forth; and between 1832 and 1844 a number of articles from his pen were published on the fishes, and two on the grasses of that district. These papers appeared in the *Memoirs of the Wernerian Society*, and in the *Transactions of the Royal Society of Edinburgh*; in *Jardine's Magazine of Zoology and Botany*; in the *Annals and Magazine of Natural History*; and in the *Reports of the British Association*.

In them numerous species of fishes are recorded as new to the British fauna; and he enters more or less exhaustively into the natural history and economical value of the species of most value to man.

He made a special study of Grasses, not only throughout Britain, "but also in the West Indies and the southern parts of North America;" and, besides the two articles already mentioned, he wrote a valuable work on the "Grasses of Scotland," published in 1842. To this he added a second volume in 1845, and changed the title of the whole work to "The Grasses of Britain." In this work are carefully described the species and varieties of British grasses, with figures of each and of dissections of the more important parts, drawn and engraved by himself. In it he proposed a genus *Bucetum*, to include certain species of *Festuca* and names, and describes as new several forms of *Poa*; but his conclusions have been regarded by later botanists as founded on characters of too minute a kind to be followed. To prevent uncertainty in regard to the forms described by him, he placed in the herbarium of the Linnean Society in London "specimens of the original grass plants employed in the descriptions and figures throughout the entire work." Since 1845 he has not published anything, so far as can be ascertained, in any branch of Natural Science.

JOHN SADLER, born on 3rd February, 1837, at Gibleston, Fifeshire; died on 9th December, 1882, in Edinburgh. For



many years he was assistant to Dr. J. H. Balfour, Professor of Botany in the University of Edinburgh, and took an active part in teaching the classes, and particularly in the excursions with the students during the summer, in which his minute knowledge of the localities of the flora around Edinburgh rendered him a very efficient guide. He also made frequent excursions with the botanical class to the Scottish Highlands. He had a good knowledge of the alpine plants of Scotland, and in 1874 he discovered, in the Corrie of Loch Kander in Braemar, two additions to the British flora—viz., *Carex frigida* (a species found also on the mountains of Central Europe and Asia) and *Salix Sadleri*, described and named by Dr. Boswell from the specimens then found.

Mr. Sadler acted as secretary to the Botanical Society of Edinburgh from 1858 until 1879, when he was appointed to be Curator of the Edinburgh Botanic Garden; and the botanical papers written by him almost all appeared in the transactions of the Society, from the year 1863 onwards.

He gave considerable attention to the Mosses of Scotland, especially to those found near Edinburgh; and several of his articles record the results of his study of these plants, of which he added several species to the flora. He wrote occasionally on other Cryptogams also (ferns and fungi), and assisted Dr. Balfour in drawing up his small "Flora of Edinburgh," published in 1863. For several years he published observations on the times of flowering of the plants in the Botanic Garden, and on the effects of the winters on plant-life in the neighbourhood of Edinburgh. A collection of several hundred British mosses prepared by him was purchased for the herbarium of the British Museum in 1861.

SIR CHARLES WYVILLE THOMSON, born at Bonsyde, near Linlithgow, on 5th March, 1830; died in Edinburgh, on 10th March, 1882. He studied medicine in Edinburgh, having entered on the study at the age of 15. While a student he joined the Botanical Society there, and also became secretary to the Royal Physical Society. In 1850 he succeeded Dr. Dickie as Lecturer on Botany in King's College, Old Aberdeen. After Dr. Macgillivray's death he was appointed, in 1853, to the same office in Marischal College, Aberdeen, the two colleges at that time constituting distinct and independent universities. But a vacancy occurring in the chair of Natural History in Cork, on Professor Nicol's appointment to the same position in Marischal

College, Mr. Thomson applied for the Cork professorship, and was successful. A few years later on Dr. Dickie's vacating the same chair in Belfast University, on his return to Aberdeen as Professor of Botany, Dr. Thomson was a second time his successor. This latter appointment he held from 1860 until in 1870 he succeeded Dr. Allman as Professor of Natural History in the University of Edinburgh. Owing to the state of his health, he resigned his office in October, 1881.

From an early period he directed his attention to marine zoology. He first appears as writer on zoology in a short paper in the *Annals and Magazine of Natural History*, in 1852, entitled "*Notes on some Scotch Zoophytes and Polyzoa*;" and much of his later work bears on these and allied groups of marine animals, both recent and fossil. The embryogeny of the Echinodermata interested him greatly, and he worked out the life-history of several forms very fully, and made several interesting and important discoveries in this way in the relationships of the various living and fossil forms.

His scientific studies led to his becoming always more convinced of the probable abundance and diversity of the fauna to be found by systematic dredging of the deeper parts of the ocean bed, where it has been supposed that life could not exist. Believing it to be of great importance in the advancement of knowledge of recent and of fossil animals alike, he exerted all his influence to obtain from the Admiralty the use of a vessel suitable for such investigations, and properly equipped for a cruise. In this he was successful; and in August 1868 the "Lightning" sailed for a cruise in the North Atlantic. The vessel returned to Oban in September. A full account of the results will be found in Thomson's "*Depths of the Sea*." They proved the existence of abundant and varied animal life at depths of 600 or 700 fathoms. Some of the forms met with were startlingly similar to groups supposed to have died out in the Tertiary or the Chalk periods; and public interest was awakened vividly to the importance of such investigations in their bearing on the past history of the earth as interpreted by its fossils. Another subject of much interest and importance in the study of marine faunas and climatology had some light thrown upon it during the cruise—viz., the distribution and temperature of oceanic currents. The investigations were resumed next year in the "Porcupine," from May till September. During part of this time Dr. Thomson directed operations in the Bay of Biscay, and in the Atlantic to the west of the British Islands. Again, in 1870, the "Porcupine" was sent out, but an attack of illness prevented him from taking part in the work. The results of both cruises are described in the "*Depths of the Sea*." They were such as to raise still higher the general expectation of great and very valuable scientific results being secured were a well-equipped expedition sent forth to survey the bottom of the great oceans, with a scientific staff thoroughly



qualified to avail themselves of the opportunities at their command for research in these unexplored regions. This feeling led, in 1872, to the "Challenger" being thoroughly fitted out, and despatched on a voyage round the world, with Dr. Thomson in charge of the scientific staff. The voyage lasted for three years, during which Professor Huxley acted as Dr. Thomson's substitute in Edinburgh.

The "Challenger" brought back to England large stores of material for future examination, (distributed to numerous specialists at home and abroad), which, when fully wrought out, must add very largely to all that was previously known concerning the ocean-bed. Several volumes of the "*Challenger Reports*" have already appeared.

On his return home Dr. Thomson was knighted, and one of the gold medals of the Royal Society of London was conferred on him. His health, after his return, was broken; and in 1879 he became paralysed, and was unable to conduct the work of his class, or to take part in the preparation of the Reports of the "Challenger Expedition," except occasionally. He was a member of several scientific societies; among these were the Royal Societies of London and of Edinburgh, the Linnean, and the Geological Societies.

WILLIAM A. FORBES, though hardly a Scottish zoologist, may yet be included among such, as he studied medicine for some time in the University of Edinburgh, and published some short articles on the fauna of Scotland.

He was the second son of Mr. J. S. Forbes, the railway-director; and was born at Cheltenham, in 1855. From childhood he showed a great love for zoology. He was educated at Kensington School, and thereafter at Winchester till 17 years of age, when he spent a year at Aix-la-Chapelle, in order to learn German. He next became a student of medicine at Edinburgh, and spent two years there. In 1875 he went to London University to complete his medical studies, but next year changed his plans, and entered on the study of Natural Science in Cambridge University, where he graduated B.A. in 1879, taking a First Class in the Natural Sciences. In January, 1880, he was appointed to succeed Professor Garrod as Prosecutor to the Zoological Society of London, a position in which he proved himself to possess abilities of a very high order. He was also Lecturer in Comparative Anatomy in Charing Cross Hospital in London.

His vacations were chiefly spent in travelling. He frequently visited the Alps; in 1881 he visited Pernambuco in Brazil; and in the following year he spent some time in the United States, that he might become personally acquainted with the zoologists of that country. During these excursions he was never unmindful of his favourite pursuits, as his numerous scientific papers show. In July, 1882, he left England to spend some months exploring



the fauna of the Niger, but hindrances detained him in the unhealthy lower tracts of country; and on 14th January, 1883, he died of dysentery, at the early age of 27.

Mr. Forbes began, like so many others, with a strong predilection for entomological studies, and his earliest papers relate to entomological subjects. However, by degrees, he gave almost his whole time to the investigation of the comparative anatomy of vertebrates, and chiefly of birds. The results of his investigations appeared in the form of numerous papers in the "*Ibis*," and in the *Proceedings of the Zoological Society of London*, as well as a smaller number in other scientific periodicals. His last work before leaving England was to finish a memoir on the anatomy of the petrels, a work since published in the "*Zoology of the Challenger Expedition*."

His premature death has cut short the promise of an eminently successful and useful career as a scientific man.

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## NOTICES OF NEW WORKS.

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### ARTICLES IN JOURNALS.

*Journal of Botany*, 1883. H. & J. Groves. Notes on British Characeæ, the result of the examination of specimens, which had passed through their hands during 1882. A list of species, with their distribution as worked out during the year, is given, in which several Scottish localities are included; but it is stated that from one half the botanical provinces into which Scotland is divided, they have no information, and cannot record a single species, and they add, "We shall therefore be very glad to see any specimens that may be collected, in order as far as possible to complete the census." The following are recorded for Scotland:—*Chara fragilis* Desv. (from Kirkcudbright to Orkney), var. *barbata* from Stirling; var. *Hedwigii*, Dumfries; var. *delicatula*, Kirkcudbright, Braemar, and Orkney. *C. aspera* Willd., Sutherland and Orkney; *C. polyacantha* Br., Roxburgh; *C. contraria* Kuetz., Haddington; *C. hispida* L., East Perth; *C. vulgaris* L., Sutherland and Caithness; var. *atrovirens*, Orkney; *Nitella translucens* Ag., Perth, *N. flexilis* L. Kirkcudbright, E. Perth; var. *crassa* Braun., W. & E., Perth, differs from type in its much stouter stems and branchlets, and shorter end-segments, much resembling *N. translucens*, from which it differs in its end-segments consisting of one cell only, and in absence of the bright shining green colour; occurs in deep water, and may be 4 or 5 feet long; var. *indifica* Wallm., E. Perth; *N. opaca* Ag., Kirkcudbright to Caithness.

Arthur Bennett, Two new Potamogetons; of these *P. Griffithii*, sp. n., was found in Aber lake in Wales, at 1250 feet above the sea-level, and should be looked for in Scotland; it has much the habit of *P. praelongus* Wulfen. but differs in having floating leaves; Mr. Bennett has described and figured it,

*Midland Naturalist*, Jan. 1883. G. C. Druce. A Visit to Glens Clova and Callater.

*Grevillea*, Vol. XI., September, 1882, to June, 1883. C. B. Plowright. A Monograph of the British Hypomyces: with illustrations of all the species, by Dr. M. C. Cooke. (12 plates accompany this monograph). On the Heterœcism of the Uredines; Experiments upon the Heterœcism of the Uredines; and Classification of the Uredines. Dr. M. C. Cooke, New British Fungi; among the species described are the following from Scotland:—*Ovularia Syringæ* B. & Br., in Gard. Chron. 1881, II. p. 665, found on Lilacs in Aberdeenshire, by Mr. A. S. Wilson; *Ramularia pruinosa* Speg., from Forres, Rev. J. Keith; *Puccinia Oxyriæ* Fckl., from

Skye, F. B. W. ; *Ramularia Malvæ* Fckl., from Forres, Rev. J. Keith ; *Thecaphora Trailii* Cooke, on *Carduus heterophyllus* in capitula, from Braemar, J. W. H. T. ; *Ramularia Cochleariæ* Cooke, on *Cochlearia officinalis*, near Aberdeen, J. W. H. T. M. C. Cooke, *Cryptosphæria millepunctata*, Grev. ; On *Xylaria* and its allies (pp. 81-94) ; *Hypoxylon* and its allies (pp. 121-140) ; Classification of the Uredines (pp. 151-152) ; Rev. J. M. Crombie, Enumeration of the British Cladoniei (with their arrangement, general distribution in Great Britain and Ireland, and reference to British published Exsiccati), includes numerous species from Scotland ; E. M. Holmes, New British Marine Algæ, and Algæ Britannicæ rariores exsiccatae. Many of the species noted are from Scottish localities ; these are as follows:—*Phyllitis Fascia* Ktz., from Elie, E. M. H., and Berwick-on-Tweed, E. Batters ; *Dictyosiphon feniculaceus* Grev., *subsp. hispidus* Kjellm., near Edinburgh, G. W. Traill ; *D. hippuroides* Aresch., along the south coast of the Firth of Forth, G. W. T., and at Berwick-on-Tweed, E. B. ; *D. Mesogloia* Aresch., Elie, E. M. H., Longniddry, G. W. T. ; *Phlæospora tortilis* Aresch., Joppa, near Edinburgh, G. W. T., Berwick-on-Tweed, E. B. ; *Sphacelaria plumigera* Holmes, Joppa, G. W. T. ; *S. cæspitula* Lyngb., Berwick-on-Tweed, E. B. ; *S. plumosa* Lyngb., Kinghorn, G. W. T., Ardrossan and Fortincross, Rev. D. Landsborough ; *Elachista Grevillei* Arn. ; *Nitophyllum reptans* Crn., Berwick-on-Tweed, E. B. ; *Prasiola marina* Crn., Joppa, G. W. T.

(NOTE.—In this connection it may be mentioned, that Mr. G. W. Traill has published the following papers:—The Algæ of the Firth of Forth, read before the Royal Physical Society of Edinburgh on 17th December, 1879 ; Additional Notes on the Algæ of the Firth of Forth, read on 19th January, 1881 ; and an Alphabetical List of the parasitical Algæ of the Firth of Forth, read, on 17th April, 1882, before the Royal Dublin Society, and published in the Scientific Proceedings, Vol. III., Part V. ; in this list the host-plants on which each species has been observed are enumerated.)

*The Geological Magazine.* Since the beginning of the present year, the following papers have appeared in this journal:—Thomas Davidson, LL.D., F.R.S., On Scottish Silurian Brachiopoda ; Part II. of a review of The Palæozoic Conchology of Scotland delivered by R. Etheridge, Jun., as his address to the Royal Physical Society of Edinburgh, published 1882 ; Prof. Charles Lapworth, The Secret of the Highlands, in which he deals with the age of the strata that form the Scottish Highlands, as determined by the fossiliferous strata at Durness and Eriboll in north-west Sutherland ; and arrives at a conclusion opposed to that of Murchison, and supported since Murchison's time by the members of the Geological Survey ; Dr. C. Callaway, The Highland Problem, stating shortly the conclusions arrived at by himself on the same subject as the former.

#### NEW BOOKS ON BRITISH CRYPTOGAMIC BOTANY.

In at least some departments, the study of the Cryptogamic Flora of Great Britain, including of course Scotland, ought to be very much more easy to beginners, and certainty in the determinations of the species discovered in any district by the monographers of local floras (of whom there are now so many), ought to be attainable to a degree formerly beyond even the limits of hope. The publication of such works as Dr. Cooke's *Illustrations of British Fungi (Hymenomycetes)*, at so moderate a price as to put them within the reach, if not of all individual botanists, at least of all societies, places in the hands of all a means of accurate work formerly unattainable. We are glad to see that this work has already reached its 17th part. Another work by the same author, of a similar kind, *British Fresh-Water Algæ, exclusive of Desmidiæ and Diatomacææ*, has now reached its 5th part—the groups already treated of in it being the *Palmellacææ*, *Protococcacææ* and *Volvocineææ*. *Zygnemacææ*, *Vaucheriaceææ*, *Ulvacææ*, and *Confervacææ*, and the *Cedogoniaceææ*,

Dr. Braithwaite's *British Mossflora* is also progressing, though more slowly, and has now reached its 6th part. It keeps well up to the high standard of excellence of the earlier parts.





## SUGGESTIONS FOR THE FEDERATION OF SCOTTISH SCIENTIFIC SOCIETIES.

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THOSE who are best acquainted with the workings of the various Natural History Societies that are scattered throughout the country cannot but confess that in too many cases the results are not quite commensurate with the labour, time, and money expended. It is happily true that not unfrequently good and enduring work is done, but this is only a proof that the capability for work exists, and that if some method were devised by which the energies of the societies could be guided into the right direction, the percentage of good results would be very greatly increased.

Conversation with members of various societies has indicated that one means towards the attainment of the desired end, is a closer union amongst the different associations. Each at present pursues its own course, quite irrespective of the work done by the others. Hence, in some cases, the same ground is gone over repeatedly, and in others, some field that would well repay investigation is left untouched.

That a more or less intimate union is not only practicable, but would result in good, is evident from what has been, and is being, done in England by the associated societies of Yorkshire, and by those of the Midland Counties. In Scotland no direct attempt at association has been made; but the Inverness Scientific Society has taken a step in the right direction by organising, during the past two or three years, an annual joint-meeting of several of the Northern Societies. What is required, however, is something more than this.

From the distance between the respective headquarters of many of the societies, it seems scarcely feasible (at least at present) to form a confederation of all the Scottish Societies, but there appears to be good reason why an attempt should not be made to form several confederations, and when time and experience has shown the best way of working these, then attention might be



turned to the attainment of a general confederation. Each group of societies will be able to estimate how federation may best be carried out in individual cases, but, in the meantime, we will mention some ideas that have occurred to us on the subject.

It should be premised that it is in connection with the various societies in the east centre of Scotland that we have been induced to discuss this subject, and the scheme may best be explained by a short sketch of how federation might be carried out amongst these societies.

The area in question includes the two districts defined for zoo- and phyto-geographical purposes, as "Tay" and "Dee," or in other words, those parts drained by the Tay, Dee, and Don, and the rivers between them. From a natural history point of view, "Tay" and "Dee" have much in common. Within their boundaries lie the two chief alpine districts of Scotland, and, as regards the lowlands, their productions are very similar. It seems therefore fitting that they should, to a certain degree, be "worked" together.

In this area there are societies at Perth, Dundee, Arbroath, Montrose, Aberdeen, and perhaps elsewhere—altogether eight or nine in number. They are all within a few hours' reach of each other, so that it is possible for the members of any of them to attend—so far as distance is concerned—without much difficulty, a meeting at any of their respective head-quarters.

As initial steps to confederation each society should appoint one or more delegates, and all the delegates should meet at some selected place to discuss the basis of union. It must be remembered that, of course, it is not proposed to interfere in the slightest degree with the independent existence and autocracy of any society, but simply to receive joint and combined action in carrying out the objects for which all the societies have been founded. How this may be best attained it is for the delegates to consider, but the following amongst other points should be discussed:—The appointment of a standing committee (of representatives of each of the societies) to conduct the affairs of the union; an annual meeting to be held at the headquarters of each of the societies in rotation; the desirability of meetings in addition to the annual meeting; the source whence the expenses of the union are to be defrayed, &c. There still remains to be considered the special objects on which joint action by the societies forming the confederation should be taken, but this is a matter that can best be discussed at the first general meeting.

As for the other parts of Scotland, the following areas of federation may be suggested:—One for all the west between Dumfries and Glasgow (north of this there seems not to be any societies yet in existence), or in other words the districts “Solway” and “Clyde;” one for the south-east, from Fife and Stirling to the borders (that is, the districts “Forth” and “Tweed”); while the societies in the north would naturally form another confederation.

F. B. WHITE.

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### THE PERTHSHIRE NATURAL HISTORY MUSEUM.

By F. BUCHANAN WHITE, M.D., F.L.S.

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AT page 97 of Vol. VI. of this magazine is a short description of a building which had just been erected in Perth for the Perthshire Society of Natural Science. As all our readers may not have had an opportunity of reading this description, we may mention that the building in question was erected chiefly by means of the “Moncreiffe Memorial Museum Fund,” subscribed in memory of the late Sir Thomas Moncreiffe, who died while President of the Society, and who, during his term of office, had been an enthusiastic promoter of, and large subscriber to, a scheme for founding a Natural History Museum in Perth.

In addition to lecture-room, library, laboratory, &c., the building in question contains a museum-hall. This is 56 feet long by 22 broad, and 19 feet 6 inches high to the spring of the rafters of the roof. The ceiling is open and made of varnished pitch-pine. The hall is lighted by a row of windows on one side and a double series of windows in the roof.

Though it is not much more than a year and a half since the Museum was furnished with cases, yet the arrangement is so far completed that it is in contemplation to open it to the public in a short time. The arrangement, it must be remembered, has been entirely a labour of love, and, as like most other societies, the Perthshire Society has comparatively few workers, the space of time in which it has been carried out is by no means excessive, but rather the reverse. As a considerable amount of thought had to be expended on the scheme of arrangement, it has been considered that some details of it may not be without use to other societies or individuals who contemplate the formation of a museum.

The object of a museum is of course educational. A museum

situated in a large town, and with ample space and means at its disposal, may endeavour with some hope of success to bring together the products of every clime, and to arrange them in such a manner that they may best convey instruction. But a provincial museum, with necessarily limited space and funds, will probably, if its vaulting ambition leaps too high, achieve no better end than that of showing "how not to do it." What the aim of a local museum should be is to get together as complete a collection as possible of the natural productions of the district, and to arrange them in the manner best calculated to instruct any visitor, however ignorant he may be of natural science. But such a collection has other uses than this, since it will eventually supply a mine from which the educated naturalist may derive much valuable information. Moreover, such a museum may attain in its own line the perfection which is beyond the reach of the more ambitious, but less judiciously planned one. At the same time, to more effectually carry out the educational objects of the local museum, it is well to supplement the local collection (which will form its principal contents) by a smaller collection constructed to show the chief features of the classification and structure of the animal, vegetable, and mineral kingdoms. Such a collection is called an "index collection," and should be kept apart (or as far apart as circumstances permit) from the local collection.

On this plan the arrangement of the Perthshire Natural History Museum has been carried out. Most of the space has been allotted to the zoology, botany, and geology of Perthshire, and the Basin of the Tay, but four table-cases have been set apart for the index collection, and we will begin with the description of the latter.

Each table-case is 13 feet long by 4 feet wide, and consists of two longitudinal compartments, each of which contains twelve wooden trays for holding specimens. The cases are made of polished mahogany, and glazed with plate-glass. Inside they are lined with white paper, and have a gentle slope backwards from the front to the middle longitudinal line.

Owing to the limited space (rather more than 200 square feet) afforded by the table-cases, it is evident that if the collection was to fulfil its purpose, the specimens must be very judiciously selected, and space allotted. One case and a half has been devoted to geology, the same amount to zoology, and one case to botany.

The geological index collection contains three departments.



One is devoted to mineralogy, a second to illustrating the structure of rocks, and the third shows, by means of characteristic fossils, the succession of the sedimentary rocks. The mineralogical department possesses already upwards of 300 species and varieties of the most typical minerals, a little preponderance being given to those which occur in the rocks of the district. They are arranged according to Dana's classification, and each specimen is placed on cotton wool in a small paper tray, the trays being arranged in rows, and each row separated from the next by a squared black stick, on which the label is placed. The label indicates the name, the crystalline system, the chief chemical components, and the locality whence the specimen has been derived. In addition to the label appropriate to each specimen, a larger label or placard on the perpendicular back of the case indicates the group or groups to which the specimens in each of the wooden trays belong. In order to avoid the risk of confusion in any re-arrangement of the collection, each specimen has a number painted on it, the label bears the same number, and the same is entered in a catalogue of the specimens.

The department containing the fossils of the sedimentary rocks is arranged in a similar way to the mineralogical one, and has specimens illustrative of upwards of 300 species of animals and plants. As amongst the minerals, so each specimen of the fossils has a number painted on it. The labels indicate the formation and division of the formation of which the fossil is characteristic, the name of the species, and the locality whence the specimen has been derived. The larger labels behind the trays point out the geological epoch of the contents of the wooden trays.

The department relating to rock structure is not yet quite as complete as it is intended it should be. The larger labels at the back of the case indicate the nature of the specimens in the trays, the main divisions being igneous rocks, aqueous rocks, specimens showing contact-phenomena between igneous and aqueous rocks, and altered or metamorphic rocks ; while a small part of the case is devoted to historical geology, illustrated by stone implements. As in the other departments, each specimen bears a painted number.

*(To be continued.)*





## ZOOLOGY.

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### RAT AND MOUSE.

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ON passing an old ruin one day and hearing a rather loud squeaking, which I suspected to proceed from rats fighting, as I knew they were plentiful there, I stood in the hope that they might come out. In this I was not disappointed. In a short time one appeared at a hole, but with his tail first. Here he came to a dead halt, and could get no farther. He seemed from his writhings to be dragging something that he could not very well manage. This continued for a time. At last, however, and with what looked like an extra effort, he cleared the opening, and brought another rat with him. The two now fixed on each other in a fresh, and as it seemed, a deadly combat. The screaming was fearful. They rolled and tumbled about for a long time, but at length one got clear and bolted. Both were bleeding. The other now turned and looked, as I thought, rather anxiously all round. He then sped to the hole, but stopping short at its mouth looked at me, came and ran over and over and smelled my shoes, then actually had the audacity to stand up against the wall on which I was leaning, and stared me in the face, his large black eyes glistening the while. Satisfied that I was either a friend or a statue, he left me and ran to his abode. Soon after he entered, the squeaking recommenced, but now on a much lower key. This ceased, then out came the ratten, carrying in his mouth what I took for a young one. Having gone to a distance the burden was dropped, and I could now see that it was a mouse, so big with young that it could scarcely walk. The rat having disposed of his burden, returned to his domicile. The mouse, after wandering amongst a lot of loose stones and rubbish, came back and entered the hole too. A little more squeaking followed, and then out came the rat as before; and having carried the intruder fully farther than he did last time, he dropped it again, and then ran back to his retreat. The mouse this time came direct back, and entered again also. A few minutes now elapsed, when a slight noise indicated that the affair, finished, as I was beginning to think, was not yet all over; and shortly after the mouse was thrust out of the hole, but not carried this time. The rat then came out, took the mouse by the back of the neck, and having dragged it several yards, he then tossed it farther with his nose. This done, he once more returned to his house; but instead of disappearing, he now seated himself at the entrance, from which he looked at the mouse and at me alternately. Poor mouse seemed now very much exhausted; in fact, it was hardly able to move. On recovering itself a little, however, it began even again to crawl towards the rat. Seeing this, as it came near, the rat rushed at it and threw it back with some force, if not violence. This stunned the little creature, so that it lay quite motionless. Thinking that it was now time to put an end to the matter, I picked the mouse up, more dead than alive, rolled it into my handkerchief, put it into my pocket,



thanked his ratship for what he had done, and then bade him good-bye. While going along I passed many a braw house with beautiful doors and clean thresholds, but I stopped not at these. Getting to a rather disreputable part of the town, however, I soon found a dilapidated hovel. Here, I said to myself, is just such a place as any mouse could wish to live in. I therefore unwrapped my captive, and put it very gently in beyond the door, which I would have shut, but found it had no latch; I managed, however, to close it nearly as well. I then crossed to the other side of the street, where I commenced a quarter-deck march, but kept my eye on the door all the time. This I continued for about a quarter of an hour, and not seeing mousie again I left, thinking and hoping that it had at last found a congenial home.

I am well aware that rats eat mice, and how this one escaped is not for me to say. Neither do I offer any opinion as to the most extraordinary pertinacity exhibited by the mouse to get into the rat's abode. I have told the facts, plain and simple, and now leave the rest to the reader.

THOMAS EDWARDS, A. L. S., Banff.

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## OCCURRENCE OF RARE FISHES AT ABERDEEN.

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### THE ANGEL FISH—*Rhino squatina*.

A fine specimen of this species was brought to land by one of our local trawling steamers, on January 20th, 1883, and is the first example for the locality. Yarrell says that this fish "is common on the coasts of Kent and Sussex, where it is called a Kingston." Parnell, in his "Fishes of the Firth of Forth," says of it: "On the eastern shores of Scotland it is seldom seen. It has been, however, noticed by Dr. Neill as occurring occasionally in the Firth of Forth; and I myself have met with two examples, taken with the hook, in the month of June, from the same quarter. The fishermen have no name for them further than that of *Mongrel Skate*." Couch, in his notice of the species, says: "The monk is a common fish on the western parts of the kingdom, but it becomes more rare as we proceed to the north, although it has been taken so far in that direction as the Orkney Islands." He, however, gives no authority for this latter statement. Dr. Francis Day, of Cheltenham, informs me, by letter, that one was cast upon the Banffshire coast in the winter of 1851. In Low's "Fauna Orcadensis," no notice is taken of this species as occurring in that region, yet Baikie asserts that it occurs there.

The specimen under notice was a female. The stomach contained fish remains. As an article of food, the angel fish is coarse, and could be eaten only in the absence of anything better.

### THE GREAT-FORKED BEARD—*Phycis blennoides*.

On the 23rd, 24th, and 28th of February last, four of the above, three females and one male, were brought into port by some of our local trawlers. Each of the females was carrying spawn, which was about half-way towards maturity. Unfortunately all their stomachs were empty, thus affording no clue as to what their food consists of. According to Jewyns and Yarrell, this species was first described as British by the late Mr. Iago, on the Cornish coast, where it is not common, and it is there called the *Hak's Dame*. It is recorded as having



occurred at St. Andrews, *vide*, "Memoirs of the Warnerian Nat. Hist. Society vol. vi., p. 569." It is not mentioned by Parnell in his "Fishes of the Firth of Forth," nor in Low's "Fauna Orcadensis." Mr. Couch remarks: "This species may be regarded as scarce, rather than rare." Dr. Day, in his "Fishes of Great Britain and Ireland," at present in course of publication, says of this species: "Mostly seen off our coasts during winter, and but little is known respecting its habits. It has been recorded as rare in Banff (Edward)."

The smallest of those now referred to was fifteen inches long, and the largest twenty-four inches. In each case the stomach was empty. One of them, when cooked, proved to be excellent and delicate eating. In the hand-book issued in connection with the London Fisheries Exhibition, on "British Marine and Fresh-water Fishes" (by W. Saville Kent), a most excellent and useful little work, a mistake occurs in speaking of the fish under notice, in as far as it is there called the Great Fork-Beard, or *Torsk*, *Brosmius brosme*, thus confounding two very different species.

#### DRUMMOND'S ECHIODON—*Fierasfer dentatus*

A small specimen of the above was cast on the beach here, on the 18th of March last, and is the first of its kind that has come under the notice of the writer. This interesting form was first discovered as British by Dr. J. L. Drummond, who found one on the beach at Carnclough, County Antrim, June, 1836. Subsequently another was found, "thrown on the shore by a storm in the harbour of Valencia" (Couch). In the *Zoologist*, for April, 1863, it is reported by Mr. Edward that six specimens of this fish had been obtained at Banff; but this report is not noticed by Dr. Day in his history of British fishes. This species is found on the Mediterranean and Italian shores, and is remarkable principally on account of its extraordinary dental development, which appears much beyond the little creature's requirements. However, when we come to know its habits, and of what its food consists, about all of which at present we are ignorant, there is little doubt but that an explanation of its long, sharp canines, and numerous other keenly-edged teeth, will be rendered to us.

#### THE BASSE—*Labrax lupus*.

A fine specimen of this species was caught in the salmon nets, near the mouth of the Dee, on the 21st of May last, and was brought to the writer by the fishermen. It was a female, laden with spawn, and was thirty inches long, and ten pounds in weight. This fish was known as *Labrax*, or "sea wolf," by the Greeks, and *Lupus*, or "wolf," by the Romans. Dr. Day remarks: "In Britain it is most common in the summer months, along the southern coasts, while towards the north it decreases in numbers. In Scotland it is rare to the north of the Firth of Forth. Edward records a single example, found dead in the River Deveron, in Banffshire, in 1839, while it has not been recorded from the Orkneys and Shetland Isles." The stomach of the one referred to was empty, and but little is known, with any degree of certainty, as to what its food consists of. As an article of food, this fish is excellent, and it is, therefore, to be regretted that it is not more plentiful in our seas.

#### THE STRIPED RED MULLET, OR SURMULLET—*Mullus surmulletus*.

A specimen of the above, ten inches long, was brought in by one of our trawlers on the 20th August. This is one of the rarest fishes on the north-east

coast of Scotland. During a period of over twenty years' daily observation, the writer has not seen one till the present, and our local fishermen did not know, nor had they seen, the species before. "One was caught amongst herrings off Peterhead, in September, 1848, measuring ten inches long" (Dr. Dyce's MS.) It is recorded from the Moray Firth by Dr. Gordon, and from Banffshire by Mr. Edward. It is not mentioned in Parnell's "Fishes of the Firth of Forth," nor by Low, in his "Fauna Orcadensis." Yarrell mentions it as of "frequent occurrence along the extended line of our southern coast, from Cornwall to Sussex, but becomes more rare in proceeding from thence northward by the eastern coast." Dr. Day figures and describes this form as a "variety of the plain red mullet (*mullus barbatus*)," which is equally rare along the eastern coast of Scotland. The stomach of the one referred to was empty, and little is known as to what constitutes its food. As an article for the table, the mullet is held in high esteem.

August 31st, 1883.

GEO. SIM.

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## ON A VARIETY OF *HELIX ARBUSTORUM*, NEW TO BRITAIN.

By JOHN W. TAYLOR.

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IN my Life History of this species, published in the *Journal of Conchology* for October, 1881, I gave an account of all the varieties then known to inhabit these isles, with a full description of each form and summary of its distribution; in addition, I described the most interesting varieties found on the Continent, but not yet discovered in Britain.

One of the most remarkable of these—the var. *Baylei* Lecoq—has been added to our fauna by Mr. W. Baillie of Brora, one of the most assiduous and successful of Scottish conchologists, who discovered it a few weeks ago, "on a cold exposed rock, with a north-east aspect, in the neighbourhood of Loch Brora, at an elevation of 600-800 feet above sea-level, feeding upon nettles and foxgloves." The specimens already found are hardly mature, but the peculiar character of the variety *Baylei* is strongly marked. They are exceedingly transparent, thin and vitrinaceous in texture, of a clear, uniform, yellow colour, tinged with greenish, and entirely devoid of the calcareous maculations usually present in the species.

According to continental conchologists, the characters specified are the effects of altitude and deficiency of calcareous earths, and are exemplified in other species in a similar way.

The conchological fauna of Scotland is very far from being known, and I trust the re-issue of the *Scottish Naturalist* will stimulate the conchologists to investigate and work out fully the fauna of their country.

POTTERNEWTON LODGE, LEEDS, July 16th, 1883.



## PHYTOLOGY.

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### SOME HINTS ON THE FORMATION OF A HERBARIUM.

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IN these days of universal diffusion of knowledge, it may seem unwarrantable to assume that there are still some to whom the modes of studying Natural Science in any of its branches are yet more or less unknown, and that would be willing to make use of any hints relating to such studies. But, though there is no longer need to defend these pursuits from the charges formerly so frequently brought against them of uselessness, or to apologise for venturing to interest oneself in them, there is considerable misconception in the minds of many in regard to them; and it becomes the votaries of such studies to guard against errors gaining sway. Too often it seems to be thought that the study of Science can be carried on in a desultory way, and that it is not necessary to do more than skim the surface to gain all that can be learned. But a little experience teaches distrust of the claims to knowledge advanced by those that trust to what can be picked up from books instead of as the result of their own labour—slowly gained it may be, but, once gained, not likely to be readily lost. The trite saying that there is no royal road to learning is not less applicable to scientific studies than to other departments of human knowledge; and from none are these studies more in danger of injury than from the dilettante student, by whose errors and pretended acquirements discredit is liable to be brought upon them in the general estimation.

To benefit, as all may, by such studies requires that there must be no disposition to shrink from the details of work, irksome it may be at times, and yet perhaps by reason of the care and attention needed for its performance, a most valuable part of the training to be gained by the true worker. It is with the hope of clearing some difficulties from the path of such students of Nature, and of possibly directing their view to points that are too often overlooked, that the writer ventures to offer some remarks here on what may be learned from a carefully prepared herbarium, such as may be



made in even the most limited district. Only seldom does one see a herbarium that approaches what may be conceived as the ideal type in completeness, and in the information that might be gained from it; and yet the preparation of such a collection demands nothing beyond care and that power of observation that is one of the most valuable results of a study of Botany. It is not a source of expense to its maker, but far more may be learned from it than from the most expensively got up of the heterogeneous collections one sees at times.

Much aid could be given in extending the boundaries of what is known in all sciences of observation, even in the most limited area for work, by careful and unwearied workers; each confining himself to one district, so as to be thoroughly familiar with the fauna and flora, the geology, the meteorology, and the various other conditions of existence, apart and in their mutual relations and actions on one another. As Tennyson has well said:—

“ Flower in the crannied wall,  
I pluck you out of the crannies :  
Hold you here, root and all, in my hand,  
Little flower, but if I could understand  
What you are, root and all, and all in all,  
I should know what God and man is.”

To know that, may well be believed to be beyond human reason; but to know in part is within the reach of our powers; nor is the knowledge likely to be gained more fully than by the careful observation of the varying conditions of existence in circumstances where the mind is not liable to be distracted by too wide a range of conditions. There are many that are in circumstances and that have the ability to add largely to our present knowledge if once they were to make a beginning. We have still among us those that could worthily follow the example of Gilbert White of Selborne; and that by being the natural historians of a parish, or even of a less area, might largely extend the confines of our knowledge. It might perhaps be of use to point out how much there is to observe even under apparently the most unfavourable conditions; and a series of articles with this object would worthily find a place in this Magazine, if from the pens of those able to speak with personal experience.

The value of a herbarium may be assumed to be admitted by everyone—though some botanists seem to think it unworthy of the trouble entailed in its formation, and trust to their recollection

for the names and other particulars concerning the plants known to them. But it needs only a little experience of the untrustworthiness of this method in actual work to prove its insufficiency. Without the actual specimens it will be found impossible to obtain the certainty desirable in ascertaining the species described by any author, or to determine the identity or difference of the species and varieties of one country with those of another.

It can hardly be matter of surprise, however, that in some cases the herbarium is undervalued when we see the condition of the specimens contained in it. From their scrappiness, as well as from the want of care in their preparation, an inspection of some herbaria is a positive pain instead of the pleasure it ought to be, and that a fair amount of care in the selection of specimens and in their preparation would insure it should be.

A good local herbarium, such as should be prepared by, or available to the members of the Natural History Societies and field clubs, now so numerous scattered over the length and breadth of the land, ought to show the plants of the district to which it relates. There should be a full and extensive series of each of them, to illustrate its life-history from the first appearance of the seedling till its full development.

Of each species of plant there ought to be a well-chosen series of specimens to illustrate the changes it undergoes when growing amid different surroundings, such as in open and in shady spots, in dry and in damp places, with sufficient space for full development, or crushed in among other plants. In fact the influence of the physical environment shows itself in so many ways that it is useless to attempt to sum them up here ; but the effects are well deserving of regard in the formation of a herbarium, and will be found far more extensive and important than is generally supposed. Then in the case of herbaria to illustrate the flora of some district of considerable extent—*e.g.*, of Perthshire—it is very desirable to show the distribution, both superficial and altitudinal, and also the varieties, if such occur in the subdistricts. To fulfil these aims requires good series beyond what might be needed for the herbarium of a small area.

There are comparatively few plants that do not show considerable differences in the appearance of the leaves if traced with care through life ; yet few herbaria show a good series of the changes undergone. Even so important organs as the cotyledons are seldom to be seen in herbaria, though much may be learned from them ; inasmuch as they, like embryonal structures in animals,

point to the earlier and simpler condition of the plant's history, before its vital needs had brought about the adaptational changes that disguise the genetic resemblances of the different forms.

The marked differences that exist in the leaves of the conspicuously heterophyllous plants, *e.g.*, *Ranunculus aquaticus* or *Helosciadium inundatum*, are known to almost everyone, and are usually to be found represented in collections, though often enough rather poorly; but there are many other plants that are more or less heterophyllous, but that do not get the same care bestowed on them. Of such species many examples might be mentioned, *e.g.*, *Ranunculus auricomus*, *Pimpinella Saxifraga*, *Scabiosa arvensis*, not to refer to more commonly quoted examples. Obviously any collection that fails to show these parts is defective in at least one or more very important respects.

A cursory glance at any descriptive work on the flora of any land, at once shows that characters of value in distinguishing species are obtainable frequently from the form and structure of the underground parts of plants. In these species it is clearly essential to have such parts shown in the collection; but in all cases, where at all manageable, subterranean parts ought to be properly shown along with the rest, despite their unsightly appearance at times. In the parasitic species of Phanerogams, the value of the specimens is much enhanced by the connection between the host-plant and the parasite being clearly shown in the herbarium, though this is seldom seen. In fact, in the semi-parasites, such as *Rhinanthus*, the parasitism is generally forgotten entirely.

In other plants, *e.g.*, the *Lesser Celandine*, there are special bodies produced at certain seasons for reproduction, which in the plant named take the form of axillary tubers; while a viviparous condition is by no means unfrequent in certain plants, depending for its frequency, in some degree, on local or climatic causes.

The importance of the flowers is generally sufficiently recognised to render it needless to dwell upon them as essential; but in very few herbaria is there any attempt made to show the development of the parts of the flower; despite the value of development as a clue to genetic relationships, and thereby to the determination of a really natural system of classification. It is often hardly possible from a dried plant as a whole to ascertain readily, without injuring the specimen, such points as the nature of the inflorescence; and naturally it is still more difficult to see the form and relations of the parts of the flower. •Structural characters like these are best made available by special preparations accompanying the entire plant.



Attention has been so often and so fully directed of late years to the existence of cleistogamous flowers in the plants possessed of them, and also of dimorphous and trimorphous flowers, that there are few to whom they are quite unfamiliar, but too often still they are not found in the herbarium.

The transition is natural from flowers to fruits and to seeds, both of which should be represented, if possible along with the plants. Small dry fruits and seeds are easily accommodated, like other small parts of plants, in small envelopes on the sheet with the specimen. Larger fruits and seeds, if dry, are best kept in boxes of suitable size; if fleshy they require to be preserved in bottles in some preservative fluid. Of course all ought to be carefully labelled to render errors in reference to them impossible.

The interest and value of the study of Botany is very greatly increased by observing the adaptations to favour pollination of the stigma in the various plants, and those to favour dispersion of the seeds, whether affecting the seeds themselves or the carpels or outer floral whorls. It is certainly difficult to show the adaptations affecting the floral organs in pollination in the dried plants, yet it may often be done in some degree with a little care, especially if sketches are affixed to the sheets. On the other hand the adaptations for dispersion of the seeds are many of them such as to be easily preserved and clearly shown in herbarium specimens.

Before passing from the points to be observed in collecting the specimens, it may be noted that the stipules are worth careful attention, and ought to be properly displayed. In many trees, *e.g.*, the Oak and the Beech, they serve the functions of bud-scales, and when the buds open they soon fall off, leaving so little trace that their existence might be entirely overlooked on examining the branches at a later period of the summer.

Turning now for a little to the modes of preparing the specimens, we may glance at a few of the difficulties that meet the collector, and at the best modes of overcoming these. The question of drying paper is one that may be left to the determination of each individual, since any paper will do with skill to use it. The absorbent paper prepared for the purpose is the most satisfactory for use; but it is somewhat expensive if much of it is used; while old newspapers will do, but need to be more frequently changed. The press is an article of some consequence, as lightness and simplicity in use add very greatly to its value. As the result of experience of a good many years duration, the writer would strongly advise beginners to discard solid wooden boards, and to make use

of strong wire frames the size of the paper to be made use of in drying the specimens. Over the frames lies a set of thin wires about half an inch apart. The requisite pressure is obtained by using a pair of rug straps ; and a little experience shows that the pressure given by these is ample. These frames have very great advantages over wooden boards in lightness, portability in travelling, and freedom in giving off the moisture of the enclosed plants, thereby rendering the changes of paper required less numerous, while diminishing the risk of injury to the specimens.

Some groups of plants require special precautions to ensure successful results. Those growing submerged must not be exposed long to the air, or they will wither and shrivel so as to make it almost impossible to obtain a satisfactory specimen from them. Species that have the submerged leaves much cut and the stems very slender should be treated like seaweeds and be spread out on the sheet to which they are to remain affixed under water, the water being run carefully off after the plant has been properly arranged on the paper. Of course all must be thoroughly washed before being laid out. A piece of linen above the plant in the press will prevent it from sticking to the dry paper, while it will adhere readily to the sheet on which it is lying.

Some fleshy plants *e.g.*, *Sedums* and some *Orchids*, are very troublesome because of the difficulty experienced in killing them, and in the almost certainty of their leaves dropping off or turning black in the press. It is known to most that such plants require to be dipped into boiling water, ironed with a hot iron, or otherwise subjected to treatment to kill them before being put into the press. Some will stand an almost incredible amount of such usage without being killed, and may even begin to grow again after they are in the herbarium.

The tendency in many flowers to become black, or otherwise unsightly, is unfortunately known to every collector by unpleasant personal experience ; and is especially common in blue flowers, less frequent in red. Yellow flowers very generally stand drying well, and change comparatively little. The best general precaution is to dry them as quickly and as thoroughly as possible, using artificial heat for those peculiarly liable to suffer. It has been recommended to cover the fresh flowers in a vessel with fine sand, and then to expose them to heat for a time. Mr. English recommends the use of dry plaster of Paris, heated to 90° or 100° F. In this they are left for 12 hours, or longer if necessary, then they are removed, brushed with a camel's hair brush, and carefully washed

with petroleum. Reds and purplish-reds are rendered too purple, but their natural colour is restored by exposing them to the vapour of hydrochloric acid in a wide-mouthed jar or bottle. Orchids and other red flowers may have the colour preserved in some degree by washing them with a mixture of one part of hydrochloric acid in three of spirits of wine ; but the colour is apt to be too bright red.

It is needless to dwell here upon the need of carefully labelling all specimens with the locality and date of collection, with the name or initials of the collector as a guarantee of authenticity. Such additional information as relates to the nature of the habitat, its height above sea-level, the kind of soil, or anything that could bear on the conditions of life of the specimen may also be stated with advantage. It is generally recognised that the herbarium should be attached to sheets of uniform size, sufficiently large to allow of entire characteristic examples of all but the larger plants being attached to them. Of small species several examples may be put on a sheet. The sheets should be protected in covers of strong paper. These may be stored away in a special cabinet, or they may be secured in bundles between cardboards secured with cloth straps, and may then be arranged in a closed bookcase like so many volumes. It is not at all advisable to commence a permanent collection in bound volumes, as the need of space and the difficulty of making interpolations will constantly make themselves more and more felt.

Those desirous of assistance beyond the limits of this article, will find it in an excellent pamphlet by Mr. Britten, of the British Museum, entitled "*The Young Collector's Handbook of Flowering Plants*" (published at the exceedingly low price of one penny) ; or in the textbooks of Botany of which several have appeared of late years. The object of the present article is fully gained if it suggests to any who read it ideas that may be of service in rendering their herbaria more complete and more instructive alike to themselves and to others, and therefore more fit to spread an intelligent appreciation of the aims and uses of Botany among the non-botanical public.



## PLANT NAMES.

By WM. DURIE.

(Read at the Meeting, on 19th July, 1883, of the Arbroath Horticultural and Natural History Society).

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GRANT ALLEN, in his charming "Vignettes from Nature," provides a very suitable text and an ample justification for a paper on the names of plants, in these words: "Our thoughts about Nature are often too largely interwoven with hard technicalities concerning rotate corollas and pedicellate racemes; and I, for my part, am not ashamed to confess that I like sometimes to see the dry light of science diversified with some more fallacious scintillations of the *literae humaniores*, or even with some will-o'-the-wisp of pure poetical imagination." The necessity for giving different names to different forms of vegetable life must have led, in the childhood of the world, to the assigning of distinguishing names by which each kind which early man had occasion to notice should be known. *Popular* names of plants have been conferred through the operation of various causes, which will be shortly noted and fully illustrated further on. But it was long before *scientific* names, properly so called, were invented, not indeed till last century, however great the convenience appeared of having a uniform system of naming which would enable observers all over the world to compare with certainty their respective discoveries. Many prejudices had, however, to be overcome. A good example of this is seen in the anecdote of an old naturalist, who, about 200 years ago, when the great fact of the two sexes in plants was being established, objected that the ascribing of sexes to flowers sullied their virgin purity! Linnæus, by his artificial system, "his rough and ready classification," based on such sexual distinctions, and by his rigorous definitions, did much towards the formation of a universal and easily followed system of naming, although it has been urged against his system that "it led only to a knowledge of names, to a mere index of genera and species." But Nature proved too rich in variety and too prolific in distinctions to fall exactly within the limits of his cast-iron system. As remarked by Goethe, the German poet who first proved the evolution of the flower from the leaf: "Naturalists are probably delighted when they have brought any peculiar plant under some head; but still Nature carries on her own free sport, without troubling herself

with the classes marked out by limited men." ("Eckermann's Conversations," p. 295.) The Linnæan Latin names for species and genera were so good that they have been retained. The *natural* system, based mainly, but not exclusively, on the fructification and the most perfect system as yet devised, is due to the labours of the great French botanist, Jussieu, who was under much obligation to the equally great Englishman, John Ray, and whose work has been further improved upon by De Candolle, Robert Brown, Lindley, and others.

According to the English Cyclopædia, there are at least 100,000 known species of plants arranged in about 7000 genera—a multitude such as no single life would be able to survey; but, thanks to the admirable system of nomenclature and subordination of species under genera, natural orders, divisions, sub-classes and classes, it is possible to collect, under about 300 heads, the vast mass of characters required to distinguish them, while a knowledge of some 200 heads is sufficient for the purpose of the ordinary observer. The sub-division of a species into *varieties*, constituted by some individuals of a species showing certain minor characteristics not possessed by the rest, tends still further to extend and complicate the work of investigating plant names. In dealing with a subject so extensive and various as this has been shown to be, the great difficulty is to hit upon a system of classification which, while embracing in distinct divisions a number of what may be called representative names, shall neither fall into the fault of giving the same name under two or more divisions—*i.e.*, shall not overlap, nor, on the other hand, omit to take notice of any class of names that should be kept distinct. I cannot claim that the scheme adopted in the remainder of this paper satisfies all the conditions of a good classification. It has, at all events, been approved only after trying and rejecting other schemes, and after a careful survey of the field to be mapped out. The scheme is divided into the following heads designed to show chiefly the various ways in which plants have come by the names they now bear:—

- I. Named after persons.
- II. Named from myths.
- III. Named from places.
- IV. Native names.
- V. From real or fancied properties of the plant.
- VI. From uses to which the plant has been put.
- VII. From likeness to other objects.

VIII. Misnomers.

IX. Corruptions.

X. Puzzlers.

I. Names derived from *persons*. The place of honour should be given to the *Linnæa borealis*, which owes its name to the great botanist, Linnæus, whose portrait usually shows him with a sprig of this northern evergreen in his button-hole.

Men of science have also given their names to the following among many others :—

*Fuchsia*, after L. Fuchs, a German botanist of the 16th century.

*Camellia*, after George J. Kamel, a Moravian Jesuit, who introduced it into Europe last century.

*Dahlia*, from Mexico, after Dahl, a Swedish botanist.

*Magnolia*, after Piérré Magnol, a French botanist of last century.

*Banksia*, in compliment to Sir Joseph Banks, an eminent naturalist of George III.'s reign.

*Adansonia*, the extraordinary African tree which Humboldt considered as probably "the oldest organic monument of our planet," is named after the French naturalist, Michael Adanson, who last century was the author of no less than 65 different methods of classifying plants.

Personal names have been conferred on other plants, such as *Cinchona* (Peruvian Bark), after the Countess of Chinchon (wife of the Governor of Peru), whom it cured of fever in 1638, when the Spaniards brought it to Europe.

*Gentian*, after Gentius, an Illyrian King, 180 B.C., said to have first discovered its properties.

*Pepper*, from French *le poivre*, after Le Poivre, a governor of the Isle of France.

The genus *Nicotiana* (species Tobacco), named after Jean Nicot, who introduced tobacco into France in 1560.

*Quassia*, a South American tree, named by Linnæus after Quassi, a negro, who pointed out the use of the bark of the tree as a tonic.

*Thomson's Weed* (*Lepidium draba*), curiously named after Mr. Thomson, owner of a chalk-pit, into which the straw from the soldier's beds brought from the ill-starred Walcheren expedition was thrown, and out of which this weed sprung for the first time in England.

*Greengage* got its name by an accident. In 1725, Sir Wm. Gage introduced some French fruit-trees into Britain; but in the passage across the Channel, the ticket of the Reine Claude



plum had been rubbed off, and his gardener, not knowing its name, called it, when the fruit became ripe, *greengage*, in honour of the family.

*Cudbear* (*Lichen tartareus*), a Lanarkshire name, is said by Jamieson to be a corruption of *Cuthbert* (Dr. Cuthbert Gordon), who first employed it for dyeing purposes. In Banff it is called *cup-moss*. Additions to this list will readily occur to all lovers of plants, some of whom have had the naming of new varieties, and have thus done honour to their friends, if their modesty prevented them from so immortalizing their own names.

II. The second head embraces those plants named from *myths* and *religious* associations. This is a large class also, and owes most of its names to the primitive beliefs current, "when wild in woods the noble savage ran," or in the days of happy faith, which we, in our boasted time of enlightenment, call the "Dark Ages." The names may be arranged in two sub-divisions:—

1st. Those given previous to the introduction of Christianity, such as—

*Centaury* (Greek, *κενταυρίον*), named after a Centaur, Chiron, who first revealed its properties.

The *House-leek* is sometimes called *Jove's Beard*, after the god Jupiter.

*Mint* (Greek, *μίνθη*; Latin, *mentha*), so called from the fable of Menthe, a daughter of Cocytus, changed by Prosperpine into this plant out of jealousy.

*Peony* (Greek, *παιόνια*), from Παιών, who was reputed physician to the gods, this plant having been used in Greek medicine.

*Royal Osmunda Fern*, named after a Saxon princess, who was left defenceless on an island, and fabulously changed into this fern.

An orchis (*Satyrrium olbidium*) is called in Sweden *Frigg-jargas*, from *Freya* (hence our *Friday*), love-goddess of the Scandinavian mythology, love-potions having been brewed from this plant. The *Maiden-hair Fern* was named *Frejuhas*, after her.

2nd. Those names given during Christian times:—

It has been well said that "just as when the breath of the new creed blew over the fields, the old and familiar names of plants died down. Apollo's Narcissus, Aphrodite's lilies, Njord's glove, or Freya's fern, grew up again as the Flowers of May, Our Lady's Hand, or the Virgin's Hair."—(Keary.)

*Aaron's Beard*, a Roxburgh name for *Hypericum Calycinum*, from its bundles of hair-like stamens.

*Christ's Thorn* (*Poliurus aculeatus*), a prickly shrub found in Palestine. So named from a tradition that the Jews made the Crown of Thorns from its twigs.

Nearly every saint in the Church Calendar had a flower dedicated to him, as the Crocus to St. Valentine, and the Lady's Smock, to the Virgin Mary; while some plants took their names from Saints—Herb Christopher, St. John's Wort, St. Barnaby's Thistle, &c.

The *Carob-tree* (*Ceratonia siliqua*), a native of Palestine, produces pods which are formed into a pulp and thus used as a food, supposed to have been part of the meagre fare of John the Baptist, and so called *St. John's Bread*.

But Satan's popularity was greater than that of any of the Saints, if the number of plants to which his name is attached be a test of it, especially in Scotland, where there has always been a sneaking fondness for "the de'il, puir chiel." We have the

♥ *Deil's Bit* (*Scabiosa succisa*), which seems to have a bit bitten off its root, of course by the devil.

*Deil's Dung* (*Asafetida*), so called from its stench (German, *Duyvel's Dieck*—devil's dirt).

*Deil's Snuff-Box*, the common Puff-Ball, a fungus full of dust.

*Deil's Spoons*, the Great Water Plantain. The French call Bryony *Navet du diable*, or Devil's Turnip, on account of its bitter root.

III. The third head comprises names taken from the places from which plants are believed to have originally come, or the places to which they are most partial.

1st. From places of origin—

The *Cherry* and the *Chestnut* were named *Cerasos* and *Castana* by the Greeks, after two places in Pontus, Asia Minor; and our names of these fruits are derived from the Greek names.

The *Gean* or Wild Cherry (*Prunus avium*), come first from Guyenne, France (French name, *guigne*), probably brought by French nobles to Scotland by way of gift.

The almost imperishable *Cypress-tree* (*Cupressus sempervirens*), of which the walls of Constantinople were made, and which lasted 1100 years, owes its name to the Island of Cyprus, which also gives its name to copper.

*Rhubarb*, Greek ῥῆον βάρβαρον, or ῥᾶ or Volga plant, growing near that river, called by the Greeks (Rha) 'pā.

*Medick* clover, Greek μηδική, or Median grass, growing in Media.

*Dittany*, Greek δίκταμνος, from Mount Dicte in Crete, where it abounded.

The *Currant* came from Corinth; the *Damson* from Damascus.

The *Shallot* (kind of Onion), is named after the Philistine city Askalon, Greek Ἀσκάλων, well-known to every Scripture-reader—through French *eschalote*.

*Apple of Sodom* (*Solanum Sodomeum*), fruit said to be “fair to look upon” but full of rottenness, found near the Dead Sea. This name is given more often to a larger gall of attractive aspect from the same region.

*Ribston Pippin*, from Ribston in Yorkshire, where the first tree of this variety was grown in England.

*Guelder-rose*, from *Gueldres*, French spelling of the Dutch province of Gelderland.

The *Sheen* or *Fotheringham Plum*, because cultivated by the statesman Sir Wm. Temple at Sheen near Richmond, about 1700.

The *Quince* is named after Cydonia in Crete, but the name has undergone many changes before reaching us, beginning with the Greek κυδώνιος μήλεια, it has passed through Latin, Italian, and French until it has assumed the name *Quincé* (Trench : Study of Words).

2nd. From places where plants abound :—

The *House-leek*, grown on roofs of houses.

*Aconite* (Monkshood) Greek ἐν ἀκόναις, *i.e.*, on sharp, steep rocks.

*Origan*, wild marjoram, literally mountain-pride, from Greek ὄρος, mountain; and γάμος, beauty.

*Heather*, literally inhabitant of the heath.

*Wall-flower*, from preference for old walls.

*Midden-myliis* (*Chenopodium viride*), as growing on dunghills.

*Carmylie Clover* (*Prunella vulgaris*), called also *Self-heal* and *Heal-all*, from its supposed medicinal virtues; abundant at Carmylie, near Arbroath, and wherever the land is poor. This a purely local (Forfarshire) name, and conveys the popular opinion of the poverty of the Carmylie land.

IV. The fourth head is *Native Names*, or names that have been given to plants either (1) by the early inhabitants of Britain, or (2) in the countries whence the plants have come, and which they have carried with them to their new homes.

(1). Early British Names—most of our tree-names :—

Aspen, Birch, Elm, Fir, Hazel, Honeysuckle, Oak, &c.

The *Thorn* is in Anglo-Saxon literally the Piercer (Sanskrit root, *tar*, to tear.)

The *Apple*, both in nature and in name is almost identical all over the North of Europe. The Dutch, Swedes, and Germans give it practically the same name as ourselves, and the Russians.



call it *Iabloko*, evidently from the same root, which is found also in the Sanskrit *Abala*.

The family relationship of different countries in the matter of plant-names is even more fully illustrated by the case of

The *Sallow* (willow), Anglo-Saxon *Sealg*, named from growing near the sea or water; Icelandic, *selja*; Swedish, *sälg*; Danish, *selje*; Old German, *salohà*; Latin, *salix*; Gaelic, *saileach*; Irish, *sail*; Welsh, *helig*; Greek, *helike*; Sanskrit, *salila*.

Gaelic names continue in the *Gowan* (Gaelic, *gugan*), the yellow or golden flower; *Shamrock* (Irish, *seamrog*); *Michen* (Gaelic, *moiken*) the Perthshire name for the Common Spignel (*Meum Athamanticum*); *Spignel* is a contraction for *spikenaie*, from the shape of its capillary leaves; *Yew-tree* (*wibhar*); *Briar*; *Scalies*, or *skellochs*, Scotch for Wild Mustard (*sinapis arvensis*) is from the Irish *sgcallagach*, wild mustard.

*Canna down*, a Scotch name for the Cotton-grass, from Gaelic *cannach*, and the Scotch *down*, as it was formerly used in Forfarshire for stuffing bed-pillows.

(2). Names originally given in other countries and adopted here on the introduction or recognition of the plant. Out of many examples, we thus owe to the

Jews—*Cumin* and *Ebony*.

Persians—*Jasmin* and *Lilac* (literally *blue*).

Chinese—*Tea*.

Malays—*Mango* and the *Upas*.

Arabs—*Coffee* (which originally meant wine), *Cotton*, *Myrrh*, and the *Rose*.

Greeks—*Polyanthus* (literally *many-flowered*), *sycamore* (literally fig-mulberry), and the *Lotus*.

American Indians—*Potato*. The French and the Germans have rejected the native name and called it earth-apple, *pomme-de-terre* and *erd-apfel*, while the Italians call it *bianco tartufo*, or white truffle, from the likeness between a potato and a truffle.

West Indies—*Maize* and *Mahogany*, through the Portuguese, *Iphēcacuanha*, which means literally "the smaller roadside sick-making plant."

Mexican—*Cacao* and *Tomato*, literally the Love-apple, of which meaning Dickens made clever use in the famous trial of Bardell v. Pickwick, when "chops and tomato-sauce" conclusively pointed to love-passages.

Dutch—*Hop*, introduced from Holland in the 16th century.

(To be continued.)

A NEW LIST OF THE FLOWERING PLANTS AND FERNS OF  
ORKNEY.

EDITED BY W. IRVINE FORTESCUE.

(Continued from page 26.)

JUNCAEÆ.

LUZULA D.C.

360. pilosa Willd., "Dry pastures," D. & H.'s list, but no authority given; probably a mistake.
361. sylvatica Beck., B. Common by sides of streams and on the hills.
362. campestris D.C., B. Common.
363. multiflora Koch., B. Common.  
*b.* congesta, B. Common with above.  
*c.* sudetica, B. Common on heaths.

JUNCUS L.

364. triglumis L. Warthill, Orphir, above Naversdale, H.
365. conglomeratus L., B. Common.
366. effusus L., B. Common.
367. glaucus Sibth, "Wet places," H. Very doubtful.
368. acutiflorus Ehrh., B. Not uncommon.
369. lamprocarpus Ehrh., B. Common.  
*b.* nigritellus. Loch of Kirbuster, Orphir, B.
370. supinus Mœnch, B. Common.
371. bufonius L., B. Common.
372. Gerardi, Lois, B. Not uncommon.
373. squarrosus L., B. Common.

CYPERACEÆ.

SCHÆNUS L.

374. nigricans L., B. Not uncommon.

BLYSMUS PANZER.

375. rufus Link., B. Near Rackwick, Hoy, H. Wauk Mill Bay, Orphir. Local.

SCIRPUS L.

376. palustris L., B. Common in lochs and pools.
377. uniglumis Link. The Fidge, Swanbister, B. The only recorded station.
- 377A. pauciflorus Light. Harray, J.W.H.T.
378. multicaulis Sm. Marshes above Ryssa Walls, B. The only recorded station.

379. *cæspitosus* L., B. Common on the hills.  
 380. *fluitans* L., Walls, B. Loch of Knitching, Rousay, and  
 Lochs in Ophir, H.  
 381. *setaceus* L., B. Frequent, H.  
 382. *lacustris* L. Loch of Aikerness, Loch of Newark, Sanday,  
 Gillies. Doubtful. Loch of Bosquoy, in Harray, J.W.H.T.  
 383. *Tabernæmontani* Gmel. Burn of Scapa, D.

ERIOPHORUM L.

384. *vaginatum* L., B. Common.  
 385. *angustifolium* Roth, B. Common.

CAREX L.

386. *dioica* L. Scapa, B. Hoy, H.  
 387. *pulicaris* L., B. Common.  
 388. *pauciflora* Lightf. Rousay. Rare, H.  
 389. *incurva* Lightf, B. Pierowall Westray, D. Deerness,  
 opposite Copinshay, Links of Boardhouse, Birsay. Local.  
 390. *arenaria* L., B. Hoxa, Scapa, and probably elsewhere in  
 suitable localities.  
 391. *paniculata* L. Swanbister, B. The only recorded station.  
 392. *stellulata* Good., B. Common.  
 393. *ovalis* Good., B. Meadows Crantit, Foot of Hoy Hill, H.  
 Pickaquoy, Kirkwall, J.G.I. Howan in Birsay, J.W.H.T.  
 394. *rigida* Good., B. Hoy Hill, H. Rare.  
 395. *vulgaris* Fries., B. Common.  
 396. *glauca* Scop., B. Common.  
 397. *pilulifera* L. Ophir in several places, B. Rather scarce.  
 Harray and Birsay, J.W.H.T.  
 398. *præcox* Jacq., Dry pastures, H.  
 399. *panicea* L., B. Common.  
 400. *binervis* Sm., B. Common.  
 401. *distans* L. "Fidge, Swanbister, 1849, extinct? 1875," B.  
 402. *fulva* Good., B. Common.  
     *v. sterilis*, Swanbister, B. Naversdale.  
 403. *extensa* Good., "Fidge, Swanbister, 1849, extinct? 1875," B.  
 404. *flava* L., B. Common.  
     *b. lepidocarpa*, B.  
 405. *Oederi* Ehr. D. & H.'s list, but no authority given.  
 406. *ampullacea* Good., B. Common.

GRAMINACEÆ.

ANTHOXANTHUM.

407. *odoratum* L., B. Common.



## DIGRAPHIS TRIN.

408. arundinacea Trin., B. Common.

## ALOPECURUS L.

409. geniculatus L., B. Common.

410. pratensis L., B. Not uncommon.

## PHLEUM L.

411. pratense L., B. Not uncommon.

## AGROSTIS L.

412. canina L. Hoy Hill. 1880, B.

413. alba L., B. Common.

*b. stolonifera.* Sands in various places, H.

414. vulgaris With., B. Common.

*b. pumila,* B. Common.

## PSAMMA BEAUV.

415. arenaria R. &amp; S. Hoxa B. Sandy shores, Walls, Rothies holm, Sanday, &amp;c., H.

## PHRAGMITES TRIN.

416. communis Trin., Loch of Stennis, B.

*(To be continued.)*NOTES ON THE GENUS USNEA, WITH DESCRIPTIONS  
OF NEW SPECIES.*(Concluding paper.—Contd. from Vol. VI. p. 297.)*

By JAMES STIRTON, M.D., F.L.S.

*Chlorea malacea* sp. nov.—Thallus pallescens vel pallide lutescens vel ochroleucus, acute 1-3-costato-angulosus præsertim truncis primariis et scrobiculato-rugosus, sæpe annulato-ruptus, acute et longe ramosus, ramulis creberriter et longe fibrilloso-attenuatis, pendulus, elongatus (longit. 1-3-pedalis); apothecia spadicea, sat magna (latit. 2-5 mm.), truncis primariis plerumque sita; sporæ 8næ incolores, ellipsoideæ, simplices, 0.006-0.0085 × 0.004-0.005 mm.; paraphyses conglutinatae apicibus fuscescentes. Axis teres mediocris pallidus solidus, I cærulescens; fibrillæ medullares compactæ, albæ, K—C—; J—.

Ad truncos arborum in Chili, altit. 5000 pedum (T. & J. King).

Similar to *Ch. Pæppigii*, but differs in the spores, stems, &c. Only two or three detached bodies resembling spermatia have been detected, straight, cylindrical, 0.007-0.009 × circ. 0.007 mm.

Cephalodia, of an orange-yellow colour, are somewhat abundant, pitted and robose, containing gonidia of a smaller size than in the other parts of the lichen, and with scarcely any granular contents.

*Chlorea rigidula* sp. nov.—Thallus pallide lutescens vel albido-cinerascens elongatus, nonnihil angulosus præsertim infra et axillis compressus, ramosissimus, apicibus attenuatis et plerumque fibrilloso-contextis. Axis crassus vel crassiusculus, pallidus vel sæpe et præsertim infra pallide rufescens, solidus, fibrillæ medullares compactæ albæ, K flaventes dein rubentes vel rufo-ferrugineæ, J—. In montibus Nielgherrensibus (D<sup>re</sup> G. Watt) et in Canada ad Lacum Superiorem (Roy).

The Indian specimens are much more robust than those from Canada, and attain, at times, a foot in length; the axis is also thicker and denser, otherwise there is scarcely any other difference of sufficient importance to warrant a separation.

*Usnea maculosa* sp. nov.—Thallus cinereus vel luride cinereus, erectus compactus, rigidus, ramosus, subangulosus, lacunosos-impressus, creberriter nigro-maculatus. Axis solidus, mediocris; fibrillæ medullares compactæ albidæ, K—C—; J—.

In Chili a cl. J. King lecta.

The axis in this lichen is compact, almost corneous, but scarcely so well defined and distinct from the medullary fibres as in others of the genus. In the absence of fructification, I cannot, however, dissociate it from the members of the genus, nor can I refer it to any other order, although it presents several characters common to *Ramalina ceruchis*. The presence of an axis is a barrier, &c.

*Usnea himantodes* sp. nov.—Similis *U. longissimæ* sed truncis et ramis primariis lævigatis, teretibus sed hinc inde articulatis et longius parciusque fibrillosis. Thallus pallidus vel pallide cinerascens firmior, rigidior, pendulus, elongatus (pedalis, interdum ultra). Axis crassus (ut in *U. longissima*), fuscescens, J—; fibrillæ medullares parcæ, condensatæ, J cærulescentes, K flaventes.

Corticola in New South Wales Australiae (Kirkton).

A very characteristic lichen. The reactions by Jodine differ entirely from those by the same reagent on *U. longissima*, inasmuch as the axis is not affected, while the medullary fibres (which are scanty) are rendered by it an intense blue then violascent.

*Usnea undulata* sp. nov.—Thallus pallescens vel ochroleuco-pallidus undulatus, pendulus vel prostratus, elongatus (pedalis et ultra). Similis *U. longissimæ* et similiter fibrilloso-et divaricato-ramulosa. Truncus et rami primarii angulati et spiraliter

costati, læviusculi sed non evidenter vel tantum obsolete articulati. Axis crassus pallidus, J—; fibrillæ medullares J—, K flaventes dein rubentes.

Ad rupes in New South Wales Australiæ (Kirton).

Another very distinct lichen, having also affinities to *U. longissima*, but differing, as may be observed, in various respects.

*Usnea punctulata* sp. nov.—Similis *U. cavernosæ* (Tuck.) sed pallida vel pallide lutescens etiamque pallide rufescens. Axis filiformis: fibrillæ medullares K—C—; J—.

Prope Punta Arenas Patagoniæ, a cl. J. King lecta.

In *U. cavernosa* the thallus is glaucescent, while the axis is thickish and the medullary fibres are tinted yellow, or even orange by K.

*Usnea rubescens* sp. nov.—Similis *U. rubrotinctæ* (vide *Scot. Nat.*, Julio, 1881) sed pendula? vel prostrata, elongata (interdum pedalis). Thallus cinerascenti-pallidus, passim rufo-ferrugineus. Axis mediocris vel crassus, pallidus, K passim rubromaculatus; fibrillæ medullares albidæ compactæ J—, K flaventes dein rubentes.

Ad rupes in New South Wales Australiæ.

This lichen tends to merge into a rufo-ferrugineous colour, especially after being retained for a time in the herbarium.

At page 294 of *Scot. Nat.* for July, 1882, is described *U. comosa*. As this name had previously been assigned by Acharius to a form of *U. florida*, it becomes necessary to change it. Let the *Usnea* there described be now called *U. chætophora*.

Under this I possess another from Australia which may be ranked as a sub-species.

*Usnea chætophora* (Strn.), *subsp. propinqua*.—Similis typo sed robustior, crassior et minus ramosa. Thallus pallescens et ad ochroleucum mergens.

In Victoria Australiæ a cl. H. Paton lecta.

*Usnea protensa* sp. nov.—Similis *U. subsordidæ* (Strn.) sed robustior et pendula, longitudine (.5-1)-pedalis.

Prope New Galloway Scotiæ a cl. J. M'Andrew lecta.

*Usnea lorea* sp. nov.—Thallus albido-cinerascens vel sordide flavescens, teres, elongatus, pendulus, acute ramosus et ramulosus, ramulis sæpe curvulis vel cirrhatulis concoloribus, sat crebris, passim fibrillosis. Axis crassiusculus pallidus solidus; fibrillæ medullares compactæ albæ vel albidæ, J cærulescentes dein violascentes, K flaventes. Ad ramulos arborum in Montibus Himalayis (Sikkim) a D<sup>re</sup> G. Watt lecta. The blue



reaction by J. is brought out much more vividly if there has been left on the ivory-rod a trace of K previous to the rod being dipped into the solution of Iodine.

*Usnea Pangiana* sp. nov.—Subsimilis *U. Himalayanæ* (Bab.) sed robustior rigidior. Thallus sordide cinerascens et partim pallide lutescens. Axis mediocris pallidus vel pallide fulvescens præsertim infra; fibrillæ medullares et axis K flaventes dein intense rubentes; J—.

In Himalaya alt. 6-8000 pedum (G. Watt).

*Usnea molliuscula* sp. nov.—Similis *U. Thomsoni* sed pallida vel lutescenti-pallida. Sporæ 8næ late ellipsoideæ, simplices, .009-011 x .007-008 mm. Discus apotheciorum K—C flavens.

In Victoria Australiæ (M'Cann), haud rara.

*Usnea foveolata* sp. nov.—Thallus cinerascens vel sordide cinerascens rotundatus foveolato-scrobiculosus, rigidus, ramosus et divaricato-fibrillosus (præsertim infra). Axis tenuis vel mediocris, pallide rufescens; fibrillæ medullares J—, K flaventes dein rubentes. In Africa australi (D<sup>re</sup> J. Shaw). Until I have further evidence I cannot associate this lichen with *U. lacunosa* (Willd.), more especially in the face of such manifest discrepancies.

*Usnea pectinata* sp. nov.—Thallus pallidus, pallide ochroleucus, vel glaucescenti-pallidus, rigidus, erectus (altit. 5-2-pollicum) acute et parce ramosus, densissime et rigide ramulosus vel fere pectinatus. Axis crassus, densus; fibrillæ medullares, K—C—; J—. Thallus (extus) K—C bene flavens. In Africa australi prope Somerset East, a Prof. P. MacOwan lecta, et in Australia passim.

*Usnea xanthophana* sp. nov.—Similis *U. floridæ* et similiter ramosa, &c., sed differt colore ochroleuco-pallido et thallo lævigato (K—C flav.) In Monte Tararua, N. Z., sat frequenter (Buchanan).

I have been tempted to separate the N. Z. plant from that of the northern hemisphere, owing to the striking contrasts in colour and appearance.

*Usnea flexilis* (Strn.)—var. *intestiniformis* (Strn.)—Differt colore fusco-rubescente, truncis et ramis primariis magis inflato-articulatis, etiamque extremitatibus magis fibrilloso-ramulosis. Axis tenuissimus pallidus: fibrillæ medullares K flaventes dein rufo-ferrugineæ, J vinoso-violaceæ.

Ex hb. Ind. Or. Hook. fil. et Thomson (No. 1720).

I think it necessary, before concluding this paper, to give one

or two cautions as to the use of the reagents employed towards the discrimination of species, and

1st, as regards K and J.

In those instances where K gives an orange or red reaction on the medulla, the faintest trace of a solution of K on the quill or stick of ivory used in the application of the reagents, before dipping it into the solution of Iodine, will serve to develop at once a beautiful vinoso-violascent colour, whereas, if the quill or ivory had been previously entirely free of K no reaction would have ensued, or, as the case may be, only the usual blue reaction.

2nd. The solution of Iodine requires to be frequently renewed in order to get the reactions developed, otherwise, apparent discrepancies will result, in other words, a solution of Iodine retained for a length of time, and especially if exposed much to sunlight, besides becoming weakened, will often prove powerless as a reagent, where previously a characteristic blue with its consequent violaceous tint had resulted. It cannot be denied that the reactions by Iodine on the medulla are somewhat uncertain even when every care has been taken in the preparation of the solution. How to account for this has engaged my attention for some little time, but I have failed to arrive at any satisfactory explanation of the difficulty. Probably chemical changes in the constitution of the gelatine will ultimately account for such differences in the reactions—changes induced during the process of decay and disintegration. The abstraction or rather addition of the elements of water in starchy compounds is well known to occur under such very slight differences of external conditions as are implied in varying degrees of moisture and temperature, and it is not unlikely that an explanation may be afforded by experimenting in this direction. Be this as it may, I have no hesitation in stating my convictions of the importance of attending to chemical reactions as factors in the discrimination of such simple structures as Lichens.

The opponents of this means of investigation are certainly in the minority, and as time goes on their ranks are thinned by desertion. Even Professor Tuckerman of Amherst, U.S., one of the most inveterate enemies of such tests is fain to seek, in more than one instance, an additional characteristic for his species by means of such reagents, more especially when the true botanical distinctions are of somewhat doubtful significance. It is true he usually appends a note by way of excuse for so acting, for the purpose, it may be, of keeping up an honourable consistency.

Professor Müller of Geneva is, however, the only one of the more modern Lichenologists who utterly repudiates their use, and on more than one occasion he has written to me in no measured language of his abhorrence of such means of discriminating species. In order to obviate the necessity for their use he is in the habit (latterly at least) of giving such refined distinctions as are implied in comparisons of length, breadth, size, colour, hardness, smoothness, &c., &c., that the reader is confused and ultimately perplexed instead of enlightened as to what he means—nay, so minute and elaborate have his diagnoses become that they can only apply, in their entirety, to individual specimens. As it is, the subject of Lichenology (certainly the most difficult of the divisions of botanical science) is fast becoming clouded instead of elucidated by writers, each of whom is pursuing his pet line of investigation independently of, and often in direct opposition to, his contemporaries. A state of matters which, by the way, is not without a parallel in other sections of botany, and kindred branches of pure science. When all this is to end is beyond me. Sooner or later, however, a reaction must take place. One way out of the maze would be to hold a conference of botanists, or better still, to submit all the known or alleged species and varieties of one genus, *seriatim* to all who have written on it or described species under it, and afterwards to compare results. In the interests of botany I, for one, would gladly hail any such proposal.

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### HETERŒCISM IN THE UREDINES.

By J. W. H. TRAIL.

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OF late years much has been written, and many observations and experiments have been made, by Continental botanists with a view of, in some measure, throwing light on the uncertainty that still enshrouds the reproduction and the cycle of development of this group of Fungi. The problem is one of no slight practical value, relating as it does to some of the most wide-spread and hurtful parasites of farm produce; yet despite its great economic importance, and despite the almost universal diffusion of these Fungi, there are few problems in the range of Botany that have been more keenly debated, or that have found more strenuous defenders for both sides of the question in dispute.

It is doubtless known to most of our readers that there has long been a suspicion that the "rusts" on the cereals are only one stage in the life-history of the parasites, and that during a part of their existence they live on other plants under a somewhat differ-



ent form. It is long since the belief gained ground among farmers in some parts of England that there was some connection between the abundance of Barberry bushes in any locality, and the prevalence of disease in wheat in the same locality; but it was only at a comparatively recent period that the suggestion was offered of a possible genetic relationship between *Æcidium Berberidis*, the fungus that causes the orange spots on Barberry leaves, and *Puccinia graminis* (the "black rust"); and *Uredo linearis* (the "red rust"), of wheat.

That such a connection should exist at first sight appears improbable, and for its acceptance ample proof would require to be advanced,—the result of continued and careful experiments under conditions such as to exclude the possibility of error. Yet, however improbable it may appear at first sight, it must be borne in mind that an analogous course of development is undergone by the animal parasites belonging to the group of Entozoa or parasitic worms; many of which in the course of their life-history require to pass from the body of one animal into that of another, as in the case of the *Echinococcus* of "hydatids" in the human liver, which develops into *Tænia Echinococcus* in the intestine of the dog; or the still more remarkable development of the "liver-fluke" of the sheep (*Distoma hepaticum*), which passes part of its cycle of development in the body of a pond-snail (*Limnæa truncatula*). A somewhat analogous condition is met with among the insects of the group of Aphides. *Brachycolus Stellariæ*, among the Aphides of Scotland, affords a good example of this change of food-plants, as it may be found in early summer on Caryophyllaceous plants (*Stellaria*, *Cerastium*, &c.), but later in the year it lives on *Holcus* and other grasses; on all the plants attacked by it causing pseudo-galls composed of imbricated crowded fleshy leaves. Such facts may well induce caution in rejecting the theory of the *Heterocism* of the Uredines without full inquiry.

Such caution is seen to be needful also if we remember the frequency with which the *Æcidia* are associated with *Uredo* and *Puccinia* when, as often occurs, all these forms of parasite are met with on a single host-plant, an association so close in some cases that they occur in the same spot. In such cases the inference would seem natural that there is a genetic relationship between the different forms of fungi. But in these cases in which only one of the forms is known to occur on a host-plant, and where consequently the cycle, if such is gone through, must be passed through in part on a different plant, the difficulty of following the development through all its stages is very greatly increased; and the evidence required to prove the existence of the cycle must be stronger. The necessary proofs can be obtained only by careful, repeated, and continued experiments, from which, to the utmost extent possible, the risk of error has been eliminated.

The subject has met with far greater attention, and the experimental method has been far more largely followed, by Continental

than by British botanists ; and the theory of Heterœcism has been far more widely adopted by the former than by the latter as the best explanation of the facts, and as in harmony with the results of experiment.

But in 1881 and 1882 Mr. C. B. Plowright has occupied himself with numerous experiments, with the view of corroborating or disproving the statements and experiments of Continental mycologists ; and he has published the result of his experiments, and the conclusions to which they have led him, in *Grevillea*, Vols. X. and XI. These conclusions are in agreement in general with those prevalent elsewhere, and embodied in Winter's "Die Pilze" in Rabenhorst's "Kryptogamenflora," new Ed. In a subject of so great interest, alike as a scientific and as a practical problem, and one in regard to which the published records of experiments are few in the English language, a somewhat detailed recapitulation of Mr. Plowright's results may be given with advantage, and will, we believe, be welcome to the readers of this magazine.

His experiments in 1881 were conducted entirely on *Æcidium Berberidis* and *Puccinia graminis*, with a view to convince himself one way or the other in regard to the connection said to exist between these fungi. The result of the experiments of that year was that in thirteen sets of experiments where seedling wheat-plants were grown, and half of each set infected with pores of *Æc. Berberidis*, while the other half were kept as far as possible free from infection as check-plants, *Uredo linearis* developed itself on the infected plants in twelve of the sets, but also upon the check-plants in eleven of the sets ; and in consequence he was hardly able to believe in proofs being obtained, sufficiently reliable, of any genetic relationship such as had been asserted to exist.

In 1882, however, he continued his experiments in the same direction, and extended them to other fungi of the same group, alleged to show similar cycles, with the result that "overwhelming evidence of the Heterœcismal nature of several species was forthcoming."

"In these cultures various and less common Uredines were employed, so that the error of accidental sporadic infection, it is scarcely possible to believe, could have taken place, time after time, with species after species. To take for instance the *Ræsteliæ*. On every occasion upon which I have infected hawthorns with *Uodisoma Juniperi*, and pears with *P. Sabinæ*, the corresponding *Ræsteliæ* have been produced. Now both these *Ræsteliæ* are very uncommon plants near King's Lynn. With *Gymnosporangium* upon mountain ash, four out of five cultures were successful, which is the more noteworthy when it is remembered that the *Gymnosporangium* was sent from Forres, in the north of Scotland (some 400 miles away), by my friend the Rev. James Keith, it being a plant that does not grow in this district.

"All the cultures of *Puccinia graminis* on Barberry were success-



ful, the control plants remaining free from the fungus. With *Æcidium Berberidis* on wheat, the three experiments performed were all entirely successful, the check-plants remaining free from the fungus. Both the infected and the control-plants in these last-named experiments were raised under bellglasses, and covered by them continuously, except for the few minutes necessary to perform the infection, until the end of the experiment, so that the source of error from accidental atmospheric infection was reduced to a minimum.

“The culture of *Peridermium Pini* on the common Groundsel (*Senecio vulgaris*) has with me been one of the most difficult to perform. After several successive failures, however, I succeeded in two instances in producing the *Coleosporium*.

“By the infection of *Poa annua* with the spores of *Æcidium Tussilaginis*, the *Puccinia Poarum* of Nielsen was in three out of four cultures produced—a *Puccinia* hitherto unknown in Britain.

“Perhaps the most interesting of the series, however, was the production of *Æcidium zonale* on *Inula dysenterica* (also a fungus new to the British flora) by infection with *Uromyces Junci*. This was successful in every experiment. The actual demonstration of this Heterœcism had not hitherto, I believe, been made, although Fuckel had the strongest ground for believing it to exist. In one of these experiments some fragments of *Juncus obtusiflorus*, with numerous pustules of *Uromyces*, in active germination, on them, were placed upon the upper leaves of a plant of *Inula dysenterica*; in the course of ten or fifteen days these leaves began to show the yellow spots, which were the forerunners of the *Æcidium*. By his time the plant had grown taller, and had developed fresh leaves above those on which the *Juncus* had been placed. The fragments of *Juncus* were then removed from the leaves, on which they had been in the first instance placed, to the healthy, recently expanded leaves above, where in due course the *Æcidium* was developed. It was very interesting to observe how the *Æcidium* could thus be produced in successive crops.”

In the article from which the above quotations are taken (*Grevillea*, Vol. XI., pp. 52-57), the details of these experiments are described, from which it appears that the fungus showed signs of its presence often in a few days, and usually became fully formed in from one to two months after infection of the host-plant. In the same paper are described similar experiments, with a like result, made on *Puccinia Caricis* and *Æcidium Urticæ*, the *Puccinia* spores off *Carex hirta* causing the appearance of *Æc. Urticæ* on *Urtica dioica*, and conversely the *Æcidium* spores so produced, when laid on *C. hirta* giving rise to *Uredo Caricis* on it: on *Puc. Magnusiana* and *Æc. Rumicis*; *Rumex Hydrolapathum*, infected with *Puccinia* from leaves of *Phragmites communis* producing *Æc. Rumicis* (the same treatment of *Rumex obtusifolius* produced no result); and on *Æc. Rhamni* and *Puc. coronata*,



seedlings of the common oat infected with *Æcidium* spores from *Rhamnus* producing the Uredo of *Puccinia coronata*.

That these experiments are very remarkable in the uniformity of their results, and that they afford, in the hands of so careful an observer as Mr. Plowright, a very strong support to the theory of Heterœcism, cannot be disputed; and yet they raise other difficulties by their very success. It is very hard to see why, for example, *Æcidium Tussilaginis* should be so common, while its alternate form, *Puccinia Poarum* on this theory, had not previously been recorded from Britain, though both host-plants are extremely common; and this is but one case out of many in our present knowledge, or rather ignorance, of the life-history of the Uredines. Again, *Puccinia graminis* is known to be exceedingly injurious to wheat in places where Barberries are few and widely scattered, or even where they do not occur. From the analogy of the *Entozoa* among animals, it would naturally be expected that for the welfare of heterœcious fungi both host-plants ought to be within reach of the spores; and that the fungus would soon disappear from any locality unfavourable in this respect. It would also be only natural to suppose that it should occur, of course in its corresponding generation, in proportionate frequency on both host-plants, yet we see that such is not the actual state of matters. It is evident that our information as yet is very fragmentary, and that there is great need of further observations to throw light on the darkness that still surrounds these fungi.

Throughout the vegetable kingdom, as all botanists are aware, the most useful and reliable characters on which to found the classification of any group are those obtained from the modes of development and reproduction. Hence it is only what may be looked for that the relations claimed to exist between the various forms of spores in the Uredines, and the cycle of development indicated in such experiments as Mr. Plowright's, should be made the basis of a classification to supersede the very unsatisfactory one that has gradually grown up in that group, and that an attempt should be made to establish somewhat more natural genera than has been possible hitherto. Accordingly, we find that in the latest work treating of the Uredines of Central Europe (Winter's "Pilze" in Rabenhorst's "Kryptogamen-flora von Deutschland, Oesterreich und der Schweiz"), they are broken up into genera on this basis, and that the number of genera is considerably reduced, while at the same time they are better characterised and more readily recognised than in earlier works. Necessarily there are many points that must yet be worked out before we may hope for a perfectly satisfactory system of grouping these plants, and a good deal may be said still on both sides of the vexed question of Heterœcism; but enough is known, and admitted by all, to prove that many of the fungi that have been described, and that are still retained in systematic works on these plants, as distinct species

of a distinct genera or even of distinct families, are only different stages in the development of other so-called species; and there is good reason to hope that our knowledge of them is in a fair way of being cleared of much that is only an obstacle, though perhaps unavoidable when introduced.

In such a group as the Uredines the most natural classification is a most difficult problem to solve, and it carries with it the further difficulty that, owing to the various forms of spores having received names as distinct species, almost all the fungi have several names from this source, over and above the natural source of such names from error or ignorance on the part of later writers as to the species described by their predecessors. It becomes therefore a point of great consequence in the nomenclature to ascertain fully, and on sufficient grounds, what ought to be regarded as the perfect stage of each fungus; as the name given to it in that condition ought to be retained as the future name, the others being dropped as synonyms of that name.

Unfortunately, the most trustworthy character derived from the modes of reproduction—viz., the sexual reproduction—is unknown to us yet in the group; hence it is an open question which stage shall be held for the purposes of systematic botany to be the more perfect. There is a pretty general tendency to decide in favour of the form producing the teleuto-spores, hence that is made the basis of the classifications generally that recognise Heterœcism. However, there is something to be said in favour of the belief that the sexual individuals in the cycle may be those producing æcidia and spermogonia, and that these consequently form the more perfect condition, and that therefore the nomenclature should be taken from them.

Be that as it may, it cannot be without value to compare our own lists with Winter's classifications; and with this object the following list has been drawn up. In it the names and arrangement employed in his work have been adhered to in each genus. After each species, in brackets, follow the number and the name by which the same species is distinguished in the *Mycologia Scotica*, or in the supplementary lists that have appeared in this magazine. Where several numbers and names follow one of Winter's they are all referred by him to one species, either as varieties, or as being only forms in the development of the same fungus. In some cases it will be observed that only one stage in the alleged cycle has yet been found in Scotland. A few species are included also that have been detected with us since the last supplementary list was published. A careful comparison of the results tabulated in this way cannot but prove instructive, for whether the classification at present favoured on the Continent may prove in its main features to be correct, or may itself be superseded, we may profit by the questions suggested for and against the beliefs on which it rests. That these questions are of much interest must be self-evident to us all.

(*To be continued.*)



MYCOLOGIA SCOTICA.

BY REV. J. STEVENSON.

(Continued from S. N., Vol. I., page 37.)

2282. *Puccinia paliformis* Fckl. (*Symb. Myc.* p. 59. *Winter, Pilze*, p. 224.)

Sori epiphyllous, small, usually sunk in grooves of leaf, rounded or oblong, dark brown to black; spores crowded, both forms often on same leaf, on moderately long pedicels. Uredo-spores round or ovate, rather thin-walled and pale to chestnut-brown, .020-.028 u. diam. Teleuto-spores subcylindrical or spindle-shaped, slightly constricted in middle, wedge-shaped at base, conical, or almost truncate at apex, which is considerably thickened, .036-.040 u. long, by .016-.020 u. thick (German examples are .023-.052 by .010-.016 u.), colour some shade of brown more or less deep. J. W. H. Trail.

On *Kœleria cristata* L. Oct.

East.	—	—	—	Dee	—	—
West.	—	—	—	—	—	—

Links near Aberdeen. Professor J. W. H. Trail.  
Europe.

2233. *Thecaphora Trailii* Cke. *Grevillea*, Vol. XI., p. 155.

Developed in the florets, purplish-brown, pulverulent. Spores globose, usually in fours, rarely 2 or 3, compressed on the inner face; epispore finely verruculose.

Having very much the habit and appearance of *Ustilago Cardui*, but differs in being a true *Thecaphora*, and in the epispore being verrucose and not reticulate.

On *Carduus heterophyllus*.

East.	—	—	—	Dee	—	—
West.	—	—	—	—	—	—

Braemar. Professor J. W. H. Trail.

2284. *Ramularia cochleariæ* Cke. *Grevillea*, Vol. XI. p. 155.

Epiphyllous, orbicular, white. Spots pallid. Spores elongate-cylindrical, rounded continuous, hyaline. .025-.028 × .0035 u.

On leaves of *Cochlearia officinalis*.

East.	—	—	—	Dee	—	—
West.	—	—	—	—	—	—

Banks of Don, near Aberdeen. Professor J. W. H. Trail.

\* *Fusidium geranii* West. *Bull. d. Brux.*, 1851, p. 413. *Grevillea*, Vol. III., p. 184 (= *Conidia* of *Stigmatea Geranii* Fr. *Mycol. Scot.* No. 1910).

Spots brown, rounded, scattered, rather irregular, con-



fluent and undeterminate, occupying the greater part of the leaf. Spores cylindrical-oval, with one or two nuclei or pseudo-septate. *Cooke Fungi Britt., No. 685.*

On *Geranium silvaticum*. July. Forres. Rev. Dr. Keith.

2285. *Mucor phycomyces* Ehb. *C. Hbk. No. 1882.*

On cat's dung.

East.	—	Forth	Tay	—	—	—
West.	—	—	—	—	—	—

England. Europe. America.

2286. *Syzygites megalocarpus* Ehb. *C. Hbk. No. 1900.*

On decaying Agaric. Sep.

East.	—	—	—	—	Moray	—
West.	—	—	—	—	—	—

Forres. Rev. Dr. Keith.

England. Europe. America.

2287. *Peziza (Peltidium) Oocardii* Kalchbr. *Karst. Myc. Fen. Pt. I., p. 84.*

Apothecia scattered or gregarious, sessile, orbicular, roughish, from pallid turning brown or rufous-brown, becoming black when dry; epithecium slightly convex or nearly plane, collapsing in drying, 4-5 u. broad. Asci elongate-cylindrical, 380-390 u. long, 12-20 u. thick. Sporidia monostichous, ellipsoid, containing two large sphaeroid nuclei, or with one thin spurious septum, 14-19 u. long, 9-10 u. thick. Paraphyses numerous, articulate below, faintly yellowish-sordid, 5-6 u. thick with the apex sometimes clavate and 8-10 u. thick.

On wet rotten birch wood. Nov.

East.	—	—	—	—	Moray	—
West.	—	—	—	—	—	—

Darnaway. Rev. Dr. Keith.  
Europe.

2288. *P. electrina* Phill. & Plow. *Grevillea, Vol. VIII. p. 155.*

Gregarious, minute, subgelatinous, glabrous, amber-coloured, disc concave, marginate; stem rather short, firm; asci narrowly clavate, pointed at the summit; sporidia 8, biseriate, cylindraco-fusiform,  $005 \times 001$  u.

Intimately associated with *Dacrymyces succineus* Fr. The cups are 1.5 mm. across, paler on the margin; the stem is generally darker at the base.

On decaying leaves of *Pinus Silvestris*. Sep.

East.	—	—	—	—	Moray	—
West.	—	—	—	—	—	—

Rothiemurchus. C. B. Plowright.

2289. *Cenangium subnitidum* Cke. & Phill. *Grevillea, Vol. III., p. 186.*

Gregarious, erumpent, turbinate, becoming patellate, blackish-brown; disc ( $\frac{1}{2}$ -1 u.), marginate, depressed, then plane or convex, externally naked, opaque or somewhat shining. Asci clavate-cylindrical; sporidia narrowly elliptical, curved, binucleate, pale amber colour ( $\cdot 015 \times \cdot 005$  u.) The sporidia are probably at length uniseptate.

On hazel branches.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith.

North Wales.

2290. *Ascobolus (Ascophanus) subfuscus* Boud. *Ann. Sc. Nat. Vol. X., p. 242.*

Crowded, rarely scattered, very minute, externally brown, paler downwards, disc pale brown, darker when dry; asci 8 spored.

Receptacle hemispherical, externally glabrous, brown, fainter at the base; margin irregular, inflexed, becoming dark brown when dry; disc plane, pale or pale-tawny, papillate with the asci. Paraphyses of the length of the asci, simple or divided at the base, pyriform at the apex, hyaline, but in darker coloured specimens brownish. Asci short, hyaline, large, attenuated towards the base. Sporidia oblong-ovate, subfusiform, hyaline, rather small.

On cat's dung. April.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith.

Europe.

2291. *Ombrophila brunnea* Phill. *Grevillea, Vol. VIII. p. 103.*

Crowded, sessile, or sub-stipitate, concave, than expanded, becoming flexuous, yellowish-brown, glabrous disc darker than margin; asci cylindrical; sporidia 8, ovate oblong, rough bi- or multi-nucleate,  $\cdot 016\text{-}\cdot 02 \times \cdot 005\text{-}\cdot 008$  u.; paraphyses enlarged at the summits, adhering.

On damp garden prunings. July.

East.	—	—	—	—	Moray.	—
West.	—	—	—	—		

Greeshop. Rev. Dr. Keith.

2292. *Ascomyces deformans* Berk. *C. Hbk. No. 2233.*

On peach leaves. May.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Forres. Rev. Dr. Keith.  
England. Europe. America.

2293. *Taphrina aurea* Fr. *Obs. Myc.* I. p. 207., (= *Erineum aureum* Grév. *Scot. Crypt. Fl.* t. 33; *Monogr.* of genus *Erineum*, p. 81. t. III. f. 15.)

Spots on either surface of leaf, occupying a depression, yellow; under the microscope consisting of cylindrical or clavate cells side by side, wedge-shaped below and each inserted between two epiderm cells for about  $\frac{1}{4}$  of its length; cell contents yellow, after a time converted into numerous rounded or elliptic spores. Mycelium absent.

On leaves of *Populus nigra*. Common.

East.	—	—	—	Dee	—	—
West.	—	—	—	—		

Professor J. W. H. Trail.  
Europe.

2294. *Schinzia alni* Woron. *Mem. Acad. d. Sc. Nat. St. Petersb.* 1866., t. X., No. 6.

Causes swellings that form masses from  $\frac{1}{4}$  to 2 or 3 inches in diameter on roots of alders. Each swelling consists of crowded outgrowths often branched dichotomously, ending in short, warty, cylindrical, truncate branches. In the inner cells of the hypoderm the fungus bores its mycelium, and forms in the cells swellings on the threads, which become crowded into a dense mass filling each cell.

(Imperfectly known; classed by Fuckel under *Chytridiei*).

On the roots of *Alnus glutinosa*.

East.	—	—	Tay	Dee	Moray	—
West.	—	—	—	—		

Professor J. W. H. Trail.  
Europe.

- \* *Rhytisma acerinum* Fr., forma *punctatum* Fr.

On *Acer pseudo-platanus* L. Near Aberdeen. Professor J. W. H. Trail.

*Rhytisma punctatum* Fr., was formerly given as a separate species (C. Hbk. No. 2280. S. Mycol. Scot. No. 1788), though a doubt was expressed in "Handbook" whether they were really distinct. There can be no doubt that *R. punctatum* is merely a form of *R. acerinum*.

#### EPHELIS.

Stroma crustaceo-effused, here and there tuberculose, tubercles dehiscing into cup-shaped excipula. *Fr. Veg. Scan.* p. 370.



This genus was formed for the reception of one species—*Ephelis typhina* Fr.—from Mexico, and differs from *Rhytisma* in the prominent cup-shaped receptacles formed from the black superficial stroma.

2295. *Ephelis radicalis* (Cooke) Phill. & Keith. *In Litt. Rhytisma radicale* Cke. *Grevillea*, Vol. VIII. p. 9.

Cups substipitate, crowded, black, rugose (under a lens); disc concave, cinereous; asci cylindrical; sporidia 8, oblong ovate, trinucleate,  $0.1 \times 0.04$  u.; paraphyses filiform, or slightly thickened upwards.

Forming black swollen patches at the base of dead stems of *Rhinanthus crista-galli*. Cup developed in April.

East.	—	—	—	Dee	Moray	—
West.	—	—	—	—	—	—

Forres. Rev. Dr. Keith. Near Aberdeen. Prof. J. W. H. Trail.

2296. *Dothidea trifolii* Fr. *C. Hbk. No. 2416.*

On *Trifolium medium*. Aug. Sep.

East.	—	—	—	—	Moray	—
West.	—	—	—	—	—	—

Grantown. Rev. Dr. Keith.  
England. Europe.

2297. *Diatrype verrucæformis* Fr. Var. *Tocciana* De Not. *Grevillea*, I. p. 155.

Pustulæform, subhemispherical, depressed at the apex, fuscous, soon naked. Perithecia 3-6, seldom more, spheroid, with a short neck. Asci clavate, very much elongated at the base, polysporous.

Sporidia minute, spermatoid.

On Alder. May.

East.	—	—	—	—	Moray	—
West.	—	—	—	—	—	—

Forres. Rev. Dr. Keith.

2298. *D. pyrrocystis* B. & Br. *C. Hbk. No. 2441.*

On Hazel. May.

East.	—	—	—	—	Moray	—
West.	—	—	—	—	—	—

Forres. Rev. Dr. Keith.

(To be continued.)

ON THE OCCURRENCE OF RUBUS IDÆUS, VAR. LEESII BAB.,  
NEAR ST. ANDREWS, FIFESHIRE.

By W. F. MACTIER, M.D.

(To the Editor of the *Scottish Naturalist*.)

SIR,—I have the pleasure to send you specimens of the *Rubus Idæus* var *Leesii* of Babington, gathered last week in this neighbourhood. I found the plant for the first time in June of last year, and sent a note of the circumstance to the Botanical Society of Edinburgh, before which it was read at their meeting on the 9th November, and afterwards published in the *Gardeners' Chronicle* of 25th Nov., 1882, to which I refer any one interested in the subject. As, however, this paper may not be in the hands of all your readers, it may be worth while to call their attention to the plant, in order that they may be on the look out in their own districts. Though not I believe hitherto noticed in Scotland, I cannot but think it may be of more frequent occurrence than we are aware of, and that it may only require to be looked for, especially in the north (Deeside?) where the common Rasp is so very abundant.

You will notice (as I have mentioned in my paper) that the annual shoots differ materially from the flowering ones, and that it is only in the second year that the leaves assume the simple rounded form which is so characteristic of the plant. Besides this form, I noted a good many plants in which the departures from the typical *Idæus* were much less marked. In these the leaves are trifoliolate, but the leaflets more or less rounded. A sort of transition in fact between the two. In acknowledging specimens of *R. Leesii* sent to him, Professor Babington writes on the 28th November last: "It is certainly a very singular barren form of *Idæus*, and curious that it should be formed as simple plants, spreading by underground stems, in such distant parts of W. Europe. *Rotundifolius* connects it with the typical plant." With reference to this, I am disposed to think that we have here both varieties.

ST. ANDREWS, FIFE, 28th July, 1883.

SCOTTISH GALLS.

IN addition to the numerous forms already described by myself in the *Scottish Naturalist*, I have met with a good many during the past year, and one or two this summer, not recorded previously from Scotland; others have kindly been sent me by friends. Of a few I can find no record in any articles on Galls and their makers accessible to me. As might be expected, the new forms are chiefly inconspicuous, being the work of mites (*Phytoptus*), or of *Anguillulidæ*. Of these "worm-galls" I have found examples on *Hypochaeris radicata*, *Hieracium Pilosella*, *Plantago maritima*, and *P. lanceolata*, in addition to those formerly recorded by me on grasses. Some of the additions to my list are the work of *Cynipidæ* on oaks, and one or two are galls of *Cecidomyidæ*, on *Cardamine pratensis* and other plants. Descriptions of the various galls not in my former lists will appear in due course. My present object is to say that any assistance in working out the distribution of galls in Scotland will be most welcome; and that I shall be most happy to see and to name any specimens from any part of Scotland; and to assist, as far as I can, any one that may commence the study of these structures.

JAMES W. H. TRAIL.

## MEETINGS AND PROCEEDINGS OF SCOTTISH SCIENTIFIC SOCIETIES.

### MEETING OF NORTHERN SCIENTIFIC SOCIETIES AT BANFF.

THE meeting this year, the third that has now been held by the combined societies of the North of Scotland, was held at Banff on the third and fourth August; and proved very successful, being much enjoyed by those able to be present at it. There were present representatives from the following societies and field clubs:—Aberdeen Natural History Society, Alford Field Club, Banffshire Field Club, Caithness Field Club of Deer, Edinburgh Geological Society, Elgin Literary and Scientific Association, Huntly Field Club, Inverness Scientific Society and Field Club, Gaelic Society and Literary Institute, Keith Field Club, Nairn Literary Association, and Ross-shire Philosophical Society.

The meeting opened on Friday afternoon with a visit to the Banff Museum, where the visitors were welcomed by the President of the Banffshire Field Club, after which they were shown the chief objects of interest in the museum. The inspection occupied about half an hour, after which the company divided into two parties, of which one visited Duff House, while the other visited the chief places in the town and the Castle. An evening meeting was held at 6.30 p.m. in the Academy Buildings, under the presidency of Mr. A. Ramsay, and was well attended. A number of papers were read: some of them were on antiquarian studies in the North of Scotland, and therefore need not be referred to more fully in this report. The following papers relate to subjects that fall within the scope of this magazine:—

1. "The Flora and Fauna of Keig" (in Aberdeenshire), by Rev. Thomas Bell. Mr. Bell finds in the parish 290 Phanerogams, 10 Ferns, 4 Lycopods, 2 Equiseta, and 91 Mosses. Of these none require special mention here. In the Fauna he finds that 71 species of birds have been observed, and that of these 49 are permanent residents, 18 are summer visitors, and 4 come in winter. Of butterflies 15 species have been taken, and he has also taken a considerable number of spiders, the rarest being *Salticus scenicus* and *Epeira conica*. He also remarked on the existence of *Formica rufa* in Castle Forbes Woods, as being the furthest point east known to him where these ants occur in the district; the nests are to be found by scores, and are in some cases as much as 4 feet high, and 25 to 30 feet in circumference.

2.—A paper was read on the "Nudibranchiate Mollusca" of the Moray Firth, by Dr. A. Sutherland, Invergordon. The author stated that the number of species yet found in the Firth was 27, distributed into the following genera, —*Doris* (6), *Goniodoris* (1), *Polycera* (3), *Tritonia* (2), *Doto* (2), *Dendronotus* (1), *Eolis* (11), *Eimapontia* (1). Arranging them by their distribution in depth, 21 are found in the littoral-laminarian zone, 15 in the coralline zone, and 3 in the deeper zones. Collectively they have a northern aspect.

3.—Mr. W. Docherty read an interesting paper on "Caithness as a field for scientific study;" and called attention to its special advantages for the study of botany, of zoology, and of antiquarian research.

4.—"The Flora of Banff" was the subject of a communication by Rev. W. S. Bruce, in which he acknowledged the assistance that he had received from Mr. T. Edwards and from a manuscript of the late Dr. Todd of Alvah. The list



reaches about 400 species of Phanerogams, though the mountain plants are conspicuous by their absence in the vicinity of Banff. Among the more interesting plants of the neighbourhood may be noted *Carex incurva*, *Senecio coronopus*, *Habenaria albida* and *H. viridis*, *Scilla verna*, *Mertensia maritima*, *Pyrola secunda*, *Linnaea borealis*, *Anagallis tenella*, *Sambucus Ebulus*, and *Carex pendula*.

The members of the various societies supped together the same evening in the Fife Arms Hotel.

Saturday was devoted to an excursion westward to Boyndie, the Boyne, Portsoy, and Cullen, where lunch was taken. During the excursion, visits were made to the Old Church at Boyndie, Craigherbs with the adjacent camps, the ruins of the Castle of the Boyne, the Serpentine Quarry of Portsoy, the old camp and the Castle of Findlater, and the Old Kirk of Cullen and Cullen House. During the excursion Mr. Horne acted as guide to all points of geological interest; and kindly drew up the subjoined notes on the geology of the districts visited.

NEIGHBOURHOOD OF BANFF.—Between Macduff and Gamrie there is a great development of the clay slate series of Banffshire, consisting of shales, flags, and grits, which, owing to the curvature of the strata have been thrown into a succession of anticlinal and synclinal folds. The ripple-marks on the surface of the beds, the false bedding in the beds of grey wacke, the pebbles in the grits and conglomerates, unquestionably point to the conclusion that they are ancient sedimentary rocks. But when we cross the Deveron, the rocks gradually assume a crystalline aspect. The thin bedded flags and shales are converted into mica schists, which in the more advanced series of metamorphism, merge into knotted schists. These gradations may be followed along the shore between Banff Harbour and the Links of Boyndie. Still more intense, however, is the nature of the metamorphism in the rocks visible at low tide on the west shore of Boyndie Bay. The reefs consist of soft unctuous hydro-mica schists alternating with bands of pebbly quartzite, which have been stained by infiltration of iron oxide from the Old Red Sandstone strata that formerly covered them. In this case also, the pebbles in the grits point to the sedimentary origin of the strata, even though the matrix in some places has been changed into micaceous quartz-schist. Resting on the truncated edges of these crystalline rocks in Boyndie Bay, there are two small outliers of old red sandstone, composed of conglomerates and grits. From the character of the blocks in the conglomerate, it is evident that we have represented at this locality a fragment of the deposit which accumulated along the ancient shore line in the Old Red Sandstone Period. They connect the Old Red area of Gamrie with those of Cullen and Buckie. At Blackpots there is a thick deposit of finely laminated clay, which has yielded numerous liassic and oolitic fossils; but there can be no doubt of its glacial origin, from the fact that it contains at one point of the section fragments of glacial shells.

PORTSOY DISTRICT.—At Portsoy, a visit was paid to the marble quarry, where the relations of the serpentine to the diorite were discussed. The diorite, which occupies the greater part of the section from the mouth of the Durn Burn, westwards to the marble quarry, is of very variable character. When typically developed, as, for example, round the battery, it is an extremely beautiful rock, showing under the microscope large crystals of horn blende, with the normal cleavage angle, diallage, labradorite felspar, and magnetite. Within a

short distance; however, this type disappears, owing to the limited development of the felspar and the greater abundance of the horn blende. In the latter case, the rock approaches the type of amphibolite, and where foliation occurs it might be termed a horn-blende schist. All these varieties are to be found on the shore west of Durn Bay. At various points lenticular patches of quartzite, mica schists, and calcareous bands occur in the midst of the diorite, with the normal strike of metamorphic strata in the neighbourhood. There are no fewer than six veins of serpentine associated with this mass of diorite, two of which are of special interest and importance. Both of them lie to the west of the Battery, the largest occurring at the marble quarry. From these veins excellent specimens may be obtained of the green and mottled varieties of serpentine. The joints are usually mottled with steatite, and thin veins of chrysolite of great beauty intersect the rock. In addition to these minerals, asbestos and enstatite have also been met with. The large vein to the west of the Battery displays a gradual passage from the diorite rock or gabbro into serpentine, a graduation which is amply proved by chemical analysis as well as by microscopic examination. On the west side of the marble quarry, the serpentine is bounded by diorite or foliated horn-blendic rock passing downward into chlorite schists, large bomb-shaped masses of diorite are completely enveloped in the soft green chlorite schists. They vary in size from 2 to 5 feet in diameter, and are arranged in a linear manner along the lines of foliation. From the appearances presented by the chlorite schist it is evident that they are the result of the alteration of the diorite masses at that locality. Following the shore westwards, we gradually descend through flaggy limestones, argillites, chiasmolite slates, mica schists, with actinolite and sericite schists to the quartzites of Redhythe Point and Durn Hill.

CULLEN BAY occupies the centre of a synclinal fold in the ancient crystalline rocks. The fine-grained quartzites and mica schists which dip to the south-east on the cliffs near Cruats, reappear with a north-west inclination to the east of the harbour. The members of this series are the northern prolongations of the quartzites on Ben Aigen and the Bin of Cullen, but owing to various foldings, they occupy a large part of the coast section. The Three Kings of Cullen consist of these fine-grained quartzites, which have been brecciated by faults running in a north and south direction. On the west side of the bay there is an important outlier of Old Red Sandstone, which exhibits a remarkable instance of double unconformity. At the base, the strata consists of coarse brecciated conglomerates, dipping at a gentle angle to the west of north, and passing underneath friable red sandstones. As we follow the cliffs northwards in the direction of Scar Nose, the basal conglomerates disappear, and the overlying sandstones rest directly on the truncated edges of the quartzites. This outlier must have extended formerly along the valley of the Cullen Burn, because another fragment of this formation is to be found on the right bank of the stream above Cullen House.

#### BERWICKSHIRE NATURALISTS' CLUB.

ON 27th July, the second meeting of the season was held, the day being devoted to an excursion to Holy Island. There was a full attendance, representatives being present from most of the southern counties of Scotland, and also from Durham. The interesting ruins on the island received the attention they merited, while the botany proved of much interest to several members, with the result of yielding the following additions to the recorded flora of the



island : viz., *Equisetum variegatum*, *Lycopodium Selaginoides*, *Anagallis tenella*, *Carex distans*, *Ambylodon dealbatus* (abundant in fruit), and *Cladonia Endiviæ-folia*, var. *alcicornis*. Besides these there occurred numerous local or otherwise noteworthy plants, so that all were charmed with the richness of the flora.

The party afterwards visited Lowlynn, where a collection of rock-plants was much admired.

About forty members remained to dinner at the Half-way House. After dinner the following papers were read or laid before the meeting :—1. "William Stevenson : his scientific work and writings," with an obituary notice, by Prof. Duns, of Edinburgh ; 2. "On the damage done to Pine trees at Coupland Castle by the snowstorms of winter 1882-83," by M. T. Culley, Esq. ; 3. "On the signification of the name Lindisfarne," by R. Carr-Ellison, Esq. ; 4. "Geological Papers and Sections," by Mr. David Carr, viz. (1), Breaks of the coal-measures to the Tweed and the Till for three miles, (2), A section of the Kyloe hills, from Fenwick, N.E. of the Hills to the Low, (3), A section of the face of the Hetton Limestone ; 5. "On a recent visit to Kidland, with an account of its antiquities, botany, zoology, and mineralogy," by James Hardy, Esq.

In the beginning of August some excursions were made in connection with the club by Mr. Hardy and others with a view to extending investigations in the Cheviots. During these, various noteworthy observations were made, antiquarian, botanical, and zoological. Of the plants noted there were new to the flora of the Cheviots, *Epipactis latifolia*, *Funcus diffusus*, and *Alopecurus agrestis*. Many rare continental and exotic trees thrive as if they were natives in the woods at Hedgeley.

Several examples of the Painted Lady butterfly were seen ; and the turnips were observed to be suffering seriously from the attacks of *Plutella Cruciferarum*. *Plusia Gamma* was also noticed to be very prevalent, a fact that has also been very conspicuous during the month of July around Aberdeen, where the larvæ are very common now in the end of August.

#### TRANSACTIONS OF THE GEOLOGICAL SOCIETY OF GLASGOW.

OF these transactions Vol. VII., Part I., has just been published, containing the records of the Society for the sessions 1880-81, 1881-82. The Society is evidently in a flourishing condition ; and that it is doing excellent work is shown by this publication. We heartily wish it the success it so well deserves, and many years of continued prosperity. Though not absolutely confined to the geology of Scotland, most of the papers relate to some part or other of our own country ; the belief evidently being recognised as a good one that each provincial society will find abundant material for work without seeking it at a distance. In that belief we most fully agree.

Among the many valuable papers it is somewhat difficult to make a selection for special mention ; hence we shall only give the titles of those relating to Scottish Geology and Mineralogy, leaving those that wish a closer acquaintance with the contents to consult the papers themselves. These papers are as follows :—

1. "On the Post-tertiary Beds of Garvel Park, Greenock," by David Robertson ;
2. "Notes on several new forms of Graptolites from the Silurian Shales of Dumfriesshire," by James Dairon ;
3. "Notes on the Igneous Rocks of the Kilmacolm District," by Arthur Pratt ;
4. "Note on a specimen of altered Dolomitic Limestone from the Cement-stone series of the Ballagan Group," by James J. Dobbie, M.A., &c. ;
5. "Notes on Mull and its Leaf-beds," by W. E. Koch, B.A., &c. ;
6. "The Silurian Rocks of Logan Water, Lesmahagow," by J. R. S. Hunter, LL.D. ;
7. "Description of an erratic boulder on the Highland Railway," by E. A. Wunsch ;
8. "Sketch of the Geology of part of the Mainland of Shetland," by Thomas Stewart ;
9. "Notes on the Silurian Rocks of the Muirkirk District," by David Forsyth, A.M. ;
10. "The Volcanic History of the Old Red Sandstone Period, north of the Grampians," by John Horne, F.R.S.E., &c. ;
11. "On the Fossiliferous Strata lying between



the Lower and Upper Limestones in the Beith and Dalry District, by Robert Craig ; 12. "The Geology and Paleontology of Bankend, Bellfield, and Coalburn, Lesmahagow," by John R. S. Hunter, LL.D., &c. ; 13. "Notes on the Limestones in the Parishes of Cathcart and Eastwood, Renfrewshire," by James Stewart ; 14. "Notes on a Carboniferous Selachian Fish from the Cement-limestone Series of East Kilbride," by James Coutts ; 15. "A Geological excursion to Catlinkin Quarries," by D. C. Glen and John Young ; 16. "On a large boulder of Mica-schist near Inverbeg, Loch Lomond," by Dugald Bell ; 17. "Notes on Graptolites," by James Dairon ; 18. "Remarks on some of the external characters which distinguish *Fenestella plebeia* of M'Coy from those of *F. tuberculocarinata* of Etheridge, jun.," by John Young.

There is also a paper by Mr. Thomas M. Barr on the "Origin and early History of the Geological Society of Glasgow," in which will be found a very readable account of the earlier Geological Societies of Glasgow, and of the origin and vicissitudes of the existing Society, tracing its development from small beginnings in 1858 up to its present healthy and vigorous condition.

The "get-up" of the Transactions is as satisfactory as the contents.

#### PROCEEDINGS OF THE PERTHSHIRE SOCIETY OF NATURAL SCIENCE, 1881-82.

Volume I. Part II. When in 1871, the Perthshire Society decided to risk the publication of the "Scottish Naturalist," it took the place of the "Proceedings" that would otherwise probably, as the years went on, have been given forth from the Society. This Magazine has not had the support of the Society drawn from it, but it has been deemed desirable to issue distinct "Proceedings." The series of these began to appear in 1881. We have now before us the second part of the same, containing a record of considerable interest as the result of the year's work of the Society during the session, 1881-82. The papers published almost all deal with local (or Scottish) botany and zoology, or with the past history and future work of the Society ; and the occasion of the entrance into new premises and the opening of the new Museum buildings has wisely been taken advantage of to direct the thoughts of the members to what lies before them in advancing to a more complete knowledge of the fauna and flora of Perthshire. The leading papers in this part are as follows :—

1. "The annals of the Society from its foundation to the present time," by Dr. F. B. White ;
2. "Climatic and Geographical Changes in Post-Glacial Times," by Dr. Geikie ;
3. Local Meteorological Conditions, and Conditions of Local Meteorology," by James Moncur ;
4. "Notes on the Season," by Dr. F. B. White ;
5. "The Modes of Dispersion of the Seeds of (chiefly) Scottish plants," by Prof. Trail (printed in the "Scot. Nat." in 1882) ;
6. Address by the President, Dr. Geikie, on the "Aims and Ends of Natural Science Studies ;"
7. Notes by Dr. White on *Pyrola rotundifolia* as a Perthshire plant, and on the dates of flowering of rock-plants at Perth during the spring of 1882 as compared with former years ;
8. "On the Mollusca of Perthshire," by Henry Coates ;
9. "On the Animal Nature of *Euglena viridis*," by Prof. Allen Harker.

During 1882 the Society held four excursions: viz., on June 3rd, to Logie-rait, along the Tay as far as Dunkeld. Various rare or local plants were found, among these being *Polygonatum verticillatum* ; and of insects were taken *Emmelesia albulata*, *Eupacilia ciliella*, *Botys fuscalis*, larvæ of *Thera juniperata*, and other species.

On July 1st, to Doune and Blairdrummond Moss, where extensive reclaiming operations have been in progress for years. Numerous rare plants were met with, including a few species of *Andromeda Polifolia*.

On August 3rd, to Comrie and Glenartney. In this excursion Dr. Geikie pointed out at Ochtertyre the distribution of the drift deposits ; near this place they form hillocks and other massive deposits, which bury the Old Red Sandstone conglomerate below them ; "erratics" are very plentiful among and upon these deposits. Dr. Geikie pointed out the relation of the deposits to the great glaciers that had formerly existed in this part of Scotland ; and that after

the ice had melted the Carse had been occupied with a large lake. In Glenartney the Old Red Sandstone rocks are well seen, standing almost on end. Nothing noteworthy was observed by the zoologists in their speciality; but a goodly number of flowering plants of interest were met with. Among these we may note *Sambucus Ebulus*, radiant plants of *Centaures nigra*, *Agrimonia odorata* and *Lactuca muralis*.

On September 2nd, to the Lochs near Blairgowrie. The chief object of this trip was to work out the flora of Lochs Cluny, Marlee, the White Loch, &c. The results were of great interest, though the day was hardly so fine as might have been desired. Among the most rare or local plants gathered were *Reseda lutea*, *Carduus nutans*, and *Geranium columbinum*; in Loch Cluny grew *Potamogeton borealis*, *P. Zizii*, and a variety of *P. pusillus*; in Loch Marlee several species of *Potamogeton* were found (*Perthensis* Sturrock, *lucens*, with its var. *acuminatus*, *rufescens*, &c.), along with *Naias flexilis*, *Elatine hexandra*, &c. In the Lunan Burn other *Potamogetons* were added to the above (see Mr. Sturrock's paper in the July number of the "Scot. Nat.").

In Fingask Loch *Ranunculus Confervoides* was obtained; as was also *Naias flexilis*. In the White Loch *Potamogeton pseudo-nitens* was got hold of. In addition to the plants some attention was also directed to the water-molluscs: and some insects were noticed, as was also the green *Spongilla lacustris*.

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### ON THE OCCURRENCE OF MONOECIOUS PLANTS OF MERCURIALIS PERENNIS.

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As this species is very generally diœcious, so much so that it is stated expressly to be so in almost all "Floras," I was a good deal interested in June of this year to find plants showing monoœcious arrangements of two different kinds. Both grew on a wooded bank beside the river Don, not far from Aberdeen, amidst a profusion of the ordinary diœcious form. Of the abnormal forms the first plant was possessed of several aerial stems arising from a common rhizome. Of these stems two bore exclusively female inflorescences of the usual appearance, while there were four stems similarly exclusively male. The other plants were two in number; at least, I found two stems a good many yards apart, and evidently belonging to distinct rhizomes, each of which bore several inflorescences. In several of the inflorescences male and female flowers were intermixed, though not quite side by side. In both forms the flowers seemed sexually mature.

In the *Botanisches Centralblatt*, 1883, Vol. XV. p. 29, Dr. Fr. Thomas mentions finding at Ohrdruf six examples like my second form.

J. W. H. TRAIL.

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TO CORRESPONDENTS.—Communications, either longer articles or notes on all branches of the Botany, Zoology, and Geology of Scotland, or bearing upon these sciences, are solicited. Contributors will oblige by sending their communications clearly written on one side of the paper only, to the Editor, Professor Trail, M.D., Kent Cottage, King Street Road, Aberdeen, not later than the beginning of the month preceding the issue of the number in which the writer wishes it to appear. If unused MS. is desired in any case to be returned, the writer will oblige by stating the wish when the MS. is sent to the Editor, who will not hold himself responsible for MS. in any case. The Authors alone are responsible for the contents of their papers.

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BOOKS RECEIVED.—The Journal of Conchology, July, 1883; the Naturalist, August and September, 1883; the Canadian Entomologists, June, 1883; the Zoologist, August and September, 1883; the Entomologist, September, 1883; Grevillea, September, 1883; Transactions of the Geological Society of Glasgow, Vol. VII., Part I., 1883.





## PRELIMINARY LIST OF SCIENTIFIC SOCIETIES IN SCOTLAND.

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TO further the attainment of the federation of the scientific societies of Scotland, and of the best methods of rendering more widely useful the work done in them, the following preliminary list has been compiled, in the hope that its deficiencies will be supplemented by those interested in this subject, and that it may thus be possible to obtain a more clear idea of the strength of the various societies among us.

With the kind assistance of the secretaries, it would be possible to give a sketch of the rise and progress of some of the leading societies, such as have been distinguished for the value of the work done by them in the past ; nor is it doubtful that such sketches would be alike interesting and valuable, as well as very suitable for the pages of the *Scottish Naturalist*.

The subjoined list is based on that submitted in 1883, at Southport, to the Council of the British Association ; but in that list are included only societies that publish Proceedings, all others being passed over in silence. Hence the list given herewith is considerably fuller for Scotland, though probably several are omitted from it in absence of information concerning them. Any additional information will be gladly received by the editor, and supplementary lists will be given if necessary.

The arrangement has been made geographical, for convenience of reference, beginning from the south of Scotland, and first taking the east side, then the west.

Cryptogamic Society of Scotland (never meets in the same place for two successive years).

Berwickshire Naturalists' Club.

Edinburgh Botanical Society.

Geological Society.

Highland and Agricultural Society.

Naturalists' Field Club.

Royal Society.



Stirling Natural History and Archæological Society.  
 Alloa Society of Natural Science and Archæology.  
 Kirkcaldy Naturalists' Society.  
 Largo Field Naturalists' Society.  
 Perthshire Society of Natural Science.  
 Dundee Naturalists' Society.  
 Arbroath Horticultural and Natural History Association.  
 Montrose Natural History and Antiquarian Society.  
 Aberdeen Natural History Society.  
     Royal Northern Agricultural Society.  
     Philosophical Society.  
 Alford Field Club.  
 Huntly Field Club.  
 Keith Field Club.  
 Banffshire Field Club.  
 Elgin Literary and Scientific Association.  
 Inverness Scientific Society and Field Club.  
 Ross-shire Philosophical Society.  
 Caithness Field Club.  
 Kirkcudbrightshire Field Naturalists' Club.  
 Dumfries-shire and Galloway Scientific, Natural History, and  
     Antiquarian Society.  
 Glasgow Geological Society.  
     Natural History Society.  
     Philosophical Society.

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## THE SCIENTIFIC METHOD IN BIOLOGICAL CLASSIFICATION.

By REV. WILLIAM L. DAVIDSON.

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### I. DEFINITION.

**D**EFINITION, in its application to the Biological Sciences, may be taken in any one of the three quite different significations. It may mean the explanation of the technical terms employed in the particular science or department under consideration; or it may mean the exposition of the keystone of the natural classification, the Graded System; or it may mean adducing the various characters that go to mark off the several groups at the different stages in the classifying scheme. The first of these is, strictly speaking, Terminology; the second is technically known as Nomenclature. It is the third alone that we here

intend by Definition ; and with this alone we shall at present occupy ourselves.

Now Definition, thus understood as dealing with the "characters" of groups, is either of two kinds, according to the object we have in view. If we intend simply to aid identification, it will be sufficient to state the one or two leading characteristics (such as are obvious and readily recognised) that serve to distinguish one group from another ; but if we be guided by scientific purpose, then something fuller and more ambitious will be required. We shall have to exhaust the characters ; and, in doing so, to attend to all the niceties that the subject-matter admits of, and that the logic of method demands. The first of these is indeed an affair of considerable importance, and ought certainly to have attention bestowed upon it, and to occupy a definite place in every text-book of botany ; but the difficulties attaching to it are not great, and, as it possesses considerable utility both to the teacher and to the learner, there is little risk of its being neglected or inadequately handled. But the second is a matter of no small difficulty ; and as it demands in whoever attempts it the subtlety of the logician as well as the knowledge of the expert, it is apt to create interminable embarrassment, and to lead to very unsatisfactory results.

Let us then concentrate our attention for a little on this latter, and see what principles are implicated in the process, and how best we may deal with the difficulties that crop up.

Definition, as I have already said, has to do with the botanical "character." Now, this word, even in botany, is a term of equivocal import. It may stand for the single identifying peculiarity of a group, such as the basal gland on the petal of a *Ranunculus*, or the pair of opposite lines of hairs on the German *Speedwell* ; or it may signify the congeries of peculiarities that a group possesses, and that need to be taken in their totality before you can have the full meaning of the particular assemblage, such as the five peculiarities of the class *Dicotyledons*—viz., 2 cotyledons, exorhizal germination, exogenous growth (carrying with it the facts of distinct or separable bark and wood in continuous rings), quaternary or quinary symmetry, and reticulated venation ; or the corresponding five peculiarities of the *Monocotyledons*. Perhaps little inconvenience arises in practice from this double usage ; but to obviate all ambiguity, the word "mark" might be employed to designate the sum of the distinguishing features (in which case, instead of speaking of a class-character,



a generic character, and so forth, we should say a class-mark, a generic mark, &c.), and "character" would be applicable to any one of the mark's constituents, and the sum-total of characters would be the mark proper.

But a point of more importance arises when we come to consider what characters are worthy of being regarded as indispensable to the mark. Are the necessary constituents simply those that are possessed by every member of the group? or shall we further include those that are shared by the majority of members, though not by all? No doubt the distinction between *universal* and *general* characters would be a very desirable one, if only it could be kept up. But, unfortunately, it is not workable. In many species and genera, indeed, it might be pretty rigorously applied (and there it should be rigorously adopted), but it fails when we reach the higher grades, classes, sub-classes, &c. Thus, for instance, there is not a single character in the class Dicotyledons that *all* Dicotyledons have in common. Even the fact of dicotyledonism fails in the case of the Dodder, which is acotyledonous (though not of course in the same way as the Acotyledonia or Cryptogams), and in Abronia, which is monocotyledonous; and if we include Conifers and other Gymnosperms in this class, we have a large group of *polycotyledonous* plants. But if dicotyledonism fails, much more does every other character as yet discovered, for there is no other fact of equal generality with it. The mode of growth varies to an indefinite extent; so does the venation; and so does the floral symmetry. Universality then is a thing not to be thought of, and we must rest content with bare generality. Yet care should be taken that this generality is real, and not merely apparent; for a feature may be striking, and may be shared in by a large number of plants, and nevertheless this large number may be simply the minority. There is nothing but a *quantitative* measure to go by, and a *general* character is the same thing as a character possessed by a majority of members of a group.

Under these circumstances, various things become necessary. It is indispensable (1) to exhaust the characters at every grade in so far as this is possible; (2) to indicate the exceptions, when the characters are not absolutely universal, or, where it would be too cumbrous to give a full enumeration, to supply good typical instances; and (3) rigorously to exclude from the defining mark of a grade irrelevant characters—*i.e.* (a) every particular that properly belongs to the grades subordinate as well as to the grades



superordinate; (b) contradictory opposites put in the form of an alternative, as when we are told that a group is characterised by "leaves divided or entire," or by "flowers regular or irregular," or by "stamens indefinite or definite," which is very much like saying that the distinctive feature of men is "having beards or being without them."

And, indeed, a plausible objection may be raised against giving alternatives as characters at all; for, strictly speaking, no alternative can characterise. A fact is never an alternative—in other words, a thing is what it is, a definite something with definite and positive qualities; and so long as it continues to be that thing, it is not and cannot be anything else. Hence to say that a group has flowers red or white or yellow, for instance, is so far not to ascribe one positive attribute to its members, but to give us a choice of several; and so, in strictness, is not to characterise. But then, on the other hand, if our alternatives be exhaustive, there is no question that we do obtain from them some positive information. Although we may not be able to say off hand what the colour may be in the flower of any given member of the group, it will always be something if we can with confidence affirm that it will be one of a limited number, red or white or yellow, and not blue or pink or green. Hence, in this sense—*i.e.*, if we can exhaust the alternatives at any particular stage—we may enumerate them as a character; but if we fail to exhaust them, or if we deal in contradictory alternatives, we have no right to adduce them as a character or to present them as part of the defining mark.

(To be continued.)

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## THE PERTHSHIRE NATURAL HISTORY MUSEUM.

By F. BUCHANAN WHITE, M.D., F.L.S.

(Continued from page 53.)

As has been already stated, one and a half table-cases are devoted to the zoological index collection. These cases contain thirty-six trays, thus apportioned:—*Protozoa*, one tray; *Cœlenterata* (including *Spongia*), five trays; *Echinodermata*, three trays; *Arthropoda* and *Mollusca*, each six trays; and *Vertebrata*, twelve trays.

The *Protozoa* are illustrated by drawings of selected types of the species that have no shell, and by models (obtained from Fritsch of Prague), of the *Foraminifera* and *Radiolaria*, as well as by specimens of the actual shells of the latter groups.

As in the geological department, the back of the case bears a placard, indicating the nature of the specimens in the tray. In the zoological department these placards give the name and essential characters of each sub-division. In the trays themselves are placed narrow bands of paper, crossing from one side to the other, and indicating the names, and the essential characters of the various classes, orders, or families. Thus in the tray devoted to *Protozoa*, we have three such bands, being one to each of the classes *Rhizopoda*, *Gregarinida*, and *Infusoria*. Each specimen, model, or drawing is also labelled with its name, and any other information that may seem desirable.

All the sub-divisions of the *Invertebrata* are treated in the same way, and, wherever possible, actual specimens are given. In such a sub-kingdom as *Cœlenterata*, many of the animals in which are not possessed of hard parts, and which are also difficult to preserve so as to give any true idea of their structure and appearance, models have been largely resorted to. Fortunately, the beautiful glass models prepared by Blaschka of Dresden, which illustrate not only the external appearance of the animals, but also, in many cases, their internal structure, can be purchased at a moderate price.

Here it may be well to observe that in arranging such a collection as the one we are describing, it will be found a very great advantage to have a narrow upright case between each two table-cases, furnished with glass shelves, on which to place the preparations that must be preserved in fluid in jars. Experience proves that it is impossible to display to any advantage such preparations in a table-case, and that for purposes of study, the latter must be supplemented with the upright case.

At the commencement of each sub-kingdom is placed a diagram of its essential type of structure; and where necessary this diagram is supplemented by others.

The sub-kingdoms *Echinodermata* and *Vermes* are illustrated in the same manner as the *Cœlenterata*, by means of actual specimens, fluid preparations, models, and drawings; and the life-history and anatomy of several species are demonstrated.

To the *Arthropoda* are allotted, as has been said above, six trays. Of these the *Insecta* occupy three, not that they are considered to be of so great relative importance, but because, from the inland situation of the Museum, they form a very large part of the *Invertebrata* of the surrounding district. Hence it has been considered advisable to show specimens to illustrate all the chief orders. Preparations illustrate the structure of certain selected types, and also their metamorphoses, whether complete or incomplete. The other three trays are divided amongst the remaining arthropods, which are illustrated in the same manner as the insects.

The sub-kingdom *Mollusca* occupies six trays. Here, again,



models have been largely made use of to illustrate such parts of the animals as are not easily preserved in a dry state, as well as to demonstrate their structure and development. Preparations of the shells show the internal structure, *e.g.*, the internal form of the spire in univalves, and the attachment of the muscles in bivalves. Their geological history is also shown, so far as space permits, by examples of extinct species. It should have been said that this has been done in the other sub-kingdoms also.

Twelve trays may at first sight seem quite inadequate to illustrate a sub-kingdom containing so many large forms as the *Vertebrata*, but a little consideration will show that even in this space it is possible to exhibit the essential characters of the five *Vertebrate* Classes; and that in a small museum it is not advisable to do much beyond this. We need not describe the treatment of the Classes separately, since, for the ease of comparison, they are illustrated in a somewhat similar manner throughout. In each there is a perfect skeleton shown, and along with it are specimens to show the nature of the integument and its covering; and, as far as space allows, typical species of each group are shown. Models of brains and of the hearts with the large vessels are placed in the case; while dissections in fluid, with the bloodvessels injected, demonstrate other details. The younger stages of the lower Classes are illustrated by examples. Any remaining space is devoted to instructive specimens, such as skulls with the different bones coloured and named. It is intended to show by coloured crania, when these can be procured, the system of classification now generally adopted for birds, which depends on the form of the vomer and palatine bones.

A whole table-case is allotted to the Botanical index collection. Of the twenty-four trays in it, fourteen are occupied by the Flowering Plants or *Phanerogams*. In these are shown, as far as possible, the form and structure of the various parts of the plants, the specimens being supplemented by drawings. Thus we have the forms, normal and abnormal, of roots and stems, both recent and fossil, illustrated by sections longitudinal and transverse, and by drawings of the microscopic structure; so that the differences between exogenous and endogenous stems is well exhibited. The lower divisions have not been entered on however. Other trays contain preparations and dissections of the leaves and flowers, supplemented largely by drawings to exhibit the nature of those parts too small to be seen with the unaided eye in the actual specimen. A series of trays is devoted to the various forms of seed-vessels and fruits, concluding with examples to demonstrate the seeds and their inner structures.

To the *Pteridophyta*, or Ferns and their allies, three trays are given, beginning with drawings to show the processes of reproduction in the group, and followed by types of the different plants composing it, both recent and fossil, illustrated by specimens. The



two groups of *Bryophyta* and *Thallophyta* are exhibited in like manner, with the addition of models of some of the *Fungi*. The polymorphism of some of the latter is also pointed out, as well as the composite nature of the *Lichens*.

As in the Zoological department, the back of each case bears placards, giving the most important characters of the groups.

(*To be continued.*)

## LECTURES ON BOTANY AT SOUTH KENSINGTON.

AFTER an interval of several years, a selection of about thirty Science teachers had, during last July, the privilege again accorded to them of attending a short course of lectures on Botany, and of working in the Biological Laboratory, South Kensington. Representatives were present from various parts of Great Britain and Ireland, and among the number were teachers from Edinburgh, Glasgow, Dundee, Cullen, &c. The lectures were delivered by Mr. F. O. Bower, who also superintended the laboratory work. The students were equally pleased with the parts of the subject selected for his prelections, his clear expositions, and the painstaking manner in which they were guided and helped in their practical studies. They wrought from proof copies of a scheme of practical instruction prepared by Mr. Bower, which we are glad to learn will shortly be published. The students, both male and female, engaged in their work with the utmost enthusiasm, and this wise and enlightened policy on the part of the S. and A. department will doubtless bear fruit in the more efficient teaching of Botany throughout the country by those who were fortunate enough to spend three busy weeks at the Normal School of Science in acquiring facility in the use of the Microscope and the Microtome.

Dundee, 13th October, 1883.

J. BREBNER.

## HYGROPHORUS HYPOTHEJUS.

FRIES says that this species does not come up until after the first frost in autumn. Be this as it may, its appearance certainly is an indication that the glory of the agaric season is waning. It is one of the most variable species we have in point of colour. Before me are two specimens, gathered the other day upon a sandy heath under some Scotch firs—its favourite habitat. One is a dark smoky brown on the top of its pileus; the other bright orange, passing at one or two places into a bright vermilion. A casual observer would never take them to be the same fungus; but compare their gills and stems, and they are clearly the same. This change of colour from brown to orange is simply due to the weather. A succession of rainy days had washed off the brown gluten; then the stray gleams of sun and slight frosts at night completed the metamorphosis. This fungus is often extremely abundant where it occurs. This was the case where these two specimens were gathered. The majority of the specimens bore marks of birds having pecked them. Some were quite destroyed, only a few fragments remaining to show where the fungus had been. Others had only a small part pecked out from the centre of the pileus.

CHARLES B. PLOWRIGHT.

7 King Street, King's Lynn, 13th Nov., 1883.



## ZOOLOGY.

### THE SQUIRREL AS A FUNGUS-EATING ANIMAL.

ALL mycologists must have noticed the frequency with which the larger hymenomycetous fungi are injured by animals. I have seen various *Boleti*, notably *B. luteus*, with its pileus pecked to pieces by birds, I believe by rooks. Mr. Broome once found a number of *Tubers* stored up in the nest of a field mouse. Often the pilei without being destroyed entirely are marked by the teeth of rodents, and it has usually been supposed that a rabbit was the mycophagist. While on a visit to Glamis last September, Mr. Stevenson and I were one day sitting quietly under a tree on Hunters Hill, discussing sundry mycological problems, when we noticed a squirrel descend from a tree and begin eagerly to devour a fungus. We allowed him to finish his repast, and then inspected the fragments. He had left little else but the base of the stem and the gills, but we had no difficulty in recognising these as belonging to *Russula nigricans*. A little later in the day we noticed another squirrel run up a tree with something in its paws. This obviously was a fungus; and as the little creature seemed to set great store by its prize, which was so large in proportion to itself, that it was with considerable difficulty that it got it conveyed to the upper branches, we refrained from frustrating its endeavours; but we were almost certain that the fungus in question was another *Russula*, namely *R. foetens*, a fungus not considered to be edible. Growing near the foot of the tree were several specimens of *Boletus satanus*, all the pilei of which bore marks of having been recently nibbled by some small rodent. There were no indications of rabbits near, and doubtless the squirrel was in this instance too the mycophagist. Respecting *Boleti* as articles of human food, personally, I do not like them. There is a degree of sliminess about them when cooked, so strongly suggestive of boiled slugs—a mere fancy of course, but a sufficiently strong one to be unpleasant. It is not generally known in this country that the common *Boletus granulosis* is esculent. My friend the Rev. Canon Du Port is warm in its praise. The other day I met a lady with a basket of *Boletus luteus*, which were subsequently eaten and enjoyed by a hungry family in King's Lynn. Fries mentions the fact that both these species are edible, but it is certainly not generally known in England, whatever may be the case in the North. There is a record in one of the Woolhope Transactions of a lady being made ill by eating *Boletus flavus*; so unless you are quite clear in your knowledge between *B. flavus* and *luteus*, gentle reader, you had better leave them for the squirrels.

CHARLES B. PLOWRIGHT.

7 King Street, King's Lynn, 25th Oct., 1883.

### BERWICKSHIRE SLUGS.

By WM. DENISON ROEBUCK.

I AM indebted to Mr. R. Renton of Fans, near Earlston, in West Berwickshire, for living slugs collected in that neighbourhood, some of which are interesting varieties—interesting, inasmuch as they have not before been formally placed on record for the British fauna. The forms themselves are no doubt common enough, but the group has been so much neglected by British malacologists, that the arrears to be worked up in investigating the



range of variation of slugs are by no means inconsiderable. Mr. Renton sent me a few specimens of *Limax arborum* (the tree-slug), and several of *L. maximas*, var. *vulgaris*. This, which is the typical form of the species, is characterised as being black-spotted on the shield, and having four longitudinal black stripes on the body. To this character the smaller specimens sent by Mr. Renton conform, but the large ones differ, inasmuch as the body stripes are not black, but merely dark cinereous. There were a large number of *Limax agrestis* sent, which ranged themselves into four forms, all equally common, viz. :—The type form, as understood and defined in Lessona and Pollonera's excellent "Monografia dei Limacidi Italiani" (cinereus immaculatus), and the varieties *reticulata*, *tristis* and *sylvatica*, all of which may be regarded as common in Berwickshire, and no doubt elsewhere as well. The consignment also included several specimens of *Arion-ater*, which exhibited slight variations, not of any very great importance. Out of seven sent, five were full grown, and had dark-coloured feet; while the two immature specimens had their feet dirty-white. One of these last had the foot-fringe quite black, while in the other it was dull buff marked with transverse black streaks. With the slugs Mr. Renton sent specimens of *Vitrina pellucida*, *Zonites cellarius*, *Limnæa peregra*, *Physa hypnorum*, *Sphærium corneum*, *Pisidium pusillum*, *Helix nemoralis*, and *H. Hortensis*, as a contribution towards the working out of a county list of mollusca.

I may perhaps be permitted to ask Scottish conchologists (or naturalists generally) to help me in working out the variation and geographical range of the British *slugs*. To this end I wish to have specimens of all, especially the common species, from every county in the British Isles, and in the case of some of the larger counties which are divided for the purpose of botanical and chronological geography (see Watson's *Topographical Botany*) from each of their divisions. The divided Scottish counties are Sutherland (north-west and south-east), Ross (east and west), Argyle (Cantire split off), Inverness (E. and W.), Aberdeen (N. and S.), and Perth (East, Mid, and West). Specimens of slugs should be sent alive, in a close-fitting, air-tight tin box.

Sunny Bank, Leeds, 20th October, 1883.

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### THE ANGEL FISH, OR MONK FISH, IN LOCH RYAN.

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A GOOD specimen of this strange-looking fish was recently taken in a salmon net in Loch Ryan. So far as I could learn, it had not previously been seen by any of the fishermen here. I had not seen it before, but had no difficulty in identifying it from the drawing and description given by Mr. F. Buckland in his "Familiar History of British Fishes." It is there named *Squalus squatina*, *Squatina angelus*, or *Squatina vulgaris*. Mr. B. says, "It is by no means rare on our coasts, especially in the northern parts of the kingdom," thus differing from the statement of Couch. I think it must be considered a somewhat rare fish.

T. BARTY.





# PHYTOLOGY.

## PLANT NAMES.

BY WM. DURIE.

### PART II.

HAVING given, in the former part of this paper, illustrations of plant names derived from persons, myths, places, and primitive sources, we now proceed to consider the remaining divisions already enumerated.

V. The well-nigh infinite variety of *properties* belonging to the various species of plants has given rise to a most extensive list of names, while imaginary properties have, in ignorance, been the occasion of fixing names in other cases. Let us first take some Scotch names.

*Carl-hemp*, the largest stalk of hemp bearing the seed ; from *Carl*, male or strong, found also in *Carl-partan*, Scotch for male crab.

*Lucken-gowan* (*Trollius Europæus*), the Globe-flower. As it expands only in bright sunshine, it is called "lucken," or "locken," locked or closed. In dull weather it is closed, and forms a complete *globe*.

*Sourock*s, the Common Sorrel, used proverbially for ill-nature. Thus, Galt, in the "Entail," says, "Hey guidman, but ye hae been eating sourocks instead o' lang kail."

*Mays*, the primrose, from blooming early in May. The English give this name to the Hawthorn blossom, and the Germans, to lilies of the valley.

*Bindwood*, Ivy, from the strong hold it takes of walls.

*Wood-bine* is the same word reversed. Wood-bind, for the honey-suckle, from its clasping neighbouring trees.

*Daft-berries* (*Atropa belladonna*), because chewing the berries causes delirium.

*Catch-rogue*, or *Catch-weed* (*Galium aparine*), because generally growing in hedges, it tears the clothes of people attempting to break through, or, at least, the fruits adhere to them. It

is also called *goose-grass*, as being a favourite food of geese, though probably a corruption of *gorse-grass*, from its roughness.

*Chasbol*, or *Chesbowe*, the Poppy. Some light may be thrown on this name from the Belgian name for the poppy, *sleep-boll*, or bowl inducing sleep, from its resemblance to a bowl and its soporific property.

Next, English names as derived from other languages, *e.g.*

*Saxifrage* (*splenwort*), Latin for stone-breaker, because it was supposed good for breaking up stones in the human bladder.

*Sassafras*, a kind of Laurel, was so named for the same reason.

*Sage*, Latin, *salvus*, sound or whole; French, *sauge*, from belief in its healing powers.

*Sloe*, Dutch *sleuwe*, meaning sour, from its tartness.

*Witch-elm*, Anglo-Saxon *wice*, bending or drooping, from its pendulous branches.

*Bryony*, from Greek βρῦω, denoting luxuriant growth.

*Thyme*, Greek θύμος from its sweet smell. French *thym*, pronounced "tim," hence the silent "h" in our word "Thyme."

*Hoarhound* (*Marrubium vulgare*), Anglo-Saxon *hore-huné*, literally, strongly-scented.

*Agrimony*, Greek ἀργεμον, white spot, because supposed to remove white spots from the eyes.

*Anemone*, Greek, ἀνεμώνη, wind-flower (same root as *animal*: *an*, to breathe), so called from the action of the wind on its leaves.

*Pansy*, or *heart's-ease*. French, *penser*, to think; the flower of thought or remembrance.

*Narcissus*, Greek νάρκισσος, from νάρκη, numbness, or deadness, from the narcotic quality of the plant.

*Noli-me-tangere*, Latin, for (freely) "you must not touch me:" a plant of the genus *Impatiens*. The seed-vessels, on being touched, when the seeds are ripe, assume a spiral form and leap from the stalk.

*Lawyers* (*Rosa canina*), from the thorny stems, because, as has been well said, if they once get hold of you, you don't easily get away.

*Nyctanthes*, Greek for night-flower, because it exhales its rich odour after sunset.

*Mignonette*, French *mignon*, darling, as being a little flower much thought of.

*Daisy*, lit., "Day's eye," because it is open in daylight, and closes up at sunset. Chaucer says of it:



“ That well by reason it men callen may,  
The *daisie*, or else the eye of day.”

*Mistletoe* A.S., *mistiltan*, Norse., *mistilteinn*. *Mistel*, in old Dutch, meant glue or bird-lime, and in German it means dung, and *tan* stands for twig. Thus it is literally “bird-lime twig,” from the old fancy that the plant was propagated from the droppings of a bird, especially the *missel*-thrush. Similarly it is sometimes called *fuglelim* in Norway.

*Poplar*, French, *peuplier*; Latin, *populus*, perhaps from *palpitare*, to tremble, referring to its trembling leaves.

*Nasturtium*, Latin, literally “nose-wringer” (*nasus*, nose, and *torquere*, to twist), from its sharp smell.

VI. The next head contains names given on account of the *uses* to which plants have been put.

*Arrow-root*, because confounded with a plant used by American Indians to poison their arrows.

*Bachelor's Button* (*Lychins syloestris*), because it used to be carried by lovers. If it died, they were to fail in their courtship; if it lived, they would succeed.

*Beech*, A.S., *boc*, a beech-tree. It was from the fact of British books being at first writings scratched on beechen boards that the word “book” came to be applied in its present sense, while the original “*boc*,” tree, has been, by change of vowel turned into *Beech*.

*Belladonna*, Italian for “fair lady.” The Nightshade is so called from its use by ladies to give expression to the eyes, the pupils of which it expands.

*Bird Catcher's Service Tree* (as the mountain ash is called), from the fact of its berries attracting birds.

*Butcher's Broom* (*Ruscus aculeatus*), called also *knee-holly*, used by butchers as brooms so sweep their blocks.

*Carnation* (*Dianthus caryophyllus*). Prior says: “Incorrectly derived from the flesh colour of the flower. Supposed to be connected with Latin, *carne* (flesh), but more correctly spelt by our older writers, *coronation*, as representing the *Vetonica coronaria* of the early herbalists, and so called from its flowers being used in chaplets (*coronæ*).”

*Lavander*, French, *lavande*; Latin, *lavare*, to wash, because it was laid in newly-washed linen.

*Rue*, sometimes called *Herb-grace*, or *Herb of grace*. It was used in driving out evil spirits, and was a symbol of remembrance, because of its evergreen foliage. In “Hamlet” we find:



“There’s Rue for you, and here’s some for me. We may call it Herb of Grace on Sundays.”

*Sain-foin* (*Hedysarum*), French, meaning literally “wholesome hay,” because cultivated in France for fodder.

*Spindle-tree* (*Euonymus Europæus*), from its fine hard-grained wood being used for spindles and skewers.

*Spurge*, Latin, *expurgare*, to purge away, through the French *espurge* (same root as *purge*); so called from its corroding, and so cleansing away warts.

*Towel-gourd* (*Luffa Ægyptiaca*), because the fibrous inner-layer of the pericarp is used in the East for bath-sponges.

(*To be continued.*)

## A NEW LIST OF THE FLOWERING PLANTS AND FERNS OF ORKNEY.

EDITED BY W. IRVINE FORTESCUE.

(*Continued from page 74.*)

### AIRA L.

417. *cæspitosa* L., B. Common.  
 418. *flexuosa* L., B. Common on heaths.  
 419. *caryophyllea* L., B. Common. Partial to poor soil under cultivation.  
 420. *præcox* L., B. Common.

### AVENA L.

421. *flavescens* L. “Fields.” Not common in sandy spots,” H.  
 422. *pubescens* L. Near Manse of Hoy and Scapa, B. Gills of Scapa. D. Gillies.  
 423. *pratensis* L. D. Macnab. Doubtful.  
 424. *strigosa* Schreb. Introduced, B.  
 425. *fatua*, L. Introduced, B.  
 426. *elatior* L., B. Common.

### HOLCUS L.

427. *mollis* L. “Common.” D. & H.’s list. No authority given; probably a mistake.  
 428. *lanatus* L., B. Common.

### TRIODIA Br.

429. *decumbens* Beauv., B. Common.

### MOLINIA Schrank.

430. *cærulea* Mœench., B. Rather local, but not uncommon.

### CATABROSA Beauv.

431. *aquatica* Beauv. Loch of Aikerness, Evie, and stream near Sandwick Manse, D.

GLYCERIA Br.

432. fluitans Brown, B. Common.  
 433. plicata Tries. Dr. Boswell remarks: "I think I found this in 1849 near Learquoy, Orphir, but have not a specimen."

SCLEROCHLOA Beauv.

434. maritima Lindl., B. Local. Firth, J. W. H. T.  
 435. distans Bab. Ayre at Kirkwall, D.

POA L.

436. annua L., B. Common.  
 437. compressa L. Sides of roads, &c. D. & H.'s list. No authority given; probably a mistake.  
 438. pratensis L.; B. Not uncommon.  
 439. trivialis L., B. Not uncommon.

BRIZA L.

440. media L., B. Hill pastures above Westness, H. Wideford, 1858, J. G. Iverach, Swanbister, 1880. Binscarth. Local.

CYNOSURUS L.

441. cristatus L., B. Common.

DACTYLIS L.

442. glomerata L. Introduced, B. Rather local. Plentiful at Swanbister.

FESTUCA L.

443. sciuroides Roth., B. Sides of farm buildings, H.  
 444. ovina L., B. Common.  
 445. rubra L., B. Not uncommon.  
     *a. duriuscula* meadows, H.  
 446. elatior L. Kirkwall, B. Meadows, D. Holms of Wasbister. Loch of Harray.  
 447. pratensis Huds. Pastures, D.  
     *b. loliacea*. Meadows. D. Mill. Very doubtful.

BROMUS L.

448. sterilis L. Roadsides. Not uncommon, H.  
 449. secalinus, L. Cornfields, H.  
     *b. velutinus*. Common, H.  
 450. racemosus L. Cornfields. D. & H.  
 451. mollis L., B. Common.

BRACHYPODIUM Beauv.

452. sylvaticum. R. & S. Scapa, B. Birstane, D. Hobbister, H.

TRITICUM L.

453. caninum Huds. Cornfield Upper. Hobbister H. Very doubtful. Howan, J.W.H.T. Scarce.  
 454. repens L., B. Common.  
 455. acutum, D.C., B.  
 456. junceum L. Scapa, Hubbin, Swanbister, Hoxa, B.

## LOLIUM L.

457. *perenne* L., B. Common. Probably introduced.

## ELYMUS L.

458. *arenarius* L. Hoy, Hoxa, B. Toftsness Sanday. Scapa. Walls. D. & H. Holm. Local, and rather scarce.

## NARDUS L.

459. *stricta* L., B. Common.

## FILICES.

## HYMENOPHYLLUM Sm.

460. *unilaterale* Willd., B. Hoy Hill and Meadow of the Kame, Hoy. Not recorded from other islands.

## PTERIS L.

461. *aquilina* L., B. Common.

## LOMARIA Willd.

462. *Spicant* Desv., B. Common.

## ASPLENIUM L.

- \*463. *Ruta muraria* L. Rousay. D. Gillies and D. Probably rare and very local.

464. *Trichomanes* L., B. Hoy, Evie, Rousay, Westray, D.; Local; Harray, J.W.H.T.

465. *marinum* L., B. Not uncommon. "St. Magnus Cathedral," D. Not known there now.

466. *Adiantum-nigrum* L., Hoy, B. Rousay. Evie, D. Westray, Dr. H. H. Johnston. Rare and local. Harray, J.W.H.T.

## ATHYRIUM Roth.

467. *Filix-fœmina* Bernh, B. Common.

## SCOLOPENDRIUM Sw.

468. *vulgare* Sm. "Rousay sparingly," D. "Extinct Rousay, Rocks inland, now extinct, Enhallow," H.

## CYSTOPTERIS Bernh.

469. *fragilis* Bernh., B. a. and b. Hoy and Rousay. Local and scarce.

## ASPIDIUM Sw.

470. *Lonchitis* Sw. Hoy, rare D. One specimen. W. Evans, 1870. Very rare; possibly now extinct.

471. *aculeatum* Sw., B.

*b. lobatum.* I have fronds from two stations in Hoy. Very local and rare.

## NEPHRODIUM Rich.

472. *Filix-mas* Rich., B. Rather scarce.

*c. Borreri*, B. do.

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\* For obvious reasons, the stations for the less common ferns are better not given.—W. J. F.



473. dilatatum Desv., B. Common.  
*var. alpinum*, B. Orphir and Stenness.  
 474. æmulum Baker., B. Not uncommon in Orphir and the South Isles.  
 475. oreopteris Desv., B. Orphir and Hoy. Rather rare.

OPHIOGLOSSUM L.

476. vulgatum L.  
*b. ambiguum*, B. Rather common in several places in Orphir, Cava, Calf of Cava, Ryssa Little, Flotta Calf, Hunda, Linksness Hoy, and Eday. No doubt elsewhere.

BOTRYCHIUM Sw.

477. Lunaria Sw., B. Westness, Hobbister, Viera, H. Clestran. Standing Stones. Stenness, D. Hunda, 1882. Several places in Orphir. Probably not uncommon. Usually broken over by cattle after the middle of June.

LYCOPODIACEÆ.

LYCOPODIUM L.

478. clavatum L., B. The Mainland, Hoy, and Rousay. Common, but less so than formerly, owing to the increase of cultivation.  
 479. Annotinum L. Berriedale. Hoy, B. Hoy in several places, H. Local.  
 480. alpinum L., B. Hoy, Orphir, Rousay. Local.  
 481. inundatum L. "Near Pegal burn, Walls, 1848," H.  
 482. Selago L., B. Common.

SELAGINELLA Beauv.

483. Selaginoides Gray, B. Common.

ISOETES L.

484. lacustris L. Rousay, Orphir, &c., H. Carness D. Doubtful. Dr. Boswell remarks, "Likely only *Littorella*."

EQUISETACEÆ.

EQUISETUM L.

485. arvense L., B. Common.  
 486. sylvaticum L., B. Rather local.  
 487. palustre L., B. Common.  
 488. limosum L., B. Common.

CHARACEÆ.

CHARA Ag.

489. fragilis Desv.  
 \* *var. delicatula*. Plentiful round the shores of Loch of Harray.

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\* Named by Messrs. Henry and James Groves.

- \* var. approaching *barbata*. Shallow pools N.W. of Stones of Stenness.
490. *aspera* Willd.  
\* var. *subinermis*. Loch of Harray. Abundant in the deeper water.
491. *hispida* L. Loch of Airy, Stronsay Mill, Brogar, D. Rather doubtful.
492. *vulgaris* L.  
\* var. *brevibracteata*. Pool at Kirbuster, Orphir.  
\* var. *atrovirens*. Swanbister.

## NITELLA Ag.

- \*493. *opaca* Ag. Quarry at Swanbister.
- \*494. *flexilis* L. "Quarries at Birstane," D. & H.'s list. Probably really *opaca*.

## MYCOLOGIA SCOTICA.

BY REV. J. STEVENSON.

(Continued from S. N., Vol. I., page 98.)

2299. *Cucurbitaria Lauro-cerasi* Phill. & Plow. *Grevillea*, Vol. X. p. 72. Pl. 158, f. 8, (a) the plant enlarged, (b) ascus, (c) sporidia.

Perithecia crumpect, 1 to 4 in a group, globose, smooth, small; ostiola inconspicuous; asci cylindrical, .12-.125 × .2 mm.; sporidia uniseriate, dark brown, oblong, ovate, slightly constricted about the middle, muriform, .02-.025 × .02 mm.

This species comes near Fuckel's *C. coryli* (Nach. I. p. 20), as far as the size of the sporidia, but differs in other characters. The sporidia have often seven primary transverse septa—four in upper half of the sporidia and three in the lower.

On Cherry laurel. May.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Altyre. Rev. Dr. Keith.

3000. *Massaria Tiliæ* Phill. & Plow. *Grevillea*, Vol. X. p. 72, Pl. 158. f. 6, (a) ascus, (b) sporidia.

Perithecia subcuticular, globose, then depressed, black; ostiola minute, just piercing the epidermis; asci subcylindrical; sporidia eight, hyaline, involved in gelatine, triseptate, constricted at the septa, quadrinucleate, .04-.06 mm. long, by .01 mm. wide.

\* Named by Messrs. Henry and James Groves.

This species comes very near *Massaria eburnoides*, Sacc., but the sporidia are twice as large as in Saccardo's plant.

On lime twigs. May.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Drumduan, Forres. Rev. Dr. Keith.

3001. *Sordaria equorum* Winter. *Sord.* p. 13, t. 7, f. 2. *Grevillea*, Vol. IV. p. 124. Vol. III. t. 42, f. 7. (a) section of fungus enlarged, (b) sporidia, (c) ascus and paraphyses.

*Coprolepa equorum* Fckl. *Symb. Mycol.* p. 240.

Perithecia scattered, in a thin subcoriaceous crustlike stroma on the surface of the matrix, covered with a dark brown villosity; ostiola black, somewhat conical; asci cylindrical, octo-sporous; sporidia uniseriate, ovate or oblong, black, simple, surrounded by a gelatinous envelope,  $0.17 \times 0.07$  mm.

On horse dung. July.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Sanquhar. Rev. Dr. Keith.

\* *Sphaeria* (Pleospora) *herbarum* Pers. (*Mycol Scot.* p. 405).

Var. Pisi. On pea straw. June. Forres. Rev. Dr. Keith.

3002. *Sphaeria praetermissa* Karst. *Myc. Fenn. Pt. II.* p. 89.

Perithecia gregarious, covered with the epidermis which is more or less discoloured, sphaeroid, flattened at the base, furnished with a slightly prominent, often obsolete, widely perforated papilla, glabrous, even, black,  $0.5 \mu$  broad. Asci cylindraco-subclavate,  $110 \mu$  long (the spore bearing part),  $10-11 \mu$  thick. Sporidia 8, monostichous, oblong, obtuse at both ends, straight or slightly curved, 3 septate, more or less constricted at the septa, of a very faint yellowish brown colour,  $18-32 \mu$  long,  $7-10 \mu$  thick. Paraphyses filiform, crowded, somewhat coalescing.

On dead raspberry stems. May.

East.	—	—	—	—	Moray	—
West.	—	—	—	—		

Dunphail. Rev. Dr. Keith.

Europe.

3003. *Sphaerella innumerella* Karst. *Myc. Fenn. II.* p. 182. *Grevillea*, Vol. VIII. p. 109. *Plow. Sphaer. Brit. fasc. III.*, 98.

Perithecia hypophyllous, gregarious, erumpent spherical, pierced by a pore, black,  $75-100 \mu$  broad; asci very shortly stipitate, cylindraco-clavate, sometimes obliquely



swollen below, 42-51  $\mu$ . long, 8-9  $\mu$ . broad; sporidia 6, nearly triseriate, clavato-fusiform, one septum in the centre, not constricted, straight or curved, hyaline, 17-24  $\mu$ . long, sometimes 18-21  $\mu$ ., 3-4  $\mu$ . rarely, 5  $\mu$ . broad.

On decayed leaves of *Comarum palustre*. May.

East. — — — — Moray —

West. — — — —

Forres. Rev. Dr. Keith.

England. Europe.

3004. *S. proximella* Karst. *Myc. Fenn. Pt. II. p. 177.*

Perithecia (when on leaves, amphigenous) scattered, innate, spherical, pierced with a simple mouth, black, scarcely 100  $\mu$ . broad; asci sessile, oblong-subclavate, 64-74  $\mu$ . long, 20-24  $\mu$ . thick; sporidia 8, in 2 or 3 rows, subovoid-oblongate, slightly attenuated at the apices, uniseptate, each division with 2 minute nuclei, very slightly constricted at the septum, hyaline, 20-24  $\mu$ . long, 8-10  $\mu$ . thick.

On the axis of fertile spikes of *Carex ampullacea* after shedding the fruits. May.

East. — — — — Moray —

West. — — — —

Forres. Rev. Dr. Keith.

(To be continued.)

## HETERŒCISM IN THE UREDINES.

By J. W. H. TRAIL.

(Continued from page 84.)

ANY classification yet suggested for the Uredines must be regarded as tentative, and as certain to require very considerable modification in its details when a fuller knowledge of the life-history of the various species is gained. As a case in point, we may instance *Puccinia arundinacea* D.C., placed by Winter in his group *Hemipuccinia* (characterised by possessing only uredo and teleuto-spores, but not æcidio-spores), under the name *P. Phragmitis* Schum. M. Cornu (*Compt. rend. Vol. XCIV., 1882, No. 26*) states that he has succeeded in causing the spores of this fungus to germinate on *Ranunculus repens*, and to produce on the latter plant an *Æcidium*, formerly referred to *Æc. Ranunculacearum*; and he also states that the same *Æcidium* is met with on *R. bulbosus*, *R. acer*, *R. sceleratus*, and *R. Flammula*. It will be observed below that *Æcidia* are said to be produced on some of the same species of *Ranunculus* by *Uromyces Dactylidis* Otth.

(*U. graminum* Cooke). M. Cornu also mentions the occurrence on the same host plant (the common Reed) of *Puccinia graminis*, said to give rise to *Æc. Berberidis* on the Barberry, and of *P. Magnusiana* (vide *supra*) said to cause *Æc. Rumicis* on species of *Rumex*; *P. sessilis*, Schum. is also a reed-parasite; the corresponding fungus being *Æc. Allii* (vide *infra*). The following is the classification referred to above (*Scot. Nat.*, Oct., 1883, p. 84) in so far as it applies to the *Uredines* known to us as Scottish: the numbers are those under which they stand in the *Mycologia Scotica*:—

UROMYCES Link., teleuto-spores unicellular, free, not enclosed in a peridium, ultimately forming a powdery mass.

- A.—**Lepturomyces**, only teleuto-spores present, which germinate at once; no examples yet found in Scotland.
- B.—**Micruromyces**, teleuto-spores alone occur, fall away easily, but do not germinate for some time.  
 U. Ficariæ (Schum.) (1272).  
 U. Scillarum (Grev.) (1276, U. concentrica Lev.)
- C.—**Hemiuromyces**, both uredo-spores and teleuto-spores occur.  
 U. Rumicis (Schum.) (1293, Ured. bifrons).  
 U. Alchemillæ (Pers.) (1275, U. intrusa Grev.; and p.p. 1281, Uredo Potentillarum, D.C.)
- D.—**Uromycopsis**, only æcidio- and uredo-spores present.  
 U. Scrophulariæ (D.C.) (1274, U. concomitans B. and Br.; 1372, *Æcidium Scrophulariæ* D.C.)  
 U. Behenis (D.C.) (2187, *Æc. Behenis* D.C.)
- E.—**Euromyces**, æcidio-, uredo-, and teleuto-spores all present.
- (a) **Auteuromyces**, all three spore forms on same host-plant.  
 U. Polygoni (Pers.) (1277 and 1222, Puc. vaginalium Link.)  
 U. Betæ (Pers.) (1319, Trichobasis Betæ Lev.)  
 U. Limonii (D.C.) (2253, Uredo Statices Desm.)  
 U. Valerianæ (Schum.) (1310, Lec. Valerianæ B.; 1361, *Æc. Valerianacearum* Duby).  
 U. Orobi (Pers.) (p.p. 1266, Tr. Fabæ Link.; p.p. 1267, Tr. fallens Cooke, 1320, Tr. Fabæ Lev.; and 1365, *Æc. Orobi* Pers.)  
 U. Geranii (D.C.) (1273 and 1370, *Æc. Geranii* D.C.)  
 U. Parnassiæ (Grev.) (1369).
- (b) **Hetereuromyces**, uredo- and teleuto-spores on one host-plant, æcidio-spores and spermogonia on another.  
 U. Dactylidis Otth. (p.p. 1358, *Æc. Ranunculacearum* on *Ranunculus bulbosus*.; the other forms are said to occur on *Poa nemoralis*, *Dactylis glome-*

rata, *Avena elatior*, and *Festuca elatior* (being *U. graminum* Cooke), but have not been recorded from Scotland. (See note at end of this list.)

U. *Poæ* Rabh. (1358, p.p. *Æc. Ranunculacearum* D.C., on *Ran. Ficaria* and *R. repens*. the other forms referred to this species are found on *Poa nemoralis* and *P. pratensis*; they have not been recorded from Scotland.)

U. *Pisi* (Pers.) (? p.p. 1267, *Tr. fallens* Cooke).

**PUCCINIA** Pers., teleuto-spores two-celled, free, not enclosed in a peridium, forming a powdery mass when ripe.

A.—**Leptopuccinia**, only teleuto-spores, which form a rather compact hemispherical mass, remain long on their stalks, and usually germinate while still adherent.

*P. Buxi* (D.C.) (1268).

*P. annularis* (Strauss.) (1228, *P. Scorodoniæ* Link.)

*P. verrucosa* (Schum.) (1226, *P. Glechomatis* D.C.)

*P. Veronicæ* (Schum.) (1225, *P. Veronicarum* D.C.)

*P. Asteris* Duby (1243, *P. Tripolii* Wallr.)

*P. Valantiæ* Pers. (1245 and 1247, *P. acuminata* Fckl.)

*P. Chrysosplenii* Grev. (1257).

*P. Circeæ* Pers. (1265).

*P. Malvacearum* Mont. (2189).

*P. Arenariæ* (Schum.) (1261, *P. Lychnidearum* Link. ; see also note in *Scot. Nat.*, Vol. VI., p. 119).

B.—**Micropuccinia**, only teleuto-spores, which fall readily from their stalks, but germinate only after some time.

*P. Betonicæ* (A. and S.) (1230).

*P. Campanulæ* Carm. (1232).

*P. Virgaureæ* (D.C.) (1239).

*P. Ægopodii* (Schum) (1251).

*P. Saxifragæ* Schl. (1256).

*P. Rhodiolæ* B. and Br. (1262).

*P. Fergussoni* B. and Br. (1260).

*P. Thalictri*. Chev. abundant on lower surface of leaves of *Thalictrum minus*, var: *montanum*, at Kinloch-Rannoch; not previously recorded from Scotland.

C.—**Hemipuccinia**, uredo- and teleuto-spores both occur, but no æcidio-spores, though spermogonia are often present.

*P. Baryi* (B. and Br.) (*Epitea Baryi* B. and Br.), on *Brachypodium silvaticum* near Aberdeen last year.

*P. paliformis* Fckl. on *Koeleria cristata*.

*P. Phragmitis* (Schum.) (1215, *P. arundinacea* Hedw.)

*P. oblongata* (Link.) (1219, *P. Luzulæ* Lib., and 1317, *Tr oblongata* B.)

*P. polygoni-amphibii* Pers. (2181).



- P. Bistortæ (Strauss) (1223).
- P. Oxyriæ Fckl., on *Oxyria reniformis*.
- P. Vincæ (D.C.) (1231).
- P. suaveolens (Pers) (1240, P. *Cirsii* Lasch. ; 1321, Tr. *suaveolens* Lev. ; and 1318, Tr. *Cirsii* Lasch).
- P. bullata (Pers.) (1253, P. *Conii* Fckl. ; 1250, P. *Apii* Cda ; and p.p. 1248, P. *Umbelliferarum*).

D.—*Pucciniopsis*, æcidio- and teleuto-spores known, no uredo-spores.

- P. conglomerata (Strauss.) (1237, P. *Syngenesiarum* Link ; 1238, P. *glomerata* Grev. ; 1244, P. *Sene- cionis* Lib. ; and 1366 d., *Æc. Compositarum* Mart. var. *Jacobææ* Grev.)
- P. Bunii (D.C.) (1360, *Æc. Bunii* D.C.)
- P. fusca. (Relh.) (1254, P. *Anemones* Pers. ; and 1349, *Æc. leucospermum* D.C.)

E.—*Eupuccinia*, æcidio-, uredo- and teleuto-spores all occur.

(a) *Auteupuccinia*, all three forms grow on same host-plant.

- P. Porri (Sow.) (2252, P. *Allii*).
- P. Asparagi D.C. (1220).
- P. Soldanellæ (D.C.) (1352, *Æc. Soldanellæ* Hornsh.)
- P. Primulæ Grev. (1224, and 1374, *Æc. Primulæ* D.C.)
- P. Menthæ Pers. (1227, and 1371, *Æc. Menthæ* D.C.)
- P. flosculosorum (A. and S.) (1235, P. *Compositarum* Schl. ; P. *Lapsanæ* Fckl., Tr. *Lapsanæ* Fckl. ; 1241, P. *variabilis* Grev. ; P. *Centaureæ* D.C. ; P. *Hieracii* Mart., with the corresponding uredo- or trichobasis-spores in each case ; and also with corresponding *Æcidia*).
- P. Tragopogi (Pers.) (1234, P. *sparsa* Cooke).
- P. Tanaceti D.C. (1236, P. *discoidearum*).
- P. Galii (Pers.) (1246, and 1359, *Æc. Galii* Pers.)
- P. Adoxæ D.C. (1255, and 1350, *Æc. albescens*).
- P. Pimpinellæ (Strauss) (2183, and 1248 p.p. ; 1248, P. *Heraclei* Grev., with the corresponding uredo- and æcidio-spores.
- P. Saniculæ Grev. (1252, 1367, *Æc. Saniculæ* Carm.)
- P. Epilobii-tetragoni (D.C.) (1263, P. *Epilobii* D.C. ; 1264, P. *pulverulenta* Grev. ; 1351, *Æc. Epilobii* D.C.)
- P. Violæ (Schum.) (1259, P. *Violarum* Link. ; 1368, *Æc. Violæ* Schum).
- P. Calthæ Link. (1258, and 1357, *Æc. Calthæ* Grev.)

(b) *Hetereupuccinia*, spermogonia and æcidio-spores on one host-plant, uredo- and teleuto-spores on another ; heterœcious species.

- P. graminis Pers. (1214, on cereals and other grasses ;

- 1313, *Trichobasis linearis* Lev. on grasses; 1354, *Æc. Berberidis* Pers. on Barberry).
- P. rubigo-vera* (D.C.) (1312; *Trichobasis rubigo-vera* Lev. on grasses; 1362, *Æc. Asperifolii* Pers. on *Anchusa arvensis*, rare in Scotland; *P. straminis* Fckl., also referred to this species; has not yet been reported from Scotland).
- P. coronata* Corda (1217, at Menmuir; *Æc. Rhamni* Gmel. on *Rhamnus* sps., also referred to this species; has not been recorded from Scotland).
- P. Moliniæ* Tul. (1218 on *Mol. coerulea*; 1377, *Æc. Orchidearum* Desm. on *Orchis* and *Listera*; both forms rare in Scotland.)
- P. Poarum* Niel (1366 c., *Æc. Tussilaginis*; var. of *Æc. Compositarum*; the *Puccinia*-spores referred to this species occur on species of *Poa*; they were found in September, 1883, at Granton, on Speyside, by Mr. Plowright and Dr. Keith).
- P. Magnusiana* Koern. (1375, *Æc. rubellum* Pers.; teleuto-spores have not been detected in Scotland.)
- P. sessilis* Schn. (1376, *Æc. Allii*, on *Allium ursinum*; *P. sessilis* occurs on *Phalaris arundinacea*; it is not known as Scottish).
- P. Caricis* (Schum.) (1216, *P. striola* Link, on *Carex* sps.; and 1364, *Æc. Urticæ* D.C. on *Urtica dioica* and *U. urens*).
- P. silvatica* Schr. (1368 a., *Æc. Compositarum* Mart. var. *Taraxaci*, on *Taraxacum officinale*; the teleuto-spores, on *Carex muricata* and one or two other *Carices*, are not known as Scottish).

To which groups the following species should be referred is uncertain at present, viz. :—

- P. clandestina* Carm. (1233).  
*P. Andersoni* B. and Br. (1242).

**GYMNOSPORANGIUM**, teleuto-spores, two-celled, not enclosed in a peridium, but closely united to form a vertical spore-bearing layer, in which they are embedded in a gelatinous substance; æcidio-spores in a well-formed peridium.

- G. Sabinæ* (Dicks.) (1280, *Podisoma Sabinæ* Fr., on *Juniperus Sabina*; *Røstelia cancellata*, regarded as the æcidium, is not known from Scotland).
- G. Clavariæforme* (Jacq.) (1279, *Podisoma Juniperi* Fr. on *Juniperus communis*; and 1346, *Røstelia lacerata* Tul. on hawthorn).
- G. Juniperinum* (L.) (1278, and 1345, *Røstelia cornuta* Tul. on mountain-ash.)

**TRIPHLAGMIUM** Link., teleuto-spores formed of three cells side by side, but otherwise like those of Puccinia; uredo-spores occur, but no æcidio-spores are known.

T. Ulmariae (Schm.) (1213; Uredo-spores are Uromyces Ulmariae Sch.)

**PHRAGMIDIUM** Link., teleuto-spores formed of three or more cells in a row, in loose clusters on a basis like that in Puccinia; æcidio-spores surrounded by a circle of clavate paraphyses, but no distinct peridium recognisable; hence uredo- and æcidio-spores not easily distinguished, but the former are developed singly, the latter in rows.

A.—Phragmidiopsis, æcidio- and teleuto-spores known, uredo-spores wanting.

P. carbonarius (Schl.) (1208, Xenodochus carbonarius Schl., Tweed; the uredo-spores, Lecythea Poterii Lev., have not been recorded from Scotland).

B.—Euphragmidium, all three forms of spores known, and always on the same host-plant.

Phr. subcorticium (Schr.) (1209, Phr. macronatum; 1296, Coleosporium pingue Lev.; the æcidio-spores are Lec. Rosæ Lev.)

Phr. Fragariæ (D.C.) (1212, Phr. obtusum Fr.)

Phr. (1210, Phr. bulbosum Schl. p.p; violaceum sch.)  
(See note on p. )

Phr. Rubi-Idæi (Pers.) (1211, Phr. gracile B.; Lec. gyrosa B.)

**MELAMPSORA** Cast., teleuto-spores of one or more cells, usually divided by vertical, less often by horizontal or oblique walls, united to form a compact flat spore-layer; uredo-spores borne singly on their basidia, and enclosed usually in a kind of peridium; æcidium as in Puccinia.

A.—Micromelampsora, only teleuto-spores known; none in Scotland.

B.—Hemimelampsora uredo and teleuto-spores known.

M. Betulina (Pers.) (1303).

M. Populina (Jacq.) (1301, and 1302, M. Tremulæ Tul.)

M. Salicis-capreæ (Pers.) (1304, M. Salicina Lev.; 1308, Lec. mixta Lev.; and probably 1309, Lec. Saliceti Lev.)

M. Helioscopiæ (Pers.) (1300, M. Euphorbiæ, Cast; most common as Lec. Euphorbiæ, the uredo-spores).

M. Lini (Pers.) (1311, Lec. Lini B.)

M. Cerastii (Pers.) (1286, Uredo Caryophyllacearum Johnst.)

M. Hypericorum (D.C.) (1285, Uredo Hypericorum).

M. Circæ Schum.



- M. *Epilobii* (Pers.) (1284, *Uredo pustulata*).  
 M. *Vaccinii* (A. and S.) (1288, *Uredo Vacciniorum*  
 Pers.)  
 M. *Padi* (K. and Schm.) (1287, *Uredo porphyro-*  
*genita* Kunze).

C.—**Melampsoropsis**, æcidio- and teleuto-spores known, but not uredo-spores; not known to occur in Scotland, though M. (*Calyptospora*) *Gœppertiana* Kuehn may be looked for on thickened orange-red branches of *Vaccinium Vitis-Idæa*).

**COLEOSPORIUM** Lev., teleuto-spores formed of several (usually four) cells standing one above the other, and united to form a compact waxy flat stratum, surrounded by a colourless gelatinous mass; each cell of the teleuto-spore in germination emits a simple promycelium, which forms on it a single sporidium; uredo-spores in short rows, forming powdery uncovered heaps; æcidium in a strong peridium, otherwise as in *Puccinia*.

A.—**Hemicoleosporium**, only uredo and teleuto-spores known.

C. *Euphrasiæ* (Schum.) (1299, C. *Rhinanthacearum* Lev.)

C. *Campanulæ* (Pers.) (1297).

C. *Sonchi-arvensis* (Pers.) (1298; 1294, C. *Tussilaginis* Lev.; 1295, C. *Petasitis* Lev.)

B.—**Eucoleosporium**, all three forms of spores known.

C. *Senecionis* (Pers.) (1347, *Peridermium Pini* Chev., and *P. aciculum* Link on *Pinus sylvestris* and *P. austriaca*; 2184, Col. *Senecionis* Fr. on species of *Senecio*).

#### APPENDIX.

Uredines of doubtful affinity, only uredo-spores or æcidio-spores being yet known in each.

**Uredo**.—Each spore produced singly on tip of a basidium.

U. *Polypodii* (Pers.) (1283, U. *Filicum* Desm.)

U. *Pirolæ* (Gmel.)

**Cæoma**.—Spores produced in rows; no peridium, paraphyses may be present or absent.

C. *Orchidis* (A. and S.) (1290, *Uredo Orchidis* Mart).

C. *Mercurialis-perennis* (Pers.) (1289, *Uredo confluens* D.C.)

C. *Empetri* (Pers.) (1291, sub *Uredo*).

**Æcidium**.—Spores in rows, surrounded by a peridium.

Æ. *Pedicularis* Lib. (1373).

Æ. *Compositarum* Mart. as regards the host-plants not mentioned above (1366 vars.)

- Æ. Periclymeni Schum. (1356, Æ. crassum var. Periclymeni D.C.)  
 Æ. Thalictri Grev. (1355).  
 Æ. depauperans Vize (2188.)  
 Æ. Grossulariæ Gmel.

In the September number of Grevillea, Mr. Plowright adds to his articles quoted above a few remarks (p. 36). 1. That the teleutospores of *Uromyces Poæ* Rabh., previously unknown in Britain, have been found abundantly this year on *Poa trivialis* and *P. pratensis* wherever these grasses grow near *Æcidium Ficariæ*. 2. That the *Æcidium* on *Ranunculus repens* is connected with *Urom. Poæ*, and not with *U. Dactylidis*. 3. That *Æc. Rumicis* is connected with *Puc. arundinacea*, and that it has followed the application of the spores of the *Puccinia* to *Rumex obtusifolius*, *crispus*, *Hydrolapathum*, and *conglomeratus*, as well as to common *Rhubarb*. 4. That no results have followed the same application to *Rumex acetosa*. 5. That as there is no *Puccinia* on *Gooseberry* known in Britain *Æcidium Grossulariæ* here is not a *Pucciniopsis*, but is probably heteroecismal.

As bearing on the same subject, it may be worth notice that Rostrup has recently (1883) published a paper on injurious Fungi in Denmark, in P. E. Mueller's "Tidskrift for Skovbrug," Vol. VI. (pp. 199 to 300), in which he claims that careful observations by himself and by Nielsen have proved that *Melampsora salicina* is heteroecious, and that *Cæoma Ribesei* and *C. Euonymi* are the *Æcidia* belonging to it; and he also asserts, on the same evidence, that *Cæoma Mercurialis* belongs to the cycle *Melampsora Tremulae*.

NOTE.—In the *Journal of Botany* for September, 1883, Mr. Grove describes the *Puccinia* (under the name *P. ægra*, *sp. n.*) developed from the same mycelium, on various species of *Viola*, as *Æcidium depauperans* of Vize, which fungus would thus require to be placed in the group AUTEUPUCCINIA of Winter's arrangement quoted above. As the *Æcidium* has been found by Dr. White in Perthshire, the *Puccinia* will probably also be found in Scotland, though apparently rarely developed. The changes to which it gives rise in the host-plants are so marked that its occurrence ought to be readily detected.

#### ON THE SPECIES OF PHRAGMIDIUM ON BRAMBLE (RUBUS FRUTICOSUS) IN SCOTLAND.

WHILE preparing the paper on Scottish *Uredines* (*vide supra*), I was led to re-examine my specimens of the *Phragmidium* on brambles, of which I have examples from a good many localities in Scotland, these localities being widely separated. I find that they all belong to the form known as *Phr. violaceum* Sch. as stated in my paper. The other form *Phr. rubi* (recorded by Mr. Plowright, from Yorkshire) has not fallen into my hands from any part of Scotland. Though it would be rash to assume that the latter does not occur with us, the former is certainly the common species throughout Scotland. The distinguishing characters will be found elsewhere in this number of the *Scottish Naturalist*.

JAMES W. H. TRAIL.



## ON SOME LEAF-PARASITES NEW OR RARE IN BRITAIN.

By JAMES W. H. TRAIL.

IN the course of the past summer I have met with two or three fungi, living in the interior of the tissues of the host-plant (for the most part in the leaves), of which I cannot find notices in our British lists. They have all been found in the vicinity of Aberdeen, and will doubtless be found to occur elsewhere if looked for.

**Doassansia Alismatis**, Cornu, was rather plentiful in the leaves of *Alisma Plantago*, in a small pool near Aberdeen at Cults. The fungus was described this summer in the "*Annales des Sciences Naturelles*" (vi. Ser., t. xv., 1883, 285, pl. 16, figs. 1-4). The genus is characterised as follows by its author (l.c.) :— "*In planta viva parasitica; spora coacervata, incarcerata. Cortex sori cellulis simplicibus, arcte adnatis. Germinatio sporarum, ut in Entylomatibus, coronam sporidiorum effingit.*" The species under review is characterised thus :—*D. Alismatis, effusa, circinans, in utraque pagina Alismatis Plantaginis. Junio mense in locis uliginosis.* Sori .2-.28 mm. diam., and .16-.2 mm. deep; spores .018-.012 mm. diam. The above description applies in all essential particulars to the specimens formed by myself; but some additional points may be noted here. The leaves for a time do not show much sign of injury; but here and there roundish spots, about 10-15 mm. across, begin to turn a yellowish-green. After a time the leaf assumes a fading aspect, its colour becoming a yellowish-green, verging towards brown, and in the spots occupied by the fungus a number of small dark dots may be seen, resembling the spore-clusters of a Puccinia. These are the spore-masses, enclosed in an envelope found of a layer of oblong or wedge-shaped cells, arranged side by side, with the narrow ends inwards. There are usually many of these masses in each spot. On making a transverse section of the leaf, the masses are seen to be usually rather flattened, the dimensions being from .16 mm. to .24 mm. in breadth, by about one-fourth less in depth. The spores are very numerous in each mass. They are nearly spherical, about .008 mm. in diameter (instead of from .012 mm. to .018 mm., as in France), pale brown, and thin-walled. The cells of the outer wall are brown in colour, and are about .02 mm. long by .008-.01 mm. broad.

**Entyloma Calendulæ**, Oudemans, is common in leaves of *Hieracium vulgatum* near Aberdeen, alike in shady spots in woods and on the bare sandhills along the coast; but I have not met with it before autumn. Its presence is easily detected, inasmuch as it causes in the leaves roundish spots about 5-6 mm. across. These spots are not thickened at all, but they become pale yellowish or whitish-green, changing after a time to brown as



the tissues of the leaf die at the spot. Frequently the dead tissues fall out, leaving a hole. The species belongs to the group of *Entyloma* that do not form conidia, *i.e.*, in which the spores do not begin to germinate while still on or in the spot in the leaf. On microscopic examination of a section of such a spot, the tissues are found to be full of the small cells of the fungus. The spores are rounded, .01-.012 mm. diam., smooth, with cell-wall nearly colourless or pale brown.

**Entyloma Canescens**, Schröter, (*Beitr. z. Biol. d. Pflanzen*, II., p. 372) occurred rather commonly on some plants of *Myosotis arvensis*, near Aberdeen, in the month of October. The presence of the fungus is indicated by spots on the leaves, 1-3 mm. diam., at first whitish, then turning brown or black as the tissues of the leaves dry up, or again becoming whitish in the centre, owing to the formation of conidia by the germination of the spores while still in or on the spot. On microscopic examination of the leaf, it is found filled with the spores of the fungus. These are nearly spherical, .008-.012 mm. diam., smooth, almost colourless, and rather thin-walled. They germinate while still in the leaf, forming a circle of sporidia at the end of a club-shaped pro-embryo. The sporidia are spindle-shaped, and are about .020-.040 mm. long. Dr. Keith sent me the same fungus from Forres, before I had myself gathered it, as *Protomyces Fergussoni* B. and Br., in which determination I believe he is right, so far as the very brief diagnosis of that species will allow of identification. It is, however, an *Entyloma*.

**Protomyces Rhizobius**, n. sp. While treating of internal parasites of plants, I may describe one found by myself, in May, 1883, on the roots of *Poa annua*, growing on a dry and seldom used road at Old Aberdeen. In the roots one finds from one to eight cells in groups, but very seldom in absolute contact. They lie in the cortex of the root; but owing to their size being much greater than that of the root-cells, it is hardly possible to ascertain whether they lie in the cells of the root or between them. Nor could I convince myself as to the nature of the mycelium, though able to make out what seemed to be a delicate mycelium. The fungus-cells are spherical, .03-.033 mm. diam., nearly smooth, and very thick-walled, the contents forming a mass of only about .008 mm. diam., and the wall occupying the rest of the diameter. It is pale brown or nearly colourless. The characters seem to agree best with those of *Protomyces*, but I can find no mention of a species living in roots of grasses, hence I venture to name this species **PROTOMYCES RHIZOBIUS**. Grasses attacked by it show very little sign of injury externally, though they look weakly; but the starved appearance might be passed over as due to the unfavourable place of growth.

## THE BOTANICAL WORK OF GEORGE DON OF FORFAR.

By G. C. DRUCE, F.L.S.

IN some numbers of the *Scottish Naturalist* for 1881 (April—October), appeared a most interesting account of “The Life and Labours of George Don,” by Mr. John Knox of Forfar, which drew attention to a long overlooked working naturalist.

The attention thus directed to his work has led me to think it will not be altogether without use if some supplementary material, having especial reference to the Botanical work of Don, be added, although I sincerely wish the task had fallen to one more able to do justice to the subject. My primary object in view is to draw the attention especially of northern botanists to the unverified plants of Don, some of which it is trusted may yet be found.

To myself, as probably to many other young botanists whose opinion had been gained by perusing the list of errors at the end of “The Student’s Flora,” or by the various paragraphs in the 6th or 7th edition of Hooker & Arnott’s British Flora, or even of Watson’s Compendium to the Cybele Britannica, Don seemed to rank pre-eminent in the list of loose, if not entirely unreliable recorders. I pictured to myself some long-legged, red-headed celt loaded with a wallet of garden plants going out surreptitiously to place one here, another there, later on recording with a flourish of trumpets the addition of a new plant to the British Flora, and gaining by this detestable trick any amount of *kudos* and recompense from the too easily imposed upon botanists of that day; and any one who picks out Dr. Arnott’s remarks in the British Flora will be induced to overlook this too hasty judgment.

Mr. Watson in the Cybele Britannica gives considerable details as to the localities, &c., of Don’s plants, and with his usual scientific exactness blames Don’s looseness and want of precision in describing localities, &c.: these remarks I shall later on refer to. Mr. Watson was our best Phytogeographer; he had a very complete knowledge of the various records of British plants, and of their geographical distribution, not alone in Britain but on the Continent; he was extremely keen in detecting “errors” and “impositions;” he was merciless in punishing and exposing mistakes; neither wealth or position for a moment deterred him; our leading botanists, such as Professor Balfour, Professor Babington, Dr. Trimen, &c., at one time or another fell under his lash; so that if his opinion be quoted, one can rely that justice will not be influenced by undue mercy. This is what he says:—“It appears that Don was in the habit of bringing the plants, found on his excursions, into his garden for cultivation, and there can be scarcely a doubt that he occasionally gave or sold plants from his garden without explaining that they were not sent direct from native localities but indirectly through his own garden. When we add to this obvious source of error on the part both of sender



and receiver, the fact that botanists were far less particular about the nativity of specimens some half century ago; and also that George Don not having had a scientific education, was loose even among the *loose in his* (?) indications and reports of localities, the presumption of frequent errors becomes very strong. Hence I come to the conclusion that every thing reported by, or from, Don, and remaining unverified after modern search, ought to be excluded from our list of native plants and their stations; it being safer in science to take the chance of losing a few small truths of small detail, than to run the great risk of mingling many errors with our presumed facts. Still I do not see that anything at present known of his conduct or any necessary inferences from known facts would sufficiently warrant us in charging him with intentional deception or wilful falsehood. My individual impression is that George Don's report of species and stations, though many of them were doubtless correct, cannot safely be relied on in strict science unless confirmed afresh, but that a fair degree of moral confidence should still be given to his statements." (*Cybele Britannica*, note under *Lychnis alpina*; suggested by Arnott's accusation of Don's sowing the plant in Clova).

After this important statement and summary of his opinions by one so well qualified to judge, it will be well to quote at length the list of unverified plants recorded by Don from Sir Joseph Hooker's *Student's Flora*, and afterwards give the various opinions expressed by Dr. Arnott in the *British Flora*, Dr. Boswell in *English Botany*, and Mr. Watson in the *Cybele Compendium*, later on supplementing these with my own opinions formed after seeing Don's original specimens in his collection of grasses and rushes, and in the nine volumes of his fasciculus of British plants in the possession of Mr. John Knox of Forfar; and a collection of plants sent in a living state to the fourth Countess of Aylesford (for the purpose of painting some volumes of English plants, still probably in existence at Packington Hall), and afterwards preserved by her and kindly lent me by her granddaughter, Miss C. E. Palmer; while reference will also be made to Sir James E. Smith's *English Flora*, to Gardiner's *Flora of Forfar*, to Hooker's *Flora Scotica*, &c.

(The following contractions will be used in the subjoined notes : *St. Fl.*—Hooker's *Student's Flora*; *Brit. Fl.*—Arnott's *British Flora*; *C. C. Brit.*—Watson's *Compendium* of the *Cybele Britannica*; *Cyb. Brit.*—Watson's *Cybele Britannica*; *Eng. B.* or *E. B.*—Sowerby's *English Botany*, edited by Dr. Boswell Syme; *Bab. Man.*—Babington's *Manual of British Botany*; *Gard. Fl. F.*—Gardiner's *Flora of Forfarshire*; *Pl. of Forfar*—Don's *Plants of Forfarshire*.)

These species are as follows :—

*Ranunculus alpestris* L. Clova mountains.

“Don, never confirmed,” *St. Fl.*, “apparently from Don's



garden" Arnott's; *Brit. Fl. ed. vi.*, "A specimen from Don marked rocks near the head of Clova, has the aspect of a wild one;" *Br. Fl. ed. vii.*, "G. Don in Smith Herb., Clova mounts, now generally excluded from our list." *C. C. Brit.*, "It is difficult to decide under what category of citizenship this alpine *Ranunculus* ought to be placed. The existence of a specimen in Smith's herbarium, with a memorandum that it was collected in Forfar by Mr. G. Don, seems very good evidence in favour of its nativity, and yet no other botanist among the many who have searched the mountains of that country has ever detected an example of the species. Moreover, its geographical distribution otherwise would not much incline us to expect the species in Scotland, since it is not found in Scandinavia nor any of the Arctic lands. At the time when Mr. Don collected, it was not the custom with botanists to be very particular in recording the locality and distribution of plants, and they might not always be sufficiently careful in keeping British and foreign, or wild and garden, examples of the same species apart from each other." *Cyb. Brit.* "No doubt Mr. Don made some mistake in thinking he found it there." *Boswell's Eng. B.*

Against the foregoing statements we must say that in the *English Flora* (vol. XXXIV. 2390), by Sir James Smith, *R. alpestris* is said to have been gathered by the side of little rills and other moist places about two or three rocks of Clova; it flowers very early in the spring, and Mr. Don says it rarely produces flowers, and is very easily overlooked from the similarity of its foliage to that of other species. Mr. Don found it on April 3rd, 1809. (*See also Lin. Trans. X. 343*). After this precise statement by Mr. Don, we must, I think, be inclined to believe he found it somewhere wild in Forfar; and it must be remembered few botanists visit the Clova mountains so early in the season—April and May—while, unless in flower, the plant would be by no means conspicuous. At any rate, attention should be directed to the possibility of re-finding it. *Carex frigida* is an example of an alpine Sedge not found in Scandinavia, yet occurring in our Scotch Highlands, so the geographical distribution is not entirely against its nativity there.

Nyman in his *Sylloge* gives the Pyrenees, Juras, Alps and Carpathians as its European range.

*Caltha radicans* Forst.

"Unknown except as a garden plant," *Brit. Fl.* "Forfarshire, Don" (known now in cultivation only). *St. Fl.* "Mr. Forster, who first defined this species of *Caltha*, favoured us with specimen from his garden which agrees with wild ones sent by Mr. John. G. Don from Scotland, except that in the latter the stems are more erect. Mr. Forster's plant was found in Scotland by Mr. Dickson." Smith's *English Flora*, vol. XXXI. 2175.

"*Caltha radicans* may be retained as a book species in compliment to its author, but it is no species in nature apart from *C.*

*palustris*. Hooker correctly places one as a variety of the other." *Cyb. Brit.* Province 15, in a ditch, Carse, Forfar, 1790, G. Don, Syn. 26, *Cyb.* 1792. *Bab. Man.* vii. 12.

"Var. *b. radicans*, Hook." *Gard. Fl. F.* 5.

"In a ditch that runs from the farm house, called Haltown, on the estate of C. Gray, Esq. of Carse, Forfarshire, 1790, Mr. G. Don. No other botanist has, I believe, found this, but if the station is not destroyed, future research may determine whether it is not identical with *C. palustris, minor*, the alpine state of the common plant."

*Caltha radicans* Forst. only escaped inclusion in the list of Don's "reputed discoveries" from its being given as a variety of *C. palustris* in the *Student's Flora*.

Arnott's positive statement shows rather the opinion of an advocate than a judge. This plant, as your readers are aware, has been refound by Mr. W. Graham near Rescobie, where he pointed it out to me in 1882. The plant is very different from *C. minor*, although, size excepted, it is nearer that than *palustris*; probably the rich muddy locality, shaded with trees, which, acting through a long course of time, has been the primary cause of its peculiarities. It will probably turn up in other localities. The marshes by Loch Cluny, &c., would be likely places.

*Rapistrum orientale* D. C.

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## MEETINGS AND PROCEEDINGS OF SCOTTISH SCIENTIFIC SOCIETIES.

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[NOTE.—Accounts of meetings during the month preceding date of issue of any number of this magazine are too late for insertion in that number, but will appear in the following one.]

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### BRITISH ASSOCIATION MEETING AT SOUTHPORT.

IN the meeting of 1883 it can hardly be said that there were any subjects discussed that related to Scottish biology or geology, or of a nature specially interesting to Scottish students of science. Full accounts of the meeting from its social side having appeared in all the leading newspapers, it is unnecessary to refer to that aspect of it here. The papers in the various sections were quite up to the standard of former years in point of interest; but for a full account of them we must refer those interested to the next volume of the Reports. The presidential addresses in the sections were:—in the Biological section, by Professor E. Ray, Lankester, "*On the advancement of Science in Biology in England*;" in the Anthropological section, by W. Pengelly, F.R.S., on "*Cave-hunting in Britain, more especially in so far as throwing light on the antiquity of man in these islands*;" and in the Geological section, by Professor W. C. Williamson, F.R.S., "*On the present state*



*of our knowledge of the fossil vegetation of the Carboniferous Age, illustrated by specimens and diagrams."*

In the Geological section, papers were read by Mr. James Thomson, "*On a Coral Atoll on the shore line at Arbigland, near Dumfries,*" and "*On a Conglomerate with Boulders in the Laurentian Rocks of South Uist, Scotland.*"

The Committee appointed for obtaining records of "*Observations on the Migration of Birds at Lighthouses and Lightships,*" presented an interesting report on the year's results from 196 stations along our British coasts, the Faroes, Iceland, Heligoland, and one station in Zealand. From it we extract the following general conclusions:—

"As in preceding years, the line of migration has been a broad stream from east to west, or from points south of east to north of west, and covering the whole of the east coast. In 1882 the stations north of the Humber show a marked preponderance of arrivals. Altogether a vast migration took place this year upon our east coast, the heaviest waves breaking upon the mouth of the Humber, Flamborough Head, the Farne Islands, Isle of May at the entrance of the Firth of Forth, and again, after missing a long extent of the Scotch coast, at the Pentland Skerries. The Bell Rock also came in for a share, though apparently a much smaller one than the Isle of May. The easterly winds prevailed all along our east coasts, generally strong to gales, and the succession of south-easterly and easterly gales in October, between the 8th and 23rd, occurring as they did at the usual time of the principal migration, brought vast numbers of land birds to our shores. From the Faroes in the north to the extreme south of England this is found to have been the case.

"Although migration, that is direct migration on our east coast, is shown to have extended over a long period, commencing in July and continuing, with but slight intermissions, throughout the autumn and into the next year to the end of January, yet the main body of migrants appear to have reached the east coast in October, and of these a large proportion during the first fortnight in the month. From the 6th to the 8th inclusive, and again from the 12th to the 15th, there was, night and day, an enormous rush, under circumstances of wind and weather, which observations have shown are most unfavourable to a good passage. During these periods birds arrived in an exhausted condition, and we have reasons for concluding, from the many reported as alighting on fishing smacks and vessels in the North Sea, that the loss of life must have been very considerable. Large flights also are recorded as having appeared round the lanterns of lighthouses and light-vessels during the night migration. From the 6th to the 9th inclusive, strong east winds blew over the North Sea, with fog and drizzling rain, and from the night of the 12th to the 17th, very similar weather prevailed. Mr. W. Littlewood, of the Galloper



lightship, forty miles south-east of Orfordness, reports that on the night of October 6th, larks, starlings, tree-sparrows, titmice, common wrens, redbreasts, chaffinches, and plovers were picked up from the deck, and that it is calculated that from 500 to 600 struck the rigging and fell overboard; a large proportion of these were larks. Thousands of birds were flying round the lantern from 11.30 P.M. to 4.45 A.M., their white breasts, as they dashed to and fro in the circle of light, having the appearance of a heavy snowstorm. This was repeated on the 8th and 12th, and on the night of the 13th 160 were picked up on deck, including larks, starlings, thrushes, and two redbreasts. It was thought that 1000 struck and went overboard into the sea. It is only on dark, rainy nights, with snow or fog, that such casualties occur; when the nights are light, or any stars visible, the birds give the lanterns a wide berth.

“Undoubtedly the principal feature of the autumn migration has been the extraordinary abundance of the gold-crested wren. The flights appear to have covered not only the east coast of England, but to have extended southward to the Channel Islands and northward to the Faroes. . . . During the autumn enormous numbers crossed Heligoland, more especially in October. On the night from the 28th to the 29th, Mr. Gätke remarks:— ‘We have had a perfect storm of gold-crests, perching on the ledges of the window-panes of the lighthouse, preening their feathers in the glare of the lamps. On the 29th all the island swarmed with them, filling the gardens and over all the cliff, hundreds of thousands. By 9 A.M. most of them had passed on again.’ Not less remarkable was the great three days’ flight of the common jay, past and across Heligoland, on October 6th, 7th, and 8th. Thousands on thousands, without intermission, passed on overhead, north and south of the island too, multitudes like a continual stream, all going east to west in a strong south-easterly gale. It would have been interesting if we had been able to correlate this migration of jays with any visible arrival on our English coast, but in none of the returns is any mention made of jays. Subsequently we have received numerous notices of extraordinary numbers seen during the winter in our English woodlands. This seems especially to have been the case south of a line drawn from Flamborough Head to Portland Bill in Dorset. Additions and unusual numbers were also observed at Arden on Loch Lomond side.

“The returns show very clearly that the spring lines of migration followed by birds are the same as those in the autumn, but of course in the reverse direction, from west and north-west to south and south-east. Another point worth noting is the occurrence of many species in spring at the same stations frequented by the species in autumn. Thus double records occur at the Mull of Galloway, Bell Rock, and Isle of May, as well as at some English stations.

“As this is the fourth report issued by the Committee, we may perhaps, with the mass of facts at our disposal, be expected to draw deductions which, if they do not explain, may serve at least to throw some light on the causes influencing the migration of birds. We might reasonably reply that the work undertaken by us was not to theorise, or attempt explanations, but simply to collect facts and tabulate them; this we have endeavoured to do in the shortest and simplest manner consistent with accuracy of detail. There is, however, one circumstance which can scarcely fail to present itself to those who have gone carefully into the reports issued by the Committee, namely, the marvellous persistency with which, year by year, birds follow the same lines, or great highways, of migration, when approaching or leaving our shores. The constancy of these periodical phenomena is suggestive of some settled law or principle governing the movement. It is clearly evident, from the facts already at our disposal, that there are two distinct migrations going forward at the same time, one the ordinary flow in the spring and ebb in the autumn across the whole of Europe. A great migratory wave moves to and from the nesting-quarters of the birds in the coldest part of their range, north-east in the spring, and south-west in the autumn. Quite independent of this there is a continual stream of immigrants, week by week and month by month, to the eastern shores of these islands, coming directly across Europe from east to west, or more commonly from points south of east to north of west, and the reverse in the spring. These immigrants are mainly composed of those common and well-known species which annually make these islands their winter-quarters, and as a rule take the place of our summer birds. They come in one broad stream, but denser on some special lines or highways than others. Cutting the line of ordinary migration nearly at right angles, one flank brushes the Orkney and Shetland islands, pouring through the Pentland Firth, even touching the distant Faroes; the southern wing crosses the Channel islands, shaping its course in a north-westerly direction to the English coast.”

During the meeting the question of the relation of the scientific societies of Great Britain to the British Association and to one another, as also the best means of utilising the work done by them to make it of permanent value, was considered by a committee of the Association, and also by a meeting of delegates from a number of the Societies. The final report of the Committee will soon be submitted to the Council of the Association. It will form the subject of an article in the next number of this Magazine.

It is probably known to all our readers that the meeting in 1884 is to be held in Montreal in Canada; and that of 1885 in Aberdeen.

CRYPTOGAMIC SOCIETY OF SCOTLAND.

The Cryptogamic Society of Scotland held its ninth Annual



Conference at Dumfries, on the 11th, 12th, and 13th of September last. Owing to local circumstances, the Society had to meet thus early in the season—too early, as had been anticipated, for the Mycologists.

At the business meeting, after the transaction of ordinary business, the President, Dr. Gilchrist, delivered his annual address, in which he dwelt chiefly on fossil Cryptogams. The following papers were then read:—

1. "Heterœcism in the Uredines," by Professor J. W. H. Trail. Our readers will find this in the last and present numbers of the *Naturalist*.

2. "Heterœcism of Leaf Fungi," by Mr. R. Turner. The Author referred to recent discoveries, and described some of the instances in which heterœcism seems clearly established by experiment and observation, such as the relationship between the Cluster-cap of the Barberry and the rust and mildew of wheat, and that between *Rœstelia cornuta* on the Mountain ash, and *Gymnosporangium* on Juniper. He then dwelt upon the advantages which heterœcism affords in the life-history of these parasitic plants, and upon the advantages which an accurate knowledge of their relationships would afford in enabling us to check their ravages.

3. "On the Fungus of the Potato disease," by Mr. T. King. After giving a short life-history of the potato mould, *Peronospora infestans*, and expressing the belief that faulty methods of cultivation, continued through many generations, have enfeebled the constitution of the potato plant, and rendered it less able to resist the attacks of parasitic fungi, Mr. King gave interesting details of experiments with potatoes which he had procured from Chili, where the methods of cultivation differ materially from those which are common in this country, and where the disease is unknown. The results were very varied. The plants grew luxuriantly, but did not prove to be disease-resisting. These tubers were from the south of Chili, where the climate resembles that of Britain. Mr. King also stated that he had this year received tubers of another variety from North Chili. These gave promise of a good crop; but it was too early when he wrote to ascertain how far they would be capable of resisting disease. He had, however, observed the spots on the leaves, which showed the presence of *Peronospora infestans*. Specimens of the Chilian potatoes were exhibited.

4. Lists of Mosses, Lichens, and Hepaticæ found in Kirkcudbrightshire, were laid before the Society by Mr. James M'Andrew. The list of Mosses numbers 250 species, exclusive of varieties; that of Lichens, 198 species; and that of Hepaticæ, 75 species. These lists, containing rare and interesting species, form a most valuable addition to the Cryptogamic Flora of the south of Scotland.

The public exhibition of Cryptogams far surpassed expecta-



tion. The Fungi as usual proved the most attractive feature of the show. These were admirably grouped among moss on long narrow tables, and a fine display of potted ferns, including all the British species, with three exceptions, heightened the effect of the collection. One table was devoted to named specimens, and another to the edible and poisonous species. A separate table was also devoted to named Lichens. The walls were adorned with mounted specimens of various Cryptogams, and with a large collection of beautifully hand-painted studies of fungi. Fresh Algæ were represented on this occasion. These were placed in flat baths containing salt water, and their odour, especially on the second day, helped to temper that of the fungi.

A separate room was devoted to dried specimens, and to microscopic demonstrations. In this department all the Cryptogams were well represented, and only specialists could realise the vast amount of labour which had been expended on these collections.

It would lead us far beyond the limits of our space to mention even the names of those who contributed, by their energy, to the success of the meeting. Enough to say that their labours had been highly appreciated, and that the impulse which they have given to an interest in Cryptogamic botany is their highest reward. Such public meetings and exhibitions as those which are held from time to time under the auspices of the Society exert an influence for good beyond awakening the interest in Cryptogamic botany, which is likely to produce direct results to science. They open the eyes of many, if only to wonder. "Notwithstanding the sneers of some people," as was well said by Sheriff Hope, the Vice-President of the Society, in opening the exhibition, "they serve their purpose by providing food for thought, and stimulating a search after the beautiful and the true." Nay, even those who have associated toad-stools only with the moonlight revels of imps and fairies in forest glades, and who seem to feel that we Cryptogamists have robbed them of their poetry by dragging them together into the daylight of such a show, acknowledge that they "shall not be able to kick over a 'paddock-stool' again without stopping to admire its delicate colour and curious formation, and without a passing reflection on the wonderful family of which it is a member."

Various excursions were made in the neighbourhood, and the weather proved exceptionably favourable.

Owing, doubtless, to the meeting being held so early in the season, fewer varieties than usual were met with. Among fungi may be mentioned *Agaricus virosus* Fr. ; *A. aureus* Mattusch ; *A. calamistratus* Fr. ; *Lactarius capsicum* Schulz. ; *L. camphoratus* Bull. ; *Polyporus dryadeus* P. ; *Hydnum gelatinosum* P. ; *Rhizina undulata* Fr. *Agaricus virosus*, *A. calamistratus*, *Polyporus dryadeus*, and *Rhizina undulata* have been previously

recorded, but they seem to be comparatively rare in Scotland. *Agaricus aureus* Malt. has not been found hitherto in Britain, though *A. VahlII*, which Fries regarded as a variety of *A. aureus*, has been recorded. The typical *aureus* now found is a finer plant, being remarkable for its great size, for its rich colour, and for its beautiful velvety pileus. *Lactarius capsicum*, with its chestnut-coloured pileus and somewhat orange gills, is new to the British flora; and *Hydnum gelatinosum*, a plant of singular beauty in its form, tremelloid habit, and delicate colouring—being almost translucent with steel-blue tints shading into violet, while the spines are of a pure soft white—has not hitherto been met with in Scotland. Few *Cortinari* were seen, and these only the commoner species.

The next annual meeting of the Society is to be held at Kelso, under the presidency of William B. Boyd, Esq., of Faldonside. We may add that communications should now be addressed to Rev. John Stevenson, Glamis, Forfarshire, who has been appointed Hon. Secretary to the Society, in room of Dr. Buchanan White, resigned.

J. S.

THE DUMFRIES-SHIRE AND GALLOWAY SCIENTIFIC, NATURAL HISTORY,  
AND ANTIQUARIAN SOCIETY

HELD its annual general meeting on the 5th October. There was an attendance of about 40 members—Dr. Gilchrist, the president, being in the chair. Several objects of interest to the members were exhibited; and the Secretary intimated a donation from Mr. M'Andrew of a fine collection of upwards of 500 mounted specimens of Mosses, Lichens, and Hepaticae from the south-west of Scotland, to be deposited in the Observatory, along with the other collections belonging to the Society. Reports were submitted by the Secretary and the Treasurer of a very satisfactory kind. From these reports we gather that besides the meetings of the Society, a course of lectures was organised last winter on subjects of scientific and antiquarian interest, and that these lectures drew large audiences, and considerably increased the popularity of the Society. During the autumn there was a good deal of special work incurred in making arrangements for the meeting of the Scottish Cryptogamic Society in Dumfries, and for the accompanying fungus show. In another page will be found evidence of the care and success with which this work was performed, and of the pleasure enjoyed by those that visited Dumfries as members of the latter Society. We see also that the antiquities of Dumfries and its surroundings are religiously watched over, and that there is little cause to dread injury to them, either through neglect or wilful damage, while they find so watchful guardians. The Society proposes to publish transactions for the past three years.

The second monthly meeting of this Society was held on Friday, November 2nd, when Dr. Sharp read a suggestive paper on the "Socialological Value of Entomology," in which he drew attention to its value educationally, as well as in other ways. Mr. Starke followed with an account of some of the more remarkable features of the "Museums of Brussels," observed during a visit in the autumn of 1883.

KIRKCUDBRIGHTSHIRE FIELD NATURALISTS' CLUB.

At a meeting of the above Club, held on November 1st, Dr. Gilchrist, of



Dumfries, took as the subject of his remarks the action of water, alike in forming sedimentary deposits and in weathering and destroying them, illustrating the subject from what is known of the effects produced by rivers and lakes of the present era. He thereafter touched on the action of glaciers and of the atmosphere, both at rest and in action.

#### HUNTLY FIELD CLUB.

Professor James Trail, of Aberdeen, on November 9th, gave an account of the life-history of some of the fungi more destructive to field crops in Aberdeenshire, and of the methods that have been suggested to lessen the injuries sustained from them.

#### INVERNESS SCIENTIFIC SOCIETY AND FIELD CLUB.

The opening meeting was held on Tuesday, November 13th, when Mr. J. Fraser, C.E., the retiring president, read a paper on the stone circles of the neighbourhood. Of these there are 25 mapped in the valley of Srathnairn alone, and between the Strath and the River Ness there are at least 12 more. The subject excited a keen discussion subsequent to the paper. The financial position of the Society was reported satisfactory. The syllabus for the ensuing winter includes the following subjects:—"Travelled Boulders of Lochaber," by C. Livingstone; "Old Iron-works at Loch Maree," by J. H. Dixon, supplemented by J. E. Marr; "Plants of Palestine," by A. Ross.

#### THE ABERDEEN NATURAL HISTORY SOCIETY

Held its first meeting for the winter session on Tuesday, 20th November. The reports of the Secretary and Treasurer showed the Society to be in a healthy condition. After the election of office-bearers for the year, Professor Trail directed the attention of the members to the groups of plants (Fungi and Lichens), and of animals that have not yet been properly wrought out in the vicinity of Aberdeen, and urged the desirability of efforts being made to supply these blanks in the knowledge of the local flora and fauna, more especially in view of the meeting of the British Association in Aberdeen in 1885. Three excursions in connection with the Society were made during the summer (to Banchory and the Slack of Birnie, to Loch Kinnord, and to the Loch of Strathbeg, near Peterhead). An account of the excursions was deferred till a subsequent meeting.

#### KIRKCALDY NATURALISTS' SOCIETY.

The syllabus for the present winter gives promise of an interesting session. It is as follows:—"Insectivorous Plants," by J. D. MacFarlane, D.Sc.; "Stone Implements," by A. Mathewson, C.M.S.A.; "Some Points in the Chemistry of Plants and Animals," by F. W. Young, F.C.S.; "Leaves: their Development, Structure, and Functions," by A. H. Gibson; "Morphology of Plants and Animals," by Pat. Geddes, F.R.S.E.; "Ancient Husbandry," by Chas. Howie.

#### PERTSHIRE SOCIETY OF NATURAL SCIENCE.

The syllabus of the Society is as follows:—"On the Occurrence in Perthshire of Bones of the Red-deer in a Sub-fossil Condition," and "Some Results of the Challenger Expedition," by Dr. F. B. White; "Dimorphism in Gall-makers, and in their Galls," by Prof. J. W. H. Trail; "The Life-history of a Garden Snail," by H. Coates; "The Flora of Perthshire," by Dr. F. B. White; "How an Insect Flies," by S. T. Ellison; "Remarks on Fruit Culture, and the Hindrances to its more General Adoption," by Dr. Robertson.



TRANSACTIONS AND PROCEEDINGS OF THE BOTANICAL SOCIETY OF  
EDINBURGH.

Vol. XIV. Part III. Obituary notices of Sir Robert Christison, of Sir C. Wyville Thomson, of G. Stoddard Blackie, and of W. Jameson. Dr. J. Stirton, "On Lichens from Newfoundland, from New Zealand, and from the South of Scotland;" R. Bullen, "Report on the Vegetation in the Garden of the Royal Botanic Institution, Glasgow, from January till November, 1882;" J. Sadler, "Report on Temperatures and Open-air Vegetation at the Royal Botanic Gardens, Edinburgh, from November, 1881, till July, 1882;" Id., "Notes on the Table of Flowering of Plants in the Royal Botanic Gardens, Edinburgh, from 1850 to 1882;" Id., "Notes on Memorial Trees Planted in the Royal Botanic Gardens, Edinburgh."

## PROCEEDINGS OF THE NATURAL HISTORY SOCIETY OF GLASGOW.

Vol. V. Part II., sustains the well-known character of the preceding volumes. Among the papers in it a number refer to Scotch subjects strictly, while others relate to subjects from other parts of the world. The titles of the former are as follows:—"Notes on *Orthogoriscus mola* L., caught in the Firth of Clyde," by J. M. Campbell; "The Islands and Rocks of Haskeir, off North Uist, and their Bird-life," and "The Flannan Islands and their Bird-life," both by J. A. Harvie-Brown, F.Z.S., with sketches of the Islands in each case; "Meteorological Notes and Remarks on the State of Vegetation in the Public Parks of Glasgow, during the Year 1881, by D. M'Lellan; "Ornithological Jottings from the Neighbourhood of Loch Lomond, for 1881," by James Lumsden, F.Z.S.; "Some notes on *Goniocypris mitra*," by Thomas Scott, announcing that the author had ascertained, from an examination of specimens from the Glasgow and Paisley Canal, that this creature, formerly supposed to be an Ostracode, is in reality the larva of *Anodonta cygnea*; "On *Bubo ignavus*, the Eagle Owl," from near Ardrishaig, by J. M. Campbell; "Additional Notes on the Birds of the North-west of Perthshire," and "Notes on the Mammalia of Buchan," both by Wm. Horn; "Notes on the Fossils found in a Thin Bed of Impure Carboniferous Limestone at Glencart, near Dalry, Ayrshire," by John Young, F.G.S.; "Notes on the Flora of West Kilbride and Ardrossan," by D. A. Boyd. Among the notes of exhibitions we observe, as of special interest, the following as new to Scotland:—The gall, and both sexes of the insect *Spathogaster verrucosus*, on oaks from Mugdock Wood, by P. Cameron; *Hyperammia arbuscula*, Norman (a Foraminifer previously known only from Greenland) and *Pelosina variabilis*, Brady, both from Cumbrae, by D. Robertson, F.L.S.; *Stenophylax infumatus*, M'L., by J. J. King; a fine series of remains of fish, crustaceans, &c., from Garvel Park, Greenock, by James Steed, the most interesting feature in the collection being remains of *Cancer Pagurus* and *Hyas*, showing the antiquity of these forms in Scotland.

The deaths of four members are noted during the year—Edward R. Alston, James Allan, Arthur Pratt, and Daniel Reid Rankin, M.D.

We are glad to notice that an arrangement has been entered into with the Town Council of Glasgow, whereby the Society undertakes to form and hand over to the Town Council collections of British invertebrata and plants, accurately named and arranged, while the Town Council undertakes to supply the requisite materials, cabinets, and register, such collections to be deposited in Kelvingrove Museum.

## PROCEEDINGS OF THE PERTHSHIRE SOCIETY OF NATURAL SCIENCE.

Vol. II., pt. III, 1882-83, is, as usual, a record of good work, not only in the way of papers read during the session, but also in the practical side of excursions made with the view of extending the knowledge of the fauna and flora of Perthshire, and still more in adding to the Museum of the Society, and in making the collections full and reliable indications of the riches of the county. The residents of Perth will, beyond doubt, feel pride in the existence of so well-organised an institution in their fair city, while strangers passing through Perth will now be able, even though with little time at their disposal, to gain a fair knowledge of the leading features of its fauna and flora. That the Society may have great success and satisfaction in the good work that they have undertaken must be the wish of every lover of botany and of zoology.

Besides the reports of the officials of the Society, and of the meetings held during the previous session, the following papers are printed *in extenso*:—"The Present Condition of the Museum," by Dr. F. Buchanan White; "Light," by Dr. T. Miller; an obituary notice of Mr. John Sadler, late Curator of the Edinburgh Botanic Gardens, by the Secretary; "Autumn Tints: their Why and Wherefore," by H. Coates; "The Cultivation of Fruit on Waste Lands and Pleasure Grounds," by Dr. Robertson; "Mimicry in Insects," by S. T. Ellison.

Four excursions were made during the summer to the following places, viz. : 1. Banks of the Tay below Errol; 2. Methven; 3. Loch Ordie; 4. Kincardine Glen. These excursions were, as usual, productive alike of pleasure to those who took part in them, and of information as to the natural productions of the districts visited. Space will hardly allow us to enter into any analysis of the results here, however.

## SCIENTIFIC JOURNALS.

*Journal of Botany*, September—W. B. Grove, "A new Puccinia" (describes, under the name *P. ægra*, the Puccinia developed from *Æcidium depauperans* Vize, on cultivated violets, and which has not before been recorded; the *Æcidium* has been found at Perth by Dr. White, *Sc. Nat.*, VI., 121); W. West, "A new British Liehen" (*Synalissa intricata* Arn., found by Mr. J. M'Andrew, on the north side of Black Craig, New Galloway). October—W. Joshua, "Notes on British Desmidiæ." Among the species enumerated in this paper are numerous examples from the province "Dee," mostly the result of Mr. Roy's investigations. The species mentioned are new to Britain, or else rare with us. The following are enumerated from "Dee:"—*Closterium calosporum* Wittr., *C. linea* Perty, *C. Leibleinii* Kuetz., *Micrasterias fimbriata* Ralfs, var. *ornata* Bulnh., *M. conferta* Lund (also in Arran), *Euastrum inerme* (also in Arran), *Cosmarium exiguum* Arch., *C. cyclicum* Lund, *C. Schliephackeanum* Grun., var. *Spitzbergenses* Nordt., *C. plicatum* Reinseh (large form), *C. quadrifarium* Lund (in Arran), *C. sublobatum* Arch., *C. obliquum* Nordt., *C. notabile* var. *minus* Wille, *C. pachydermum* Lund, var. *minus* Nordt., *C. bicrenatum* Nordt., *C. sportella* Breb., *C. annulatum* Näg., *C. anceps* Lund, *C. Holmiense* Lund, var. *integrum* Lund, *C. globosum* Bulnh., *Arthrodesmus tenuissimus* Arch., *A. bifidus* Breb., *A. Incus* Hass., var. *intermedius* Wittr., *Zanthidium octo-*



corne Ralfs, *Staurastrum Meriania* Reinsch, *S. acarides* Nordt. (from Stirling, new to Britain), *S. orbiculare* Ralfs, var. *extensum* N., *S. Maamense* Arch., *S. pileolatum* Breb., *S. capitulum*, var. *amœnum* Hilz., *Penium Lagenarioides* Roy, n. sp. (Arran), *P. crassiusculum* DeBy., *Spirotaenia muscicola* DeBy., *Sphaerosoma pulchellum* Arch., *S. filiforme* Ehr., *Cosmocladium constrictum* Arch., *C. saxonicum* Rabh.

R. Braithwaite, "A new British Moss," *Trematodon ambiguus* (Hed.) Hornsch. (found on the moor near Tummel Bridge in Perthshire, growing in the centre of a tuft of *Brynm pallens*). G. C. Druce, "*Cerastium Holo-steoides* Fr." (found on the banks of the Cree, a few miles from Newton Stewart, in Wigton and Kirkcudbright).

*Grevillea*—December:—"New British Fungi," by Dr. M. C. Cooke, includes only one Scottish species, viz., *Lacterius capsicum* Schnlz., sent from Dumfries by Rev. J. Stevenson.

Dr. Cooke has commenced a revised edition of his well-known "*Hand-book of British Fungi*," in the form of an appendix to "*Grevillea*," but paged separately, so as to allow of the work when completed being bound separately. In the December number 38 species of the Leucosporous Agarici are described. The advertisement states that "Comments on the several species have not been attempted, since these will be provided for in another work now in course of preparation by the Rev. Jno. Stevenson."

"British Fresh-water Algæ," by Dr. M. C. Cooke, has now reached its sixth part; in this are included the *Ulotrichaceæ* and the *Chaetophoraceæ*, illustrated with twelve plates.

*Science Gossip*, December, 1882, p. 277, *Chelifer Degeerii* C. Koch, new to Britain, found in September on the rocks near North Berwick, among loose earth in the fissures, by Mr. Henry Crowther; verified by Mr. Cambridge. On the British Bramble Phragmidia, by Mr. C. B. Plowright (1883, pp. 11-13, with figures); records the occurrence of two species commonly confounded under the name *Phr. bulbosum*; these are *Phr. Rubi* Pers. and *Phr. violaceum* Schultz; the former has the uredo-spores in small roundish sori with pale yellow delicately echinulate spores, and its teleuto-spores are 3 to 8-celled (usually 5 to 6-celled), with moderately long apical papilla; the latter species has the uredo-spores in rather large roundish sori, with yellow round coarsely echinulate spores, and its teleuto-spores show 3 to 5 cells (4 being the usual number), and the apical papilla is shorter. New British Species of Mucorini, by W. B. Grove, B.A. (l. c., p. 68), records the occurrence of *Pilobolus adipus* Mont., (stem short and thickish; swelling turbinate; columella very obtuse, piercing the sporangium nearly to the summit; spores spherical, granular, unequal in the same sporangium, 10.5-1.48., with a distinct epispore, germinating easily in water; on cow's or pig's dung); *P. Kleinii* Van T. (stem slender and elongated; swelling ovoid; superior hemisphere of the sporangium not reticulated; columella conical; spores oval-oblong, variable, averaging 15 by 8., not germinating in pure water; on horse and cow dung); these species have been confounded by observers with *P. crystallinus* Tode; *Pilaira Cesatii* Van T.—*Pilobolus anomalus* Cesati (resembles *Pilobolus* in structure of sporange, differing in not projecting the latter explosively, and also in being much taller, reaching above an inch in height as contrasted with 1 inch); its columella is hemispherical, the lower half forming an apophysis below the sporange; stem cylindrical, not septate at base; among Mucor on horse dung; *Chaetocladium Brefeldii* parasitic on *Thamnidium elegans*; *Piptocephalis Freseniana* De B. and W. parasitic on *Mucor*: The Flora of Ben Laoigh by P. Ewing, (l. c., pp. 152-54) gives an enumeration of the flowering plants, vascular cryptogams, mosses and Hepaticae found by Mr. Ewing on Ben Laoigh in Perthshire in the course of about a fortnight in the summer of 1882. The record will be found of interest by botanists in general, and more especially by the botanists of Perthshire. The Aecidium of *Ranunculus Ficaria*, by C. B. Plowright, (l. c., p. 160), notes the occurrence at King's Lynn of uredo, and teleuto-spores of *Uromyces Poae* Rbh. on *Foa trivialis* as the result of a search on the grass in the neigh-



bourhood of *Ran. Ficaria* bearing *Accidium Ficarie*. The *Uromyces* had not previously been observed in England, but Mr. Plowright has received it from correspondents at Saltaire in Yorkshire and at Ely, to whom he had suggested to look for it in the neighbourhood of attacked plants of the *Ranunculus*. (December)—“**An Ancient Atoll-reef**,” is a summary of the paper read at the meeting of the British Association in Southport, by Mr. James Thomson, F.G.S., on the Lower Carboniferous Limestone Beds at Arbigland Bay, fifteen miles to the south of Dumfries. He concludes that the domes and simple corals imbedded in the mud, just as we find in Atolls of the present seas, plainly point to similar conditions to those now existing. The Arbigland Atoll is said to be the first recorded of Carboniferous age. “**The Carboniferous Corals of Scotland**,” is a notice of Mr. Thomson’s labours in the elucidation of the fossil Corals of the Carboniferous period in Scotland; it is accompanied by fine figures of twelve corals, to show the results attained, by a process of his own discovery, in figuring these organisms. The figures seem to leave nothing to be desired in beauty and accuracy.

*Zoologist*, Third Series, Vol. VII., 1883. “**Late breeding of Swallows and Martins in Kirkcudbrightshire**,” by Robert Service. “**Nestling Grey Plover from the Orkneys**,” *query* (on p. 179), by Rev. H. A. Macpherson, *respecting the authenticity of a specimen in the Hope Collection in Oxford; answered* (on pp. 334, 335) by O. V. Aplin, *that the specimen is authentic, but is probably the young of the Lapwing, not of the Grey Plover*. “**Grey Shrike and Waxwings in Aberdeenshire**,” by J. Whitaker, *taken in spring of this year*. “**Ornithological Notes from Skye**,” by Rev. Hugh A. Macpherson, pp. 358-362.

*Entomologist’s Monthly Magazine*, Vol. XX., June to September, 1883. (June)—Annotated List of British Anthomyidæ, by R. H. Meade (continued); A new British Trichopteron (*Mesophylax aspersus* Ramb., var.), by J. J. King, *taken in Torqueer parish, Dumfries-shire, by Mr. Service*. (July)—Notes on new British Coleoptera since 1871 (cont.), by Rev. W. W. Fowler, *treats of the Rhynchophora and Longicornia*. (August)—The British Species of *Dicyphus*, by Dr. O. M. Reuter; Annotated List of British Anthomyiidæ (cont.), by R. H. Meade. (September)—Natural History of *Endromis versicolor*, by William Buckler; Occurrence of *Argynnis Euphrosyne* in Sutherlandshire, by H. T. Stainton; Note on *Eudorea murana* in Sutherlandshire, by H. T. S.; *Scutigera (Cermatia) Coleoptrata* near Aberdeen, by Thomas D. Gibson-Carmichael. *In Stonewood paper works they have been established for over 25 years and breed freely, principally in warm moist rooms; in the same note it is mentioned that Lithobius variegatus Newp. is common and generally distributed in the west of Scotland*. (October)—Annotated list of British Anthomyidæ (concluded), by R. H. Meade. (November)—*Catocala Fraxini* near Culross, by Alf. Beaumont. *Panorpa germanica*, var. *borealis* (Leach) Steph., *(at Tongue in Sutherland)*. *Elipsocus cyanops* Rost., in Scotland *(at Kilmun)*, both by J. J. King. Captures of Coleoptera near Pitlochry, by Alf. Beaumont.

QUARTERLY JOURNAL OF THE GEOLOGICAL SOCIETY.

Vol. XXXIX, 1883. (May):—“*On the Metamorphic and Overlying Rocks in parts of Ross and Inverness Shires*,” by Henry Hicks, M.D. (pp. 141-159, pt. VI.), relates to the district from Loch Maree southwards. Dr. Hicks sums up as follows:—“The whole of the evidence obtained from these examinations tends, therefore, to confirm the views maintained in my former paper, that the crystalline schists of these areas must be all of pre-Cambrian age, and that they are not the equivalents of the fossiliferous silurian rocks of the southern Highlands and of Wales.” Appendix to the preceding paper by Prof. T. G. Bonney, entitled “*Note on the Lithological Characters of a Series of Scotch Rocks Collected by Dr. Hicks, F.G.S.*” (pp. 159-166). (August):—“*The Age of the Newer Gneissic Rocks of the Northern Highlands*,” by G. Callaway, D. Sc. (pp. 355-414), relates to the districts of Loch Broom, Assynt, and

Loch Eriboll. The problem investigated is the relation between the eastern gneiss and the fossiliferous Durness limestone; and Dr. Callaway states, on p. 357—"The view which I have here to submit approximates most nearly to that of Nicol. I maintain, with that author, that the junction of the limestone with the eastern gneiss is a line of faulting and inversion, but I shall attempt to prove that this gneiss is a distinct series, newer than, and resting unconformably on, the Hebridean, that Nicol's "igneous rock," overlying the limestone, is usually a true gneiss, and that both the older and younger gneissic systems have been brought up over the limestone by great earth-movements. The eastern gneiss I propose provisionally to name the 'Caledonian.'" Appendix to the last paper by Prof. Bonney, entitled "*Notes on a Series of Rocks from the North-west Highlands, Collected by G. Callaway;*" "*On the Basalt Glass (Trachylyte) of the Western Isles of Scotland,*" by Prof. John W. Judd, F.R.S., and Grenville A. J. Cole, F.G.S. (pp. 444-463, pts. xiii.-xiv.)

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## REVIEWS.

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**Topographical Botany**, by the late H. C. Watson. Second Edition, corrected and revised by J. G. Baker and W. W. Newbould.

BOTANISTS, taking the term in its widest sense, may be divided into three or four classes. First of all we have the mere plant-collector, the height of whose ambition it is to add a new species to his herbarium. Lowly as is the position of such in the scientific army, yet, provided that he be painstaking and conscientious, his labours, altogether apart from the personal benefit accruing from an intercourse, however slight, with Nature, are not without their value.

To the second class belongs the Systematic Botanist, who studies plants with the intention of discovering their relationships to each other, as species, genera, and orders, and who, except in so far as light may be thrown thereby on his own special pursuit, does not concern himself with plants in their relations as *living* organisms. It is the endeavour of a third class to penetrate behind the veil that, to a greater or less extent, conceals all the phenomena of life, and that makes us feel that "things are not as they seem." There is yet a fourth class whose occupation it is to collect and digest facts relating to the distribution of plants, whether in time or over the Earth's surface.

Though Mr. Watson may be said to have belonged to more than one of these classes, yet his name will always be associated specially with the study of plant-distribution in Great Britain. For a considerable period of his life he was most diligent in collecting, weighing, and arranging all accessible information as to the leading facts in this department of Geographical Botany; and he has bequeathed his successors a rich legacy in the works issued by him. Of these the latest is the one now before us, which in its first edition must be familiar to the majority of British botanists.

We have said "first edition," and the volume now issued is called the "second edition;" but as the first issue of the work was never, in the strict acceptance of the term, *published*, but was privately printed, and, by the generosity of its author, given away to many botanists, this would probably in the language of the "Trade" be termed the first edition.

Be that as it may, the present issue contains considerable additions to the information given in the former. Most of these were collected by Mr. Watson himself; but the accomplished editors have added others from various sources, while preparing the work for publication from his annotated copy and his



notes. From the preface we learn that it was his intention to have in some respects remodelled the book, but the material left by him was insufficient to permit of his intention being acted upon in this edition; hence its form remains unaltered.

A comparison of the two editions shows that not a little has been done in extending our knowledge of the comital distribution of British plants since the first appearance of the work; but it shows no less that a good deal still remains to be done as regards some of the counties of Scotland, more especially in the South and in the North-west districts of the country. May we not hope that there are botanists in or near these counties that will remove this reproach. In the introduction it is stated that "for Wigtown and for Peebles we have still no records for the commonest species. For some other counties the lists of ascertained 'common' plants are very incomplete, although not wholly blanks; for example, Stirling, &c." Many of our Scottish botanists are, perhaps not unnaturally, tempted to make their excursions to Breadalbane, Clova, Braemar, or other places well known for their rare plants, rather than to unknown regions in which the chance of discovering rarities is problematical; but, even in the absence of resident botanists, most of the gaps could be filled to a considerable extent, at least for the common species, were a few days devoted to the less explored counties, and complete lists kept of the plants observed in them. We understand that efforts in this line have already been made for one or two of the neglected areas, though too late to be incorporated in this edition. It is unfortunate that the artificial division into *counties* was adopted by Mr. Watson, instead of the natural divisions that are now employed in noting the distribution of the Scottish Fauna and Flora. For a good many of the divisions there would not be much difficulty in bringing them into correlation in the two systems; but for others it would be almost impossible now to make full use of the information collected by him.

Apart from the unexplored districts, we may reasonably anticipate a considerable addition of records, even from the better known counties; indeed, we may say that a careful examination of the lists contained in this volume has resulted in our observing a number of alterations to be made even in the well-wrought district of the *East Highlands*, using the term in the sense given to it by Mr. Watson. We cannot suppose that the same does not hold good for almost every county on the list; and we invite records in completion of the valuable work so ably carried on by the author. To him we owe it that the knowledge of the geographical distribution of British plants is placed on a solid basis, so that subsequent additions can be intercalated without difficulty. To him also do we owe it that we are able to see at once where our efforts are specially required to complete the structure so largely built up by himself.

**The Fertilisation of Flowers**, by Prof. Hermann Müller (Lippstadt), translated and edited by D'Arcy W. Thomson, B.A. Macmillan & Co., 1883.

PERHAPS no subject in the wide range of botanical studies has undergone so rapid a development within past years among us, or has aroused more general and deep interest than the fascinating researches into the relations existing between flowers and insects; and yet up to the present time, except the small though excellent work on "British Wild-flowers in relation to Insects," by Sir John Lubbock (originally published in "Nature," and afterwards as a separate volume), we have had no special work relating to the modifications of insects and of flowers mutually serviceable. Numerous papers have indeed



appeared from the pens of Mr. A. W. Bennett and other well-known naturalists, in various magazines, of which the "Popular Science Review" may be specially mentioned; but scattered papers are not sufficiently convenient for ready reference, and are frequently apt to be overlooked. On the Continent of Europe, more attention has been paid to these inquiries, and for a far longer period than with ourselves; and to those that have interested themselves in this direction the names of Sprengel, Hildebrand, Delpino, Axell, Kuntz, Errera, Kerner, and many others, will at once suggest themselves; but in the forefront must be placed the name of Professor Hermann Müller of Lippstadt, who has for many years occupied himself assiduously and most successfully with such researches in Germany, and in the Alps and Tyrol. His death in 1883 has left a blank that none at present can claim to fill. In 1873 he published his classical work: "*Die Befruchtung der Blumen durch Insekten und die gegenseitigen Anpassungen beider*," founded on his own observations, but also including those of his predecessors in this field. To this he added three appendices, under the title: "*Weitere Beobachtungen über Befruchtung der Blumen durch Insekten*," in the years 1879, 1880, and 1882. In 1881 he published the results of personal observations on the Alpine flora specially, in a large octavo of more than 600 pages, entitled: "*Alpenblumen, ihre Befruchtung durch Insekten und ihre Anpassungen an dieselben*."

Occasional articles by him have appeared in "Nature;" but, owing to no English translation of any of his books having been published, the results of his labours have been accessible to but a comparatively small proportion of those amongst us to whom they would be of peculiar interest. It is matter of congratulation that this is the case no longer, since Mr. Thompson has supplied English readers with the stores of information to be found in Prof. Müller's books in an attractive form. Nominally this is only a translation of the first-named of Dr. Müller's works; but, while making that the basis of his translation, Mr. Thompson has incorporated in the latter the results contained in the later works also, at least so far as of interest to British naturalists; and has also added notes and details from other sources where these could add to the value of the work. He has altered the arrangement of the systematic portion of the book, substituting the order in Hooker and Bentham's "*Genera Plantarum*" for Endlicher's system, which had been followed in the original. The change will facilitate its use in Britain.

A most valuable addition has been made to the literature of this field of study in the form of a comprehensive Bibliography, compiled by the translator, of all works relating to the subject of the book. A glance at the list of papers quoted will show at once the need of such a compilation, and how well Mr. Thompson deserves the thanks of all interested in such pursuits. A very characteristic and suggestive preface by Charles Darwin adds to the value of the translation. To Dr. Darwin's works on the advantages of cross-fertilisation, and on the methods by which it is secured to plants, far more than to any other cause, can be traced the great and general awakening of an intelligent appreciation of the importance of a knowledge of their value, not only to the botanical physiologist, but also to the systematic botanist. Here, as in all else that he touched, he was the pioneer of marvellous progress.

The book is divided into four parts—viz., Historical Introduction (29 pp.); The Insects which visit Flowers (38 pp.); The Mechanisms of Flowers (501 pp.); and a General Retrospect (29 pp.).

It is of course impossible here to attempt to give even an indication of the very wide information contained in the book—to learn that, reference must be made to the work itself; nor will a careless reader find it easy to appreciate the extent or interest of that information. But those that are willing to study it, as it deserves to be studied, and to strive to verify for themselves the results recorded in it, will find it one of the most interesting works in a most interesting field that has been published in the English language. And they will find how fully the works of Professor Müller deserve to be considered an addition to the knowledge of the mutual causal relationships in organic nature (“*Ein Beitrag zur Erkenntniss des ursachlichen Zusammenhanges in der organischen Natur*”), as he claims for them on the title-page of his first book.

May we not hope that this translation will exert a great effect in stimulating a love of such pursuits among us, pursuits open to all, and that require for their successful prosecution only accuracy and perseverance.

That there are a few errors in the translation may be regarded as inevitable, and doubtless if, as may be anticipated, a second edition is found necessary, these will be corrected. Hearty thanks are due to Mr. Thompson for the success with which he has put within the reach of many what was as a sealed book to them in the original. While on this subject, we are reminded of another translation of a German work on the allied subject of the means of protection against unsuitable insect visitors—viz., *Flowers and their Unbidden Guests*,” translated from Dr. Kerner’s work, in 1878, by Dr. Ogle. Probably it is already known to some at least of our readers.

It may also be worth noting that in the Linnean Society’s Journal of Zoology (Vol. XVII., 1883), will be found two papers on insect-visitors to flowers—viz., “*On the Constancy of Insects in their Visits to Flowers*” (pp. 175-185), by A. W. Bennett, M.A., &c.; and “*On the Methodic Habits of Insects when visiting Flowers*” (pp. 186-194), by R. M. Christy.

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## SCOTTISH TRICHOPTERA.

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IT is the intention of Mr. Kenneth J. Morton and myself to publish in the *Scottish Naturalist* a list of the *Trichoptera* of Scotland.

We wish to make it as complete as possible, and with this object venture to ask Entomologists who have collected insects of this order for local lists and any other information they may be able to give. We shall also be happy to name specimens, and in the case where Lepidopterists or others may have picked up odd specimens, such we shall be glad to see, provided the locality where they were captured is known. These and communications may be forwarded to Mr. Morton, High Street, Carlisle, N.B.; or to me,

JAMES J. KING, 207 Sauchiehall Street, Glasgow.

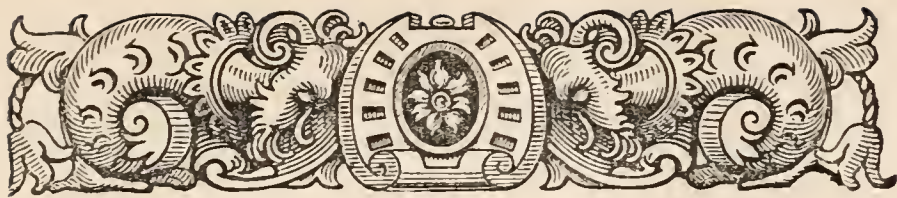
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BOOKS RECEIVED.—Zoologist, October—December; Grevillea, December; Sixth Annual Report of the Hackney Microscopical and Natural History Society; Sunlight, Nos. 1 to 3; Hedwigia, January—October, 1883; Proceedings of the Natural History Society of Glasgow, Vol. V., Part 2; Proceedings of the Perthshire Society of Natural Science, Vol. II., Part 3.

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NOTICE TO CORRESPONDENTS.—Communications, either longer articles or notes on all branches of the Botany, Zoology, and Geology of Scotland, or bearing upon these sciences, are solicited. Contributors will oblige by sending their communications, clearly written on one side of the paper only, to the Editor, Professor Trail, M.D., Kent Cottage, King Street Road, Aberdeen, not later than the beginning of the month preceding the issue of the number in which the writer wishes it to appear. If unused MS. is desired in any case to be returned, the writer will oblige by stating the wish when the MS. is sent to the Editor, who will not hold himself responsible for MS. in any case. The Authors alone are responsible for the contents of their papers.





ON THE RELATION OF THE SCIENTIFIC SOCIETIES OF BRITAIN TO THE BRITISH ASSOCIATION, AND ON THE BEST MEANS OF GIVING A MORE PERMANENT VALUE TO THE WORK OF THESE SOCIETIES.

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DURING the past three years the above problems have been carefully discussed, alike by meetings of delegates of the societies themselves, and by the Council of the British Association; and also by a Committee appointed by the Council specially to prepare a scheme to indicate how they might be solved. The results of the deliberations of this special Committee are now formally under the consideration of the Council, and will be brought before the General Committee of the Association in the course of the coming year. The Committee's report has been printed in the Report of the Association for 1883, and we are now able to give some particulars of the proposals it contains, with which we have been supplied. Believing the subject to be of great interest and importance in respect of the probable effect in stimulating the societies to greater activity, and thereby adding to the results of permanent value attained by them, we shall make use of the information we have received to give a brief sketch of what has passed, and of the present position of matters.

A desire had been felt for some years by several members of the British Association to utilise its exceptional influence in the scientific community in the direction of making it an organising centre of the work done in the numerous local scientific societies of the country; and in 1880, at the meeting held at Swansea, this desire took practical shape in the form of a meeting of delegates from several societies, present at Swansea as members of the British Association. At this conference it was resolved to hold a similar conference annually. In 1881, at York, the Council of the British Association were empowered to appoint a Committee "*to consider the number and position of delegates from Scientific Societies, and the regulations which should be adopted for governing their relations to the Association.*" In the following year, at the Southampton meeting of the Association, this Committee recom-



mended that each Society should be represented on the General Committee of the Association only by the President for the time being of the Society, or in his absence from the Association, by a delegate representing him. This recommendation was adopted by the General Committee; in the fear apparently that, if a larger representation were allowed the Societies, the latter might exercise too great a power at times in the decisions arrived at in the General Committee. That body also, at the Southampton meeting, adopted the following resolution:—“*That the Council be empowered to appoint a Committee, as recommended in their report adopted by the General Committee on August 23rd, in order to draw up suggestions upon methods of more systematic observation and plans of operation for Local Societies, together with a more uniform mode of publication of their work. It is recommended that this Committee should draw up a list of Local Societies which publish their proceedings.*”

This special Committee was accordingly appointed, with Mr. Francis Galton as Chairman, and Mr. H. G. Fordham as Secretary, and drew up a Preliminary Report, which was circulated amongst the various Societies, prior to the meeting of the Association in Southport last year. The expressions of opinion received from several Societies, and also by the Conference of Delegates held at Southport to consider this Preliminary Report, have been fully considered by the Committee in drawing up the Final Report; and the latter report may be regarded as supported by the general approval of the scientific opinion of Great Britain. We shall now proceed to quote the recommendations contained in it, as the Report of the Association will probably not come into the hands of a considerable proportion of our readers.

Space will not permit of our giving a full reprint of the introductory paragraphs of the Report, hence we shall limit ourselves to the following extract from the introduction:—

“Believing that the British Association is fitted by its constitution and position to become an organising centre of local scientific work, and that through an extension of the system of delegation from Scientific Societies, which has already been recognised in the Rules of the Association, this object may be attained, the Committee venture to make the following proposals, thrown into the form of Rules which, if approved, may be inserted amongst the Rules of the Association, with such amendments in the existing Rules as may be necessary in consequence.”

The following are the

SUGGESTED NEW RULES FOR CORRESPONDING SOCIETIES.

“(1). Any Society is eligible to be placed on the list of Corresponding Societies of the Association which undertakes local scientific investigations, and which publishes notices of the results of such investigations, especially if they are such as are carried on by Committees of the Association. (Amongst such topics during the past five years have been, Luminous meteors; Meteoric dust in various localities; Rainfall; Erosion of sea-coasts; Height of underground waters; Erratic blocks; Underground temperatures; Anthropometric collections; Photographs of typical races and crosses; Ancient earthworks; Pre-historic remains; Migration of birds at light-houses and light-ships; Periodical natural phenomena, such as flowering of plants; Injurious insects, their first appearance, &c.; Working of Education Code in elementary schools; Rudimentary Science in schools; Wind-pressure on buildings.)

“(2). Application may be made by any Society to be placed on the list of Corresponding Societies. Applications must be addressed to the Secretary on or before the first day of June preceding the annual meeting at which it is intended they should be considered, and must be accompanied by specimens of the publications of the local scientific investigations recently undertaken by the Society.

“(3). A Corresponding Societies Committee shall be appointed by the Council for the purpose of considering these applications, as well as for that of keeping themselves generally informed of the annual work of the Corresponding Societies, and of superintending the preparation of the list of papers published by them. This Committee shall make an annual report to the Committee of Recommendations, and shall suggest such additions or changes in the list of Corresponding Societies as they may think desirable, subject only to the conditions—(1) That the number of Societies on the list shall not exceed that which may be from time to time prescribed by the Council; (2) That the intended removal of any Society from the list shall not take effect until immediately before the commencement of the next annual meeting.

“(4). Every Corresponding Society shall transmit each year, on or before the first of June, to the Secretary of the Association, a copy of its publications during the preceding twelve months, and shall at the same time return, properly filled up, a schedule, which will be issued by the Secretary of the Association, and will contain a



request for such information with regard to the Society as may be desirable.

“(5). There shall be inserted in the annual Report of the Association a List, in an abbreviated form, of the papers published by the Corresponding Societies during the past twelve months which contain the results of the local scientific work conducted by them; those papers only being included which refer to subjects coming under the cognisance of one or other of the various Sections of the Association.

“(6). A Corresponding Society shall have the right to nominate any one of its members, who is also a member of the Association, as its Delegate to the annual meeting of the Association, who shall be for the time a member of the General Committee. The appointment of a Delegate to any annual meeting must be formally notified to the Secretary of the Association by the Secretary of the Corresponding Society not later than the first of July preceding that meeting.

“CONFERENCE OF DELEGATES OF CORRESPONDING SOCIETIES.

“(7). The Delegates of the various Corresponding Societies shall constitute a Conference, of which the Chairman, Vice-chairmen, and Secretaries shall be annually appointed by the Council, and of which the members of the Corresponding Societies Committee shall be *ex-officio* members.

“The Conference of Delegates shall be summoned by the Secretary of the Association to hold one or more meetings during the annual meeting of the Association, and shall be empowered to invite any member or associate to take part in the meeting.

“The Secretaries of each Section shall be instructed to transmit to the Secretaries of the Conference of Delegates copies of any recommendations forwarded by the Presidents of Sections to the Committee of Recommendations bearing upon matters in which the co-operation of Corresponding Societies is desired; and the Secretaries of the Conference of Delegates shall invite the authors of these recommendations to attend the meetings of the Conference, and to give verbal explanations of their objects, and of the precise way in which they desire to have them carried into effect.

“It shall be the duty of the Conference of Delegates to make themselves familiar with the purport of the several recommendations as brought before the Conference, in order that they and others who take part in the meetings may be able to bring the recommendations clearly and favourably before their respective Societies. The



Conference may also discuss propositions bearing on the promotion of more systematic observation and plans of operation, and of greater uniformity in the mode of publishing results."

The Committee add to the above proposals the following arguments in their favour, which arguments we commend to the consideration of our readers :—"The Committee believe that the distinction accorded to a Society through its selection and formal recognition by the British Association as one of its Corresponding Societies, the advantages of a widely circulated notice of its local work in so important a volume as the Report of the British Association, and the honourable and useful duties assigned to the Delegate, would give a considerable value to the title.

"They also anticipate that a Society which had asked for and received recognition as a representative centre of the scientific institutions in its district, would be thereby stimulated to exercise that very creditable and important function with increased zeal and efficiency. The result would be to strengthen the mutual relations between the larger and smaller Societies, to insure the encouragement of any disposition to co-operate in systematic investigations, and to establish a practice of printing the scattered results obtained by the smaller Societies of any district in a consolidated form in the publications of their leading Society.

"Finally, the Committee believe that the annual meetings of the proposed Conference of Delegates, under the Chairmanship of a distinguished member of the Association, would have large influence in harmonising the action of their several Societies, without in any way tending to compromise their independence, and that they would offer a facility that does not now exist for the natural and healthy growth of a federation between remote Societies which have no more direct bond of union than the British Association."

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#### FEDERATION OF THE NATURAL HISTORY SOCIETIES IN THE EAST OF SCOTLAND;

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CLOSELY akin to the proposals discussed by the Committee of the British Association, as set forth in the preceding article, and intended to promote the same end of combining the work of the Scientific Societies scattered over the country in a way not previously attempted in Scotland, is the federation of

several of the eastern Scottish societies, which we have this month the pleasure of reporting as an accomplished fact.

The advantages of such combination among our societies have been recognised fully by probably not a few of their members ; and the first step in that direction was made two or three years ago in the meeting of the Northern Scientific Societies, a meeting that has since been held annually. But the ties uniting the societies that have joined in this meeting have been very loose ; and it has seemed desirable that there should be a closer bond of union in well-recognised districts, the various societies in which should set certain aims in common before them, and should endeavour by concerted action to further the objects of these societies throughout the district. To the Perthshire Society of Natural Science, and especially to Dr. Buchanan White, must be ascribed in great part the credit of bringing the matter to the point of action.

The result of some preliminary discussion as to how the proposed combination of societies in the east of Scotland could be best and most usefully carried out was, that the following circular was signed in name of the Natural History Societies of Aberdeen, Dundee, and Perth, and was sent to the secretaries of all the societies from Fifeshire to Aberdeenshire inclusive :—

“The members of several Scientific Societies in the east of Scotland having had under consideration the advantages that would result from a federation of the various societies, believing that thereby the value of their scientific work would be greatly increased and their objects promoted, have determined to call a meeting of delegates from the various scientific bodies in the east of Scotland, to be held at the Perthshire Natural History Museum, Tay Street, Perth, on Saturday, 9th February next, at 1 P.M. At this meeting it is purposed to consider the question of federation, and how it may be best carried out, and also to adopt a constitution, and to arrange for a first general meeting.

Some of the advantages of such an association may be briefly stated :—

1. Increased value of work by having an aim in common.
2. Increased zeal amongst members by definite work being put before them.
3. Improvements in method of carrying out excursions.
4. Increased facilities for intercourse amongst the different societies.

The idea of a federation of societies is not a new one. In

England, the societies of three large districts have formed associations, with excellent results ; and though in Scotland no unions of a similar nature have yet been formed, the joint meetings (inaugurated by the Inverness Scientific Society) of some of the northern societies, which have taken place annually during the past two or three years, have been a step in the same direction. We hope that your society will be pleased to send two delegates (who will be your representative members in the first council) to the meeting. The enclosed draft of a constitution will explain what is contemplated."

In response to this circular, out of thirteen societies, the total number in the district in question, nine sent delegates, two explained that they hardly could be classed among Natural History Societies, and two sent no reply. The following societies, enumerated in alphabetical order, were represented. The names of the representatives from each are in brackets after the name of the society. They were :—

Aberdeen Natural History Society (Mr. John Roy and Prof. J. W. H. Trail).

Alford Field Club and Scientific Society (Rev. J. Gillan and Mr. James Ross).

Arbroath Horticultural and Natural History Association (Dr. Crichton).

Dundee Naturalists' Field Club (Mr. James Brebner).

Dundee Naturalists' Society (Mr. J. Martin White and Mr. F. W. Young).

Kirkcaldy Naturalists' Society (Mr. W. D. Sang and Mr. James Shepherd).

Largo Naturalists' Field Club (Mr. John Gilmour and Mr. Geo. Russell).

Montrose Natural History and Antiquarian Society (Dr. Howden).

Perthshire Society of Natural Science (Mr. Robert Pullar and Dr. Buchanan White).

Dr. White having been called to the chair, the delegates proceeded to consider the propositions mentioned in the invitation quoted above, and in the draft of the proposed constitution. A lengthy discussion followed, with the eminently satisfactory result that complete unanimity was arrived at ; and the federation was at once effected, the representatives of five of the societies being empowered in name of their respective societies to enrol them in the



federation. The other delegates were no less cordial in their approval, though not authorised fully to commit their societies to enter the federation ; but they pledged themselves to do what they could to induce them to join. We believe that all these societies since the meeting have signified their approval of the action of their delegates, and have joined the Union on the basis of the subjoined constitution, which was agreed upon at the meeting in Perth. The Union thus begins with a membership of over 1,300.

#### CONSTITUTION OF THE UNION.

“ 1. The Association shall be called ‘The East of Scotland Union of Naturalists’ Societies.’

“ 2. The objects of the Union shall be the promotion of joint-action in scientific work by the various societies that enter it, and of friendly intercourse amongst its members.

“ 3. Every Scientific Society in the counties of Aberdeen, Fife, Forfar, Kincardine, Kinross, and Perth, shall be eligible for membership in the Union.

“ 4. The business of the Union shall be conducted by the President, along with a Council of Representative Members, two members being elected annually by each society in the Union. The Council shall appoint one of its members to act as secretary and treasurer.

“ 5. The President of the Union shall be a man of scientific eminence connected with the district. He shall be elected by the Council, and shall not hold office during two consecutive years.

“ 6. A general meeting of the Union shall be held annually at the headquarters of the societies in rotation, regard being had, however, to the size and importance of the several societies in determining the frequency of recurrence of each place of meeting, the place to be determined by the Council. At this meeting the President shall deliver an address, the work of the Union shall be discussed, papers shall be read, and reports shall be submitted on subjects previously defined by the Council. One or more excursions shall be made.

“ 7. In addition to the annual general meeting, other meetings in promotion of the objects of the Union shall be held from time to time, at such times and in such places as the Council may select. At all meetings, both of the Union and of the Council, should the President be absent, the senior representative member of the society in whose district the meeting is held shall be chairman.

“ 8. The meetings of the Union shall be open to all the members of every society in it.

“ 9. The expenses of the Union shall be defrayed by an annual subscription from each society, the sum for which each is assessed being in proportion to the number of subscribing members in it, and the amount for the year being determined by the Council.

“ 10. Notice of the meetings shall be sent by the Secretary of the Union to the secretary of each society, who shall then intimate the same to each member of the society.

“ 11. The Union shall publish ‘Transactions’ from time to time. The Council shall determine what papers shall be published, and shall appoint an editor annually.

“ 12. Motions of any alterations in, or additions to, the constitution of the Union must be brought before an annual general meeting, and to be carried must have the votes of not less than three-fourths of those present. Notice of any such motion must be sent to the secretary at least two months before the meeting, in order that he may intimate the same to the secretaries of the societies.”

The delegates thereafter resolved themselves into the first meeting of Council of the Union, and decided that the first general meeting shall be held in Dundee on Friday and Saturday, June 6th and 7th, 1884. Dr. Buchanan White, F.L.S., was elected President for the current year, and Mr. F. W. Young was appointed secretary and treasurer. Both gentlemen intimated their acceptance of office.

A Committee of the Council (the President, Mr. Brebner, Dr. Crichton, Mr. J. Martin White, and the Secretary, Convener) was then appointed to report to a meeting of Council, to be held in Dundee about the middle of March, “on the best methods of conducting the business of the Union, and on the business to be brought before the general meeting in June.”

On the conclusion of the business, Mr. Pullar entertained the delegates of the various societies, along with the members of Council of the Perthshire Society of Natural Science, to dinner in the Victoria Hotel. A most pleasant evening was passed—a foretaste, it may be hoped, of the pleasure that will arise from the more frequent opportunities that will now be afforded of making and of renewing acquaintanceships among the members of the societies in the east of Scotland.

That the advantages of the step just taken have been fully



recognised, and the need of it felt, is proved by the very cordial and hearty response to the invitation by the societies. May we not hope to see similar federations for similar objects in the rest of Scotland at no distant date, followed by community of aims and concerted efforts by these federations. From such efforts we might reasonably hope to witness a rapid advance no less in the real achievements than in the popular interest in, and true appreciation of, the natural sciences in our midst.

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### THE PERTSHIRE NATURAL HISTORY MUSEUM.

BY F. BUCHANAN WHITE, M.D., F.L.S.

(Continued from page 104.)

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IN the first part of this paper I have described what has been done in the "Index" or "Type" department of the Museum. It now remains to give a brief notice of the chief or Perthshire department. The specimens in this are intended to illustrate, in as complete a manner as possible, the natural history of Perthshire, and every specimen in it has been obtained in the district. It was indeed at one time suggested that species of great rarity, and of which *local* specimens could not be readily obtained, should be represented by examples of exotic origin till such time as they could be replaced by Perthshire ones; but as these would not be *vouchers* of the occurrence in the district of these species, and as errors might thus easily arise, it was decided that none but Perthshire examples should be admitted. As a matter of fact, though we use the word "Perthshire," the district whose natural history is embraced by the museum includes a little more than the county of Perth. A large extent of the boundaries of the shire are natural ones, but in other parts they are entirely artificial. Especially is this the case on the eastern side, where an imaginary line cuts off from Perthshire a few miles of the Tay, which river is otherwise altogether in the county. At this point we have therefore ignored the artificial boundary, and adopted a more natural one by including in the district the whole of the Tay. The area embraced is consequently more correctly termed "Perthshire and the Basin of the Tay."

To illustrate the distribution of species, the area has been divided into a number of sub-districts, defined by the geological formation and the watersheds. The geological formation alone divides the county into two great sections—the Devonian and the Silurian—which, moreover, correspond with the physical features, the Devonian being the lowland, and the Silurian the highland, portion of the county. These two districts are subdivided into



thirteen others, the boundaries of which are for the most part the watersheds of the chief tributaries of the Tay. It is unnecessary in this paper to enter into details of these districts, and mention has been made of them merely to show that when the natural history of each is illustrated by specimens a considerable amount of space will be required in the Museum, though, as they may be expected to bring out many interesting features, this space will be well utilised.

As in the Index collection, so in the Perthshire collection every specimen is kept under glass. For this purpose tall cases, constructed of mahogany and plate-glass, have been provided for the larger specimens; and for the smaller ones, cabinets below the table-cases. The tall cases are about eight feet in height, and vary in length and breadth according to their situation. Without entering into lengthy details of the specimens already procured, a few words on the means adopted for showing them will probably not be devoid of utility to others interested in forming a local museum.

The mammals and birds are all mounted on stands of white wood, plainly varnished, and differing only in size and shape according to the specimen which is placed upon them. A light frame-work of iron in each case carries movable bars, upon which are placed shelves of plate-glass, or, for heavier specimens, shelves made of stout iron-wire painted white. By this means the light is not intercepted, and, as the tops of the cases are also in most instances constructed of glass, each specimen can be well seen. To the stand of each specimen is attached a label, giving as much information as is possible in a small space. The information thus conveyed by these labels includes:—1, The common name of the species; 2, the scientific name; 3, the local (*i.e.*, the Perthshire) name or names, both lowland and highland, when such exist; 4, the place and the district whence the specimen came; 5, the sex, the stage (*i.e.*, in the case of mammals, whether in summer or winter fur; in the case of birds, the plumage, whether that of summer or winter, of the breeding period, or transitional from one to the other, or of the young or the adult), and the date when obtained; 6, the habit or mode of life of the species, as, for example, in the case of birds, whether it is permanently resident, a summer or a winter visitant, or a casual visitor; 7, the food; and 8, the name of the donor of the specimen. Though most of the labels are only 3 × 2 inches, yet by a little care a great deal of interesting information can be given. In addition to this, each specimen is numbered, and its history preserved in a catalogue with corresponding numbers.

The collection of mounted specimens is supplemented in two ways, though as yet not very much has been done in these. One is by having skeletons of each species, and the other by having a collection unmounted. The latter is kept in drawers in the

cabinets below the table-cases, and as the specimens may be handled and closely examined, they afford advantages in the way of study, while, as they take up much less room than the mounted specimens, the distribution of species in the area can be more thoroughly illustrated, and, if thought desirable, the skins can be mounted if space for exhibiting them is hereafter obtained.

The native mammals of the area are about 30 in number, and of these about 23 have been obtained already. Some of the specimens—being species now of such rarity that they seldom if ever occur (*e.g.*, the wild cat)—are represented by specimens which have been lent and not given. Amongst the birds are similar species. Out of a total of 219 species of birds known to inhabit Perthshire and the basin of the Tay, 153 are represented—in most cases by several specimens—in the Museum, which is very fair, considering the short time in which the collection has been made. In addition to the birds themselves, a collection of the nests and eggs of the species which breed in the area is being formed. These are not kept in the same cases as the birds themselves, but in separate ones, and the labels attached to them indicate the situation and materials of the nests, and the number of eggs usually laid.

The reptiles, amphibians, and fish are mostly preserved in fluid, and are contained in appropriate jars. A few of the larger fish are stuffed. To all, labels, giving as much information as possible regarding the habits and distribution of the species, are attached. Most of the 7 or 8 reptiles and amphibians which are found in the area are represented, but of the fish we have only about 22 species as yet. The number that occurs is somewhat uncertain, since in the collection will be included the fishes that inhabit or visit the mouth of the river. Particular attention is being given to the variations presented by the common or yellow trout, and to illustrate these, specimens are being obtained from every stream and lake in the area. In addition to adult specimens, examples of the various stages of growth will be shown when these can be obtained, and in some instances (*e.g.*, that of the salmon) a series of these various stages has already been procured. The most notable specimens at present in the Museum are a sturgeon about 8 feet in length, and a 54 lb. salmon, both from the Tay.

The collections of invertebrate animals are as yet all contained in cabinets below the table-cases. These cabinets contain glazed drawers, and are closed by doors, which can be locked, but as it is desirable that the collections should be available to be easily inspected by visitors, the doors are left open. Considering the fragile nature of some of the specimens (and, it may be added, the pecuniary value of a few of them), this may seem to imply too much confidence, but by a simple contrivance each drawer is so constructed that it can be drawn out far enough to allow of the contents being examined, but not of the glass cover being



removed. Moreover, the drawer, when so pulled out, is self-supporting, and does not require to be held up whilst its contents are being examined. This contrivance places within the reach of any visitor collections which would ordinarily require special permission to inspect, and that under the supervision of an official.

The mollusca are as yet only represented by their shells. These are either mounted on cardboard, or, in the case of the smaller species, contained in glass tubes fastened to cardboard by wire. On each card is the name and locality of the species, and the name of the donor. In many cases there are numerous specimens, from various localities, and it is hoped that in course of time the distribution of each species throughout the area will be thoroughly illustrated. Most of the land and fresh water molluscs of Perthshire have already been obtained, and in several cases some interesting varieties or local races are represented also.

(To be continued.)

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## THE SCIENTIFIC METHOD IN BIOLOGICAL CLASSIFICATION.

By REV. WILLIAM L. DAVIDSON.

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### I. DEFINITION.

(Continued from page 101.)

WELL then, to return to our three defining requisites, I shall try to make my meaning plain by a few intelligible examples.

And, first of all, not to go higher than Orders, let us take Ranunculaceæ or the Ranunculus Family. Applying our rules, we find that the mark should run as follows:—“*Herbs* (except Clematideæ) with acrid watery juice; *leaves* radical or alternate (except in Clematideæ), exstipulate (except in some of the Thalictra); *sepals* imbricated (except in Clematideæ), deciduous (except in Oxygraphis, Helleborus, and Pæonia), more than two, petaloid (except in Ranunculeæ); *petals* imbricated, (anomalous in Aconitum, Delphinium, and Aquilegia, wanting in Clematis, Anemone, Trautvetteria, Caltha, Calthodes, Glaucidium, and Hydrastis); *stamens* numerous (except in Myosurus); *anthers* dehiscing longitudinally; *pistil* apocarpous; *ovules* anatropal; *carpels* free, numerous (except in Actæa), unilocular; *fruit* achenes or follicles (coherent in Nigella) or berry (in Actæa); *seeds* without an arillus (except occasionally in those with follicles); *testa* in monosperms slightly coriaceous, without prominent raphe, in polysperms crustaceous, with raphe rather prominent; *embryo* minute at base of albumen.”

In like manner, if we turn to the tribe Ranunculeæ, we shall find the tribal mark, as distinguished from the others subordinate or superordinate to it, to be:—“*Flowers* regular; *sepals* green; *petals* coloured (rarely, e.g. in Ran. auricomus, unequal); *carpels* developing into achenes, with *ovule* ascending.”



Similarly with the genus *Ranunculus*. We find here a distinctively generic mark, a mark that neither repeats the distinguishing features of the Tribe, the Order, or the Cohort, nor trenches upon the *differentiæ* that separate the various species of *Ranunculi* from one another; and this generic mark would run:—“*Stems* hollow; *leaves* sheathing at base, divided to a greater or less extent (except in the Spearworts); *sepals* 5, sometimes (as in *R. Ficaria*) 3; *petals* 5, sometimes (as in *R. Ficaria* again) more, each with a hollow spot (nectary or gland) near the base on inner surface, colour yellow or limb of petal white or red; *carpels* in a globular head.”

Now in all this I have aimed at three things: I have tried (1) to include in a grade-mark only what ought to be included, (2) to take in everything that may rightly claim a place, and (3) to indicate degree of generality. And the full significance of what has thus been done will best be seen, if, with a view to comparison, we turn to any of the well-known botanical authorities, and note their defects in method. These defects are precisely the ones that I have attempted to avoid. Irrelevant characters are ever cropping up, even in the best botanical works—characters that either have not the degree of comprehensiveness that the particular grade indicates, or that are repeated from some of the higher grades that have gone before, or else characters in the form of mutually exclusive alternatives; little or no attempt is made to denote generality; and lists of characters are given that are altogether inadequate and imperfect. Let us take an example from Hooker and Bentham’s “*Genera Plantarum*,” for there is nothing like exemplifying from the best available sources; and if the best, when weighed in the balance, are found wanting, it is an argument *a fortiori* as to the remainder. We begin with the tribe *Ranunculeæ*, whose definition is given thus:—“*Sepals* imbricated; *carpels* uniovulate; *ovule* erect, with ventral raphe; *achenes* indehiscent; *herbs*; *leaves* radical or alternate.”

Now the first thing to be remarked about this is that we have here both too much and too little. Too little; for the list is incomplete, inasmuch as no notice is taken of the regularity of the flowers (which is indeed a tribal character), or the tribal peculiarities of the sepals and petals. Too much; for characters are here set down as tribal which have already been adduced as ordinal. For, turn we to the order *Ranunculaceæ*, and what do we find? We find *inter alia* that it is characterised by *sepals* imbricated, *achenes* (when present) indehiscent, *habit* herbaceous, and *leaves* radical or alternate; in other words three, at least, of the characters adduced here as tribal are not tribal but ordinal. Moreover, “indehiscent” achene is a tautology, inasmuch as the very meaning of the word achene is “a one-seeded indehiscent carpel.”

Regarded therefore from the standpoint of Method, this tribal definition is vicious in the extreme, and, to any one trusting for instruction simply to the book, misleading.

It is hardly different when we examine the Ordinal mark itself. There are here both superabundance and deficiency. Serial and Cohortal characters are reproduced as Ordinal; we are treated to the contradictory alternative; and various characters (such as "anthers innate") will not stand the application of the quantitative test.

A similar criticism holds when we advert to the genus *Ranunculus*. Much that is properly Tribal, and much that is Cohortal, are here mixed up with what is strictly generic; while several Generic characters are conspicuous by their absence. Further, we have more than one striking instance of the absurdity of contradictory opposites.

But, lest I should appear to exaggerate, it may be well to give Hooker and Bentham's generic mark *in extenso*. Here it is, with the added strictures enclosed in square brackets:—"Sepals 3-5, deciduous [this last is ordinal]; petals as many or more (up to 15), with basal gland or fovea, with or without a scale [contradictory alternative, hence no character at all], conspicuous or more rarely minute; carpels indefinite, uniovulate [tribal]; ovule ascending from base of cavity [tribal]; achenes capitate or spicate, apiculate with short or very short style, or beaked with longer. Herbs annual, or very often possessing a perennial stem [ordinal]; leaves entire or cut [contradictory alternatives], cauline very often with few divisions; flowers [should be petals] white [only in limb], yellow or red [flowers], terminal, solitary or paniculate, more rarely sessile in the axils of the twigs; stamens shorter than the sepals or the petals, very frequently numerous [ordinal], sometimes in small-flowered species very few in number; achenes compressed or subglobose, smooth or variously striated, ribbed, wrinkled or prickly."

It needs only a glance at this list to see how mixed and unsatisfactory it is, and how multifariously it transgresses the laws of methodic procedure. Omissions also may be detected in it; e.g., no notice is taken of the hollow stem: and we are not told on which surface of the petal the gland is found.

One strong feature of the "*Genera Plantarum*," however (from the side of Method of course), is the scrupulous and consistent noting of exceptions. But surely the plan would be more effective if these exceptions, instead of being relegated as "Abnormal Forms" to a concluding paragraph, and printed in small type, were inserted in the Definition proper. Thus only, as we have already seen, can degree of generality be indicated in a way that shall be clear and satisfactory.

What then is the upshot of the whole matter? It is simply this. Three things are indispensable in order to the satisfactory handling of the Definition in Botany or in Zoology—viz., to make the list of characters as complete as may be; to indicate degrees of generality by the marking of exceptions on the plan already indicated; and to avoid mutually contradictory alternatives as char-



acters, as well as characters that properly belong either to subordinate or superordinate grades. These things have not been hitherto sufficiently attended to by systematists; on the contrary they have been woefully neglected. Hence the worse than unsatisfactory condition of even the best systematic works in these Sciences in respect of Method.

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ADDITIONS TO THE LIST OF SCIENTIFIC SOCIETIES  
IN SCOTLAND.

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Edinburgh Practical Naturalists' Society.  
Edinburgh Royal Physical Society.  
St. Andrews Philosophical Society.  
Dundee Naturalists' Field Club.  
Montrose Scientific and Field Club.  
Brechin Literary and Scientific Institution.

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Dr. Bayley Balfour, for some years Professor of Botany in the University of Glasgow, has been appointed to the Sherardean Professorship of Botany in the University of Oxford. Dr. Balfour's work in the positions he has already held has been such that the University to which he now goes is to be congratulated on securing his services.

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O B I T U A R Y.

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JOHN HUTTON BALFOUR, M.D., F.R.S.

ON the 11th February, 1884, there died one of the last survivors of the scientific worthies to whom Edinburgh University owes much of the prosperity and renown as a medical school that it now so worthily enjoys. He may be said to be almost the last of the former generation of botanists, whose names to us are as household words, and who worked well in their day and generation in spreading the love of scientific pursuits through the land.

Born on 15th September, 1808, in Edinburgh, he was educated as a boy in the High School. His studies were afterwards continued in the Universities of Edinburgh and of St. Andrews; and he took the degrees of A.M. and M.D. in the former of these Universities. For a time he seems to have studied with the intention of becoming a clergyman; but he after a time commenced medical practice in Edinburgh, having previously pursued his education in medicine for some time on the Continent. While in practice he continued to prosecute his botanical studies also, to



which he had always a strong leaning, a preference that had been much strengthened during his attendance as a student in Prof. Graham's class in the University. In 1836, along with some of his friends, he founded the Botanical Society of Edinburgh, and throughout his life he continued to retain a very warm interest in its prosperity.

In 1840, he commenced to give lectures on Botany in Edinburgh, and attracted large classes. In 1842, on the appointment of Sir William Hooker to the directorship of the Botanic Gardens at Kew, Dr. Balfour was appointed to the Professorship of Botany in the University of Glasgow, from which post he was promoted in 1846 to the Chair of Botany in the University of Edinburgh. In 1879, his failing health made it necessary for him to resign the professorship so long held by him. For the greater part of the time that he was in Edinburgh as Professor of Botany, he also held the appointments of Regius Keeper of the Royal Botanic Garden and Queen's Botanist in Scotland, and these appointments he continued to hold for some time after he resigned the chair. For many years he was Dean of the Medical Faculty in the University, and thus had much to do with "University politics," until his resignation in 1879.

Dr. Balfour for a long time also held the post of Secretary of the Royal Society of Edinburgh, for the work of which he was peculiarly suited by his methodical habits, and his ability as an organiser.

As a botanist he wrote much, but has left no large record of original work, his labour being spent in great part on numerous text-books and manuals, which for years were issued by him in a rapid succession of new editions. They did good work in diffusing a knowledge of botany in their own time, though the rapid advance of the science in late years has left them, as it must leave all text-books, behind the present standpoint, so that probably they have fallen greatly out of the knowledge of the students of the present day. He was also a copious contributor to encyclopædias, and wrote numerous short articles for scientific magazines. The only department that we recall at present, apart from text-books, in which he published separate works, was on the relations that exist between *Botany and Religion* and on the *Plants of the Bible*. He was also for a considerable time one of the editors of the *Edinburgh New Philosophical Journal*, and of the *Annals of Natural History*.

His reputation as a botanist rests, however, mainly on his work as a teacher, and it is probable that few teachers of the science of botany have had as many pupils attending their classes. In this character he was most painstaking, alike in his systematic course, in the laboratory, and in the excursions, which latter were renowned among the methods of instruction followed by him. To few, if to any, was the flora of Scotland better known; and there

is probably no one among us now so thoroughly familiar as he was with the native habitats of the rarer species of our Scottish flora. He felt more attracted to the systematic study of Phanerogams and to their geographical distribution than to the study of the lower plants, or to vegetable anatomy and physiology, the departments of botany that have come most prominently forward of late years. By many of those that listened to his instructions he will long be remembered with respect and esteem. He was a Fellow of numerous Scientific Societies, amongst others, of the Royal Societies of Edinburgh and of London.

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“Report of Observations of Injurious Insects in the Year 1882, with Methods of Prevention and Remedy, and Special Report on Wireworm.”  
By Miss E. A. Ormerod.

Probably every one interested in the very important practical subject of entomology in its practical side, as making us acquainted with the insects injurious to the produce of the farm, the garden, the orchard, or the forest, is acquainted favourably with Miss Ormerod's excellent little “*Manual of Injurious Insects*,” and probably a good many are familiar also with the annual reports issued by her. In these very useful reports we find a record of numerous observations made in many parts of the United Kingdom, along with suggestions as to the results of experiments carried on with the object of destroying the unwelcome visitors to the crops of all kinds. Several of the contributors of observations to these reports write from Scotland, from the Borders to the Orkney Islands, hence we feel specially called on to direct the attention of our readers to whom the reports may not be known, to their practical interest and value. Leaving a full acquaintance with the information in it to be gained by consulting the report itself, we may here briefly advert to the notes of special interest from Scottish observers. Mr. Dunn, of Dalkeith Palace Gardens, recommends strongly the application of a thick lather of soft soap to kill the *American blight* on apple trees. Mr. Dunn forwarded to Miss Ormerod maggots which had been very destructive to cabbages, and from these *Anthomyia floralis* Fall. was reared. Notes on the *Carrot fly* (*Psila Rosæ*) are sent from Rothesay and Mull. There is a report of 41 pages on *Wireworm and Click Beetle* stating results of observations of injuries done (in a good many of the cases in Scotland), and of the means tried and found most effective in reducing their numbers. The *Gooseberry sawfly* was, as usual, destructive in various places, but the usual remedy of hellebore powder was in all cases found sufficient to get rid of them. *Tortrix viridana* is noted by Mr. R. Coupar as very injurious to oaks near Colenden, Perthshire. *Onion flies* (*Anthomyia antiqua* and *A. platura*) have proved destructive to onions at Dalkeith and in Mull. Mr. Dunn found a dressing of dry soot and lime close around the plants an effectual remedy, when repeated two or three times. Mr. Grierson recommends burning the onions when attacked, and watering the ground with paraffin and water. Mr. Coupar, writing from Old Scone, in Perthshire, notes that the *Pine beetle* (*Hylurgus piniperda*) has been observed by himself laying its eggs in shoots of pine trees, but that in every case the trees were in a sickly state before the attack. He has also noticed that the branches have suffered much from the attacks of the larvæ of the *Pine-bud Tortrix* (*Retinia turionana*), eating out the centre of the young shoots. He also forwarded to the author two fine cones of the common spruce, with the bases of the scales galled by a small midge-larva (*Cecidomyia* sp., perhaps *C. albibris*). Mr. D. Scott, from near Forres, has seen considerable destruction caused for several years by the *Pine sawfly* to firs; the application of a solution of washing soda in water destroyed them, but is hardly manageable as a remedy on the necessary scale. The *Turnip flies* (*Phyllotreta nemorum* and *P. undulata*) have done little damage in 1882, but the *Sawfly* and *Weevil* have been injurious in Caithness.





## ZOOLOGY.

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### ON THE FOOD OF ROOKS.

BY JAMES SMAIL, KIRKCALDY.

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[This paper is part of an article by Mr. Smail on "Rooks and Rookeries" in the *Proceedings of the Berwickshire Naturalists' Club*, Vol. X., 159-184. The extract here printed is from pp. 174-178.]

MR. SMAIL sent circulars to 200 correspondents in the district about Berwick, many of them members of the Club, others landlords, farmers, and gamekeepers, and received numerous replies. Query 6 in his schedule was as follows:—  
"What kind of food do rooks eat? State particularly whether in your neighbourhood you know them to eat bulbs of turnips or clover, and whether you know of their preying on the eggs or the young of partridges, pheasants, or other birds. State also whether you have known them to injure young lambs."

He goes on (p. 175):—

"I have received such copious replies to this, and nearly all of them made from personal observations by the writers, that a small volume could be filled by them. I must of necessity abridge largely. At the same time I shall state facts sufficient to show beyond all question the kinds of food on which rooks chiefly live, and also the different sorts of food on which they occasionally feed at certain seasons of the year, and in certain states of the weather.

"Gesner writes of the rook as a corn-eating bird; and Mr. Knapp, in his delightful work, 'The Journal of a Naturalist,' speaks of it as a grub or worm-devouring bird, and most writers consider it a bird that partakes of both grain and grubs.

"My opinion, formed from observations extending over a great number of years, with excellent opportunities for watching their ways, is that rooks are omnivorous, but that they prefer as food before all grain or vegetable matter grubs of all kinds, and slugs



and earth-worms. Wire-worms, spiders, and all the beetle tribe, together with their larvæ and eggs, are ever being hunted after by those birds. When grain is in plenty in the fields it is almost never touched, provided a supply of the grubs indicated is to be had ; and in summer and autumn grubs as a rule are always to be had in fair abundance, unless in places where rooks are so very numerous as to prove a pest. Observing husbandmen have long known that rooks do a vast amount of good by hunting up and devouring the many kinds of grubs that infest the land and destroy its produce ; but they are, of course, also aware that where the birds are excessively numerous, they prey at times heavily on the valuable produce of the land. They must of necessity eat ; and when, in such large numbers, they find the supply of their favourite food short, they will in such circumstances prey on anything edible. In the cold, dry, early spring weather, they prey to some extent on grain when it is being sown, and farmers occasionally express a good-humoured wish that some neighbour would begin to “sow first and feed the crows.” After grain is in the seed-bed it is seldom preyed on by rooks, and when they are seen feeding in thick black clusters on parts of newly-sown or sprouted corn-fields, it is almost always grubs they are assembled to devour ; and almost any farmer can testify that the spots on which he may have seen rooks thus clustered after the grain has been sown for a time bear as good a crop as the other parts of the field. Indeed, in an immoderately dry season, when from want of surface-moisture earth-worms remain underground, and slugs and grubs are scarcely procurable even in small numbers, they do not attack to an extent worthy of notice either grain recently sown or grain in the ear. But in severe winters and in early spring they do much damage in stackyards here and there. In autumn they peccate now and then from the stooks, but very moderately. I have shot rooks on several occasions when feeding in stubble fields where grain was abundant, and when opened, have seldom found more than a few grains in the stomach, and I as often found none ; but there was generally present a considerable mash of beetles, small earth-worms, hoglice, and larvæ of various insects.

“Rooks are a pest in the potato field when the crop is young. They then, especially in dry summers, dig up the seed-tubers, and thereby do much damage, and on that account a crow-herd is often necessary. Many people, however, mistakenly think that rooks dig up the seed-potatoes in order to eat them. They seldom

eat any part of them ; but they carry them off and split them up to feed on the numerous grubs that are generally found sticking in and around the partly decayed tubers. They are much more destructive in the turnip field ; and indeed in the north of Roxburghshire and in Lower Selkirkshire the damage they do to the turnip crop is a matter of very grave importance. All over the country they have always been in the habit more or less of pulling up considerable quantities of turnips in the early stage of their existence on the prowl for grubs ; but it is only of late years that they have taken to feed largely on the bulbs of turnips—this in winter and the early spring. I have seen one heap of turnips of perhaps ten tons brought in from the field to the farmyard, more bulbs broken and partly eaten than there were whole bulbs, and this was done entirely by rooks. On the same farm in the severe winter of 1880-1, the rooks actually fed from the boxes along with the sheep (hoggets) on cut turnips. From the farms of Netherbarns, Rink, Fairnalee, Meigle, Caddonlee, Newhall, Kilnknowe, and Hollybush, all in Lower Selkirkshire, and in all several thousand acres in extent, I have reports from the respective tenants, all of whom state that they have lost considerably from the damage done by rooks to their turnips in winter and spring. They eat green-top yellows, but are fonder of Swedes. They dig into the bulbs and make pear-shaped holes, and when these fill with water and freeze, the bulbs go down whenever a thaw sets in. They also take up clover in several districts, and here and there do much damage to that plant ; but their end in uprooting it seems to be more to secure grubs than to eat the plant. They do eat the plant, however.

“The rook has other eating proclivities which make it anything but a favourite with numerous gamekeepers and sportsmen ; for, over and above eating of what already has been noticed, and of carrion, it annually destroys for its maw large quantities of the eggs of pheasants and partridges, and of barndoor hens that ‘lay away.’ Eggs it is most severe on in dry cold weather, when grubs are scarce ; and the egg season of pheasants and partridges is the season when rooks have young, a time that in a drougthy spring presses hard on their industry ; hence their readiness to go a-nest-ing when grubs are few. I know of several rookeries near game preserves where the keepers have told me repeatedly that more than half of the game birds were able to bring up broods from the second laying only, the first having been entirely gobbled up by the rooks. They generally carry the contents of the eggs in their bill-sack or pouch to their young.



Rooks are also birds of prey, but in this position they are somewhat cowardly, as they prey only on almost featherless younglings. They kill in this state the progeny of pheasants, partridges, and a few of the young of such birds as the blackbird and thrush. They also, but seldom, kill small leverets and very young rabbits. They also occasionally attack and injure weakly lambs, but I do not know personally of a case in which they have killed a lamb. What I have above stated as to the food on which the rooks live is from information which was in my possession, either furnished by friends or from my own observations, before I perused the returns received in the schedule already referred to. Before giving some extracts from these returns, I may state shortly a few reasons why I think rooks have of late years somewhat changed in regard to the food on which they live. There are several not unlikely causes why they have got keener for eggs and quarry; and the taste for quarry, which was shown at a much earlier date than the taste for young birds, may have led to the slaughter of the innocents. About fifty years ago, most of the cultivated land of the Borders was, broadly speaking, in a natural state, for the manures used were of a kind likely to tend to increase rather than otherwise the number of worms, grubs, and insects on which rooks naturally feed. Now, however, from the almost universal use of lime and other quickening manures and stimulants, not a third of the number of grubs and earth-worms and slugs is in the soil that there was then, maugre the increased fatness of the land. As a proof of this, let any one examine the furrows when they are being made in a field upon which lime has been somewhat recently laid, and the same in an adjoining field to which no lime has been applied. The preponderance of animal life in the shape of earth-worms, &c., in the unlimed field will be found to be great. The fact is that lime kills to a large extent both wormlings and the larvæ of numerous insects on which rooks feed. Indeed, most of the older husbandmen can testify that in some fields where grubs were occasionally little short of a plague before the quickening artificial manures were applied, earth-worms and grubs are now but little known. Now, rooks are beyond dispute increased immensely in numbers of late years, especially since the gun-tax was put in force; while, as above shown, there is a falling-off in their natural food; hence, they have taken to devouring on a pretty extensive scale very valuable farm produce, and, like some less honest bipeds, to 'trespass in pursuit of game, for they are omnivorous.' It should, however, be remembered in their favour that

they are so constituted that they require a portion of animal food, worms or otherwise, to maintain proper health. They therefore by instinct hunt up the needful.

“In moderate numbers, rooks, in my opinion, would be, as they once were, very useful birds, the friends of the husbandman, and very little of an enemy to the sportsman; and something should be done to have their number reduced, otherwise the depredations described will be multiplied, and the country at large will suffer loss. Those in a position to lessen the damage done by rooks would, by greatly lessening their number, benefit both farmers and sportsmen, as well as the general public.

“The following extract from the First Parliament, 26th of May, 1424, cap. 19. James I. of Scotland, was kindly sent me by Sir George S. Douglas:—‘Of bigging of Ruikes in trees. For thy that men consideris that Ruikes biggand in Kirk Zairdes, Orchardes, or Trees, dois greate shaith upon Cornes: It is ordained that they that sic Trees perteinis to, lette them to big, and suffer in na wise that their birds flie away. And quhair it be tainted that they big, and the Birdes be flowin, and the nest be funden in the Trees at Beltane the tres sal be foirfaulted to the King (bot gif they be redeemed fra him, throw the that they first pertained to) an hewin downe, and five schillings to the Kingis unlaw.’”

[Mr. Smail adds numerous extracts from the replies received by him to the schedules. There is a very general agreement in these replies as regards the food of rooks being as stated above by himself; but at the same time it would seem that there are differences depending on the locality of the writers, the rooks of some districts not having developed the harmful tastes so strongly shown by their kindred in other places. Accordingly, they are reported by a few observers as not injurious to turnips, and as not habitually eaters of eggs and of young birds. We seem here to be in presence of the development of new habits resulting from changed conditions of life for the rooks, owing to changes in the methods of agriculture throughout the land.—ED., *Scot. Nat.*]

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**RARE BIRDS IN ABERDEENSHIRE.**—On 24th August, 1883, two specimens of the Canada Goose, *Anser canadensis*, were shot from a flock of seven, near the Loch of Strathbeg, near Peterhead. The birds were in fine condition. Could these birds have been truly wild, or were they escaped birds?

A very fine example of the Golden Eagle, *Aquila Chrysaetus*, was shot on the Haddo estate, the property of the Earl of Aberdeen. It was a female, weighing twelve pounds. Part of a hare was found in the stomach.—G. SIM.



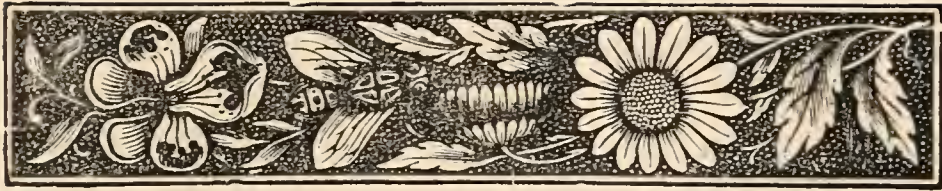
OCCURRENCE OF BANK'S OAR-FISH (REGALECUS BANKSII) ON THE ABERDEENSHIRE COAST.—On February 8th, a specimen of this rare fish was found among the rocks near Kinnaird Head Lighthouse. It was sent to Aberdeen to Professor Struthers, through whose kindness I have had the opportunity of examining it, and of making the following notes upon it:—Its length is about 11·5 feet; its greatest depth of body (at 30·5 inches behind the posterior edge of the eye) is 11 inches; its greatest thickness (at 32 inches behind the eye) is 2·37 inches. The eye is 1·37 inches in diameter, and the irides are silvery. There are 4 gills, with gill-rakers 1 inch long by 0·25 inch broad at the base. The soft palate hangs down 0·5 inch beyond the plane of the hard palate, and has 3 ridges running obliquely along each side, set with strong bristles. The stomach, which was empty, extended in a *single* tube for 3 feet 11·5 inches behind the anal orifice. Dr. Day, in his notice of this fish, says, “Stomach elongated and divided posteriorly, is continued backwards between the muscles to within a short distance of the caudal end of the fish.” In the specimen under notice there is no bifurcation of the stomach. The caecal appendages are very numerous. The intestine passed forward from its origin at the stomach for about 20 inches, then, doubling on itself, it passed straight to the anus. An organ runs from the anus, where it has a wide opening, up to within 11 inches of the gills. It is attached to the upper surface of the abdominal cavity, and for two-thirds of its length it is bifurcated anteriorly, each of the branches terminating in a fine point. I am doubtful as to the true nature of the organ, but conjecture that it is analogous to the oviduct in some of the sharks. The lateral line commences 0·5 inch above the eye, and takes a downward curve towards the belly for a distance of 13 inches from the posterior edge of the eye. At this point the lateral line is 4 inches from the abdominal ridge; at the anus they are 2·5 inches apart, and at the tail they are 1 inch apart. There are 4 indurated ridges above the lateral line. Three faint bluish slightly waved lines cross the body, their lower ends inclining backwards; they are 13 inches apart, and the first is 21 inches behind the eye. Behind the anus there are 40 dark transverse bars along the centre of the body; they are about 1·5 inches apart anteriorly, but 2 inches apart near the tail.

Unfortunately the head in front of the eyes had been smashed by dashing against the rocks. The dorsal, pectoral, and ventral fins also were broken. The tail has a little piece torn from the centre, but is otherwise complete, and differs from the figures in the works of Couch and Day, in which the lower edge of the tail is represented as prolonged into a point. In this specimen the tail finishes on each side of the broken centre, which must have extended beyond the rest, in a soft smooth rounded flesh-coloured portion.

Only twenty-two or twenty-three specimens of this species have yet been recorded from the coasts of England and Scotland. Its geographical distribution is, however, very wide, since it has been found in the Mediterranean, South Atlantic, East Indies, New Zealand, and New South Wales.

GEORGE SIM.

Aberdeen, 22nd February, 1884,



# PHYTOLOGY.

## PLANT NAMES.

BY WM. DURIE

PART III.

VII. **T**HE seventh division contains names applied on account of *resemblances* of plants to other objects. This is a very obvious device by which names would be provided; and we accordingly find that a vast number of plants owe not only their popular but also their scientific names to the operation of this mode of naming. From resemblances to men and women and their dress, we have:—

*Bloody-men's fingers* (*Orchis maculata*), a Cheshire name, from the marks on the leaves like the impression of bloody fingers.

*Calceolaria*, Latin, for "little shoe," which its flower is like.

*Carl-doddies* (*Plantago lanceolata*), means bald heads.

*Columbine*, called also *Folly's flower*, from its resemblance to a fool's cap.

*Date*, contraction for Greek δάκτυλος, a finger.

*Fox-glove*, for *folk's glove*, meaning fairy-glove, which is the literal meaning of its popular Welsh name also.

*Hand-tree* (*Cheirostemon platanoides*), from the five anthers of its flower being arranged like the fingers of a human hand.

*Lady's fingers*. The Kidney Vetch.

*Monkshood* (*Aconite*), from the resemblance of the upper sepal to a clerical head-dress.

*Orchis*, Greek for *testicle*, in allusion to the shape of its root.

*Roncevalles pears*, from their great size, akin to the gigantic bones found at Roncevalles.

*Tulip*, *Turk's-cap lily*, both named from an Oriental head-dress.

Resemblances to the lower animals are preserved in such names as,

*Cocoa* (Portuguese *coco*, skull), from the monkey-like face at the base of the nut.

*Bee orchis*, and *Butterfly orchis*, orchids (*Ophrys apifera*, and *Habenaria chlorantha*) resembling these insects.

*Crow's feet* (*Ranun. aquatilis*); *Craw-dulse* (*Fucus ciliatus*); *Craw-taes* (*Ranun. acris*); all named after crow's feet.



*Dandelion*, French, *dent-de-lion*, literally, lion's teeth, from its jagged leaves,

*Geranium*, lit., crane's bill; from the form of the fruits, *γέρανος* being a crane in Greek.

*Hen and Chickens*, a monstrosity of the common daisy, due to excess of vigour in the growth of the central head, with smaller heads grouped round it.

*Mare's tail* (*Hippuris vulgaris*), from the appearance of the leafy stems.

*Mimulus*, or *Monkey-flower*, from the appearance of the gaping corolla.

*Mouse-tail* (*Myosurus*), from the fact of the lengthening of the part bearing the carpels after flowering, so as to look like a mouse's tail.

*Snap-dragon*, and *Snakeshead lily*, from likeness of flower to reptile's head. The former is called in Scotland "*Mappie's mou*," from its likeness to a rabbit's open mouth.

*Tod's tail* (Scotch name for the common Club-moss), from its spore-bearing being like a fox's (Sc. *tod's*) brush.

Among miscellaneous objects and circumstances which have originated plant-names, may be mentioned :

*Cannon-ball tree* (*Couroupita guianensis*), from its large heavy woody fruit, about the size of a 36-pound shot.

*Eglantine*, like a needle, from its prickly character.

*Fern*, perhaps connected with Sanscrit *parna*, a feather.

*Fews*, the Roxburgh name for house-leeks, from French *fouet*, meaning whip.

*Fritillary*, from *fritillus*, Latin for dice-box.

*Garlic*, like a spear (A.S., *garleac*, from *gar*, spear).

*Hydrangea*, Greek *ὕδρ-αγγεῖον*, water-vessel, from the cup-like form of the seed-vessel,

*Orris*, for *Iris*, rainbow.

*Passion-flower* (genus *Passiflora*), is named from a fancied resemblance between parts of the flower and the emblems of our Lord's crucifixion. The five anthers symbolise the five wounds; the three styles, the three nails; the column on which the ovary is elevated, the pillar of the Cross; and the fleshy threads within the flower, the crown of thorns.

*Phlox*, like a flame (Greek *φλόξ*).

*Pine-apple*, according to Archbishop Trench, was first named *anana*, its native name, which has now been nearly put out of use by the name "pine-apple," from the likeness of the new fruit to a pine-cone. Hence the blunder in French and German dictionaries, which give the meaning of *pine-apple* as "cone of the pine," itself. The French *Journal des Debats*

one day astonished its English readers by remarking on the coarse food of the English, in winding up the dessert at a Lord Mayor's banquet with *fir-cones*!

*Pitcher-plants.* Plants that retain water in the leaves.

*Strawberry tree* (*Arbutus Unedo*), found in the United Kingdom, in its wild state, only at Killarney. It has globular scarlet fruit, with a granular surface, somewhat like a strawberry.

*Wayfaring tree* (*Viburnum Lantana*), supposed to be so called "from the white mealy down on the under side of its leaves, giving them a dusty travel-stained appearance." (J. G. Heath.)

VIII. *Misnomers*, or misleading names, form the eighth division. They are particularly worthy of note, as wrong inferences will inevitably be drawn from them unless their true origin be known. As guides to classification, the following names are worse than useless, for they lead the learner on wrong tracks.

The *Garden Laurel*, with large shining leaves, and the *Portugal Laurel*, are species of *Prunus*, and have nothing to do with the *True* (Victor's) *Laurel* of the exotic order *Lauraceæ*.

The *Acacia-tree* in England does not belong to the genus *Acacia*. It is a North American *Robinia*, and of the Pea-flower tribe.

The *Black bryony* (*Tamus communis*), has nothing to do with the genus *Bryonia*, of the Gourd family.

The *Tuberose* is no rose; but belongs to the Lily Order of plants. Its scientific name is *Polianthes tuberosa*, and from the specific name (given in allusion to the form of the root), the popular name has been derived.

*Hyssop* of Scripture is not our hyssop. It is not known what aromatic plant is represented by the Hebrew name *ézóbh*.

*Turkey Rhubarb* neither comes from, nor grows indigenous in, Turkey. It is from Tartary.

*Wolf's Bane.* Mr. Fox Talbot gives the following curious account of the origin of this name: "*Bane* is the Teutonic word for all poisonous herbs. The Greeks, mistaking *banes* for *beans*, translated it *kuamos*. Now, wolf's bane is an aconite with a pale yellow flower, and therefore called *white-bane*, to distinguish it from the blue aconite. The Greek for *white* is *leukos*, hence *leukos kuamos*; but *lukos* is the Greek for *wolf*; and by a blunder *leukos kuamos* (*white bean*) got muddled into *lukos kuamos* (*wolf bean*). Then Science comes in to make confusion worse confounded. Botanists seeing the absurdity of calling aconite a *bean*, restored the original word *bane*, but retained the corrupt word *lukos* (a wolf), and hence we get the name 'Wolf's bane,' for white aconite."

*Gooseberry*, which, in old English, is *grooseberry*, meaning rough, or frizzled berry. So, in Scotland, we have *grozet* (Burns),



- which in Forfarshire has the form “*groser*,” evidently the French *groseille*. Gooseberry has nothing to do with goose. *Goose-grass* probably is a corruption of *gorse-grass*, from its roughness.
- Wormwood* has no reference to *worm* or *wood*. In *Anglo Saxon* it is *were-mod*—preserver of the mind, on account of its supposed virtues; and our name is a corruption of the A. S. name.
- Duck-weed* is a corruption of ditch-weed, because it covers old moats and ponds. It is not food for ducks.
- Louse-wort* (*Pedicularis palustris*), has only a doubtful connection with that insect. Philology traces it rather to *loose-wort*, because the seeds are loosely held in the capsule and rattle when dry.
- Badderlocks* (*Alaria esculenta*), a Mearns name is, according to Lindley, a corruption of Balderlocks or the locks of Balder, a Scandinavian Deity, to whom other plants have been dedicated.
- Blooming Sally* (*Epilobium angustifolium*), an Irish name for the Flowering willow. *Sally* is a quaint corruption of the Latin, *Salix* meaning willow.
- Agnus castus*, one of the *Vitex* plants was called *agnos* (chaste), by the Greeks, because ladies used it in couches as promoting chastity. The monks, ignorant of Greek, mistaking *agnos*, chaste, for the Latin *agnus*, a lamb, made it *agnus castus*, chaste lamb.
- Rose-mary*, Latin *ros-marinus*, or “Sea-dew,” from some fancied connection with sea-spray. It was afterwards altered so as to be “*rose of Mary*,” in honour of the Virgin.
- Barberry*, Arabic *Barbaris*, has nothing to do with *berry*. Probably it should be spelt “*barbery*.”
- Gillyflower*, formerly *gera-flour*, a corruption of the old French *giroflée*, from Greek, *καρυόφυλλον*—a clove tree, its flower having been used, instead of cloves, to flavour wines.
- Orange*, Spanish *naranja*, through Italian. The initial “n” was dropped, then it came to be *arenge*, and lastly *orange*, from fancied gold colour. (French, *or*, gold.)
- Primrose* is really a substitute for Old English *primerole*, Low Latin *primula*, from *primus*, first. *Primrose*, as being *prime* or *first* rose is thus a popular but erroneous etymology. The word *rose* has no connection with *primrose* except by common blunder.
- Amaranth* is properly *amarant*, as used by Milton:—

“Immortal *amarant*, a flower which once  
In Paradise, fast by the tree of life,  
Began to bloom.” (*Parad. Lost*, III.)

The termination *anth* is due to confusion with *anthos*, a flower,

with which it is not connected. It comes from Greek *a*, not, and *μαραίνειν*, to wither, from its unfading property.

*Daffodil*, from Greek *ἀσφόδελος*, a lily. Middle English *affodille*. The first letter "d" has been only lately added to the name, following the sound of the French equivalent, *fleur d'affrodille*.

*Samphire*, a corruption of *Saint Pierre*, French for St. Peter, being the herb dedicated to him.

*Penny Royal* is a corruption of its former English name, *pulial royal*, from Latin *puleium regium*, or flea-bane, as being good against fleas.

*Apricot*, comes to us in a very indirect course, from the Greek, *πραικόκκια*, through Latin, Arabic, and Portuguese. It originally meant "early ripened."

*Cucumber* is supposed to be derived from the same root as Apricot, but is of very doubtful etymology.

*Germander* (*Teucrium chamædrys*), originally Greek, *χαμαιδρυσ*, ground oak (from likeness of the leaves to small oak leaves), through Latin, Italian, and French.

*Holm-oak*, evergreen oak, is a contraction of *holin-oak* or *holly-oak*.

*Arbor Judæ*, erroneously so-called from Judas being supposed to have hanged himself on it is really a corruption of *Arbol judia*, Spanish for bean-tree.

*Jerusalem Artichoke* is corrupted from the Italian name *Girasole articiocco*, or *Sun-flower artichoke*, this artichoke in its leaf and stem resembling that flower, and getting that name on its introduction into Italy from Peru. *Jerusalem* is a popular corruption of the sound *girasole*.

2. As illustrating corruptions that may be said to arise from the natural development of language, only three instances need be given :—

*Mushroom*, from French *mousseron*, mushrooms, and *mousse*, moss.

*Tarragon*, from Greek *δράκων*, dragon, through Spanish *taragontia*, French *taragon*.

*Walnut*, A. S. *wealh*, foreign—foreign nut. It is supposed to have been brought over from Gaul by the Romans. It has nothing to do with "wall." We find the same word meaning "foreign" in *Wales*, which, to the invading Saxons, was the country of foreigners.

3. And lastly, as illustrating "Grimm's Law" of change of consonants, we have

*Dishilago*, Scotch for *Tussilago*, which is Latin for Colt's-foot.

*Sandal-wood*, a corruption of *Santal-wood* of the genus *Santalum*.

*Licorice*, from Greek *γλυκύριζα*—sweet-root, through Latin and Old French.



*Hemp* is curiously derived. It is traced through A. S. *henep*, Latin, and Greek *καννάβις*, to Sanscrit *Cana*.

*Mandrake*, German *mandragen*—resembling man, from its forked roots like the lower half of the human figure. *Mandrake* is short for *mandragora*, as used in “Othello.” It is from Greek *μανδραγόρας*.

X. The tenth and last division contains names of which the origin is either unknown or can be but roughly guessed. Some of the names already given are by no means satisfactorily accounted for; but they have all more to say for themselves than those about to be mentioned. Names current in various parts of Scotland are often very puzzling, such as

*Mirrot* for carrot, a Ross-shire name. It is called *morat* or *morod* in Scandinavia. It was probably brought across by Scandinavian pirates who settled on our Northern coasts.

*Carnbie-leaf* and *Bobbins*, for the Water-lily.

*Drumlie-droits* (Perthshire), and

*Black Boids* (Ayrshire) for Bramble-berries.

*Cow-cakes* (Roxburgh) for the Wild Parsnip.

*Cow-cloos* for the Common Trefoil. The Swedes call the Yellow Trefoil, *cat-cloos*.

*Dog's Camovyne* or *Dog-gowan* for the Fever-few, which itself means *febrifuge*, because thought to be good against fever.

*Dog's Siller* for the seed-vessels of the Yellow-rattle or Cockscomb.

*Dog's Tansy* for Silver-weed. Tansy is said to be a corruption of Greek *αθανασία*, immortality.

*Solomon's Seal* (*Polygonatum officinale*), may perhaps be named from leafscars on the rhizome.

Explanations more or less doubtful have been offered of the following:—

*Bourtree* for the *Elder*. Jamieson suggests it may be *Bower-tree*, from its forming an agreeable shade; but Skinner, in his botanical dictionary, gives a more likely account in referring it to the ease with which this tree can be *bored*. The Germans call it *Holder* or Hollow-tree.

*Apple-ringie* (*Artemisium abrotanum*) for Southern-wood. *Apil-rengis*, in old Scotch meant a neck-lace of beads. This plant is called “Lad's Love” in the North.

*Dusty Miller* (*Auricula*). Some ridiculous opinions have been expressed as to the meaning of this name. Probably the most feasible account is that it is due to the whitish dust covering its leaves.

More specially English names are *Sweet William*, *Good King Henry* and *Fat Hen* (*Chenopodium*), of all of which no possible explanation has yet been given, and

*Ragged Robin* (*Lychnis flos-cuculi*), of which it is written :

“ O Robin loves to prank him rare  
With fringe and flounce and all.”

Perhaps the fringe has given its name to the flower.

*Cowslip* and *Oxlip* are held by some to refer to the animal's lip, but it is with more probability held by Mr. Skeat that the true derivation is from A. S. *Cu-sloppe* (meaning Cow's slop or dung), which name is actually met with in Ælfric's vocabulary.

*Hare-bell* (wild hyacinth) gives rise to a conflict of derivations. While Dr. Brewer says it is a corruption of *Ayr-bell* from Welsh *awry-pel*, meaning distended globe ; Mr. Skeat holds that it is simply from *hare* and *bell*, and that all other derivations are fables.

*Holly-hock* is similarly placed. Brewer derives it from *βολος αλκεια*, while Skeat says it is a hybrid name compounded of *holly*, A. S. for *holy* and *hock*, Celtic for *mallow*—so-called, because indigenous to Palestine.

*Lords and Ladies* (*Arum maculatum*), is probably named from the arrangement of the stamens and pistils round the spadix.

*Horse Chestnut*, *Horse Mint*, and *Horse Radish* are conjectured to have been originally named *gorse* (corrupted to *horse*), and meaning rough, although Taylor states that the Horse Chestnut was formerly ground and given to horses—hence the name. The prefix *horse* seems at times given to denote large size.

*Jenneting Apple*, an early apple. The etymology from “June-eating” has been called “a miserable jest,” since they come in July. The origin of the name is unknown.

*Meet-her-i'-th'-entry-kiss-her-i'-th'-buttery* (*Viola tricolor*), is probably, say Messrs. Britten & Holland, the longest plant name in English. It is a Lincolnshire name, and still waits explanation.

Before closing this paper, I must express my large obligations to the recent works of Mr. Skeat, Mr. C. J. Keary, and others too numerous to mention.

There are thousands of plant-names which the limits of an hour's paper preclude from being discussed now, although full of interest and well worthy of investigation. While it is often urged superficially that botanical study is “dull and crabbed,” judging from the technical phraseology employed, it may be of use to point out that the popular and scientific names of plants have an interesting history, not only forming an additional attraction to the student, but also greatly assisting his memory, inasmuch as what before seemed a dry and lifeless catalogue of names to be learned by rote, is now seen to be fraught with meaning and to be linked very closely, and at many points, to the history and pursuits of humanity.



## THE BOTANICAL WORK OF GEORGE DON OF FORFAR.

BY G. C. DRUCE, F.L.S.

(Continued from page 129.)

*Rapistrum orientale*, D.C.

Prov. 15. "Forfar. G. Don the sole authority. Error?"  
*Cyb.* 1, 136, "The *Myagrum orientale* of his list." *C. C. Brit.*

"Native in Attica., Pelop, Italia mer. and mid, Corsica, Sardinia."  
*Nyman Sylloge.*

*Neslea paniculata* Desv.

Forfar?

*Myagrum paniculata* of Don's Forfarshire list. *C. C. Brit.* This is included in his fasciculus, being No. 91.

This and the foregoing plant were merely casuals, the latter still is occasionally found in various parts of Britain (near Aberdeen in July, 1883. *Ed. Scot. Nat.*) "Eur. omn. exc. Brit., Norv. plur. Suec. bor., Fenn. Ross. bor." *Nyman Sylloge.*

*Arabis ciliata*.

"Incog. The late Geo. Don found an *Arabis*, which he calls *Turritis nov. sp.*, near Loch Lee, by Glen Esk, growing on rocks, and he states that Mr. J. T. Mackay recognises it as the same which he had found in Ireland. In *Flora Scotica* the Glen Esk plant is referred to *ciliata*, but it does not appear that the author had seen a specimen from Don. The probability seems strong that *A. hirsuta*, which occurs on the mountains of Forfar, was mistaken for *alpina* or *ciliata*." *Cyb. Brit.* 1, 142.

"On rocks in Glen Esk, Loch Lee, 1801, Mr. G. Don.—This rare rock cress Mr. Don considered to be a new species at the time of its discovery, but Mr. Mackay, on a visit to him at Forfar in 1811, identified it as the same he had gathered in Ireland, and Sir J. C. Smith pointed out its synonyme." *Gard. Fl. F.* 14.

In Miss Palmer's collection is a specimen labelled in the Countess of Aylesford's writing, *Turritis alpina*, from the Glen Esk locality. This was sent in a fresh state to her by Don. The plant is certainly not *A. ciliata*, nor does it appear to me to differ from typical *A. hirsuta*, except in being more glabrous, the hairs over the leaves being long and distant from each other; the root-leaves are distinctly petiolate; nor is there the compact basal rosette of glabrous leaves with ciliate margins typical of *A. ciliata*. I have no doubt that Mr. Watson's suggestion is correct, and that Mackay and Smith were wrong in referring it to *ciliata*. As is the case with Canlochan *Arabis hirsuta*, the plant when growing seems different from our lowland plant, the flowers being larger and more spreading, but I do not doubt its identity with it. Still in Miss Palmer's specimen Don must not be held strictly responsible for its naming, as it is not in his writing, and Lady Aylesford may, but most unlikely, have transposed specimens.

*Silene alpestris* Jacq.

"One of Don's reputed discoveries." *St., Fl.* "Certainly obtained from a garden." *Arnotts Br. Fl.* "A specimen of this plant gathered by Mr. G. Don 'on a rock on a mountain to the east of Clova, Angusshire' is in Mr. Borrer's herbarium." *Bab. Man.* and in *Gard. Fl. F.* 27. "Prov. 15, Forfar, G. Don in Borrer's herb. "Error?" *Cyb.* 1, 203. "Specimens from Don are now distrusted." *C. C. Brit.* "Said to have been gathered by Mr. G. Don on a rock to the east of Clova." *Boswell, E. B., Bab. Man. vii.* 51.

*Arenaria fastigiata* Sm.

"Scotch mts. Don never confirmed." In *English Botany*, Dr. Boswell says he has one of Don's specimens; this has no particles of mica adhering to the roots. "Clova mts., Mr. G. Don." *Gard. Fl., F.*, 32. "Prov. 15, Forfar and Fife. G. Don. Error?" *Cyb. Brit.* 1, 220. "Dr. Arnott intimates in the *British Flora* that he was in possession of Clova specimens from Drummond as well as Don, but Drummond may have got them from Don or from Don's garden, and Dr. Arnott suggests under the head of *Carex hordeiformis* that Drummond did distribute specimens from Don's garden as if collected elsewhere and wild." In *C. C. Brit.* "Area (15) Incog." *Cyb. Brit.* It is figured in *English Flora*, Vol. XXV., No. 1744. And is thus noticed, "Mr. G. Don had the good fortune to discover this new British plant on rock in the mountains of Clova, and also in Fifeshire. He rightly referred it to Jacquin's *A. fasciculata*." In Don's fasciculus, No. 136, are specimens of the true plant, of which on the label attached Don says:—"It is several years since I first observed this plant growing on the mountains of Clova, but very rare. I have likewise found it on some rock in Fifeshire, but rare. My specimens are from Clova." "Mountain of Fifeshire and westward of Clova. Mr. G. Don." *Bab. Man.*, ed. vii., 55.

*Alsine Jacquini*, K. Germ. occ. Bavar, Helv., &c. "Nymans' *Sylloge*."

There is a specimen in Miss Palmer's collection, but there is no mica on the roots of this or any other of her specimens. This may be accounted for by the fact that Lady Aylesford probably on receiving the living plants placed them in water while painting them.

*Sagina alpina*, E. B. 3.

"Top of Ben Nevis. Don." *St. Fl.* "Prov. 16. Summit of Ben Nevis. G. Don. Don says he found it in 1794. See *Pl. of Forfar* 24. Syn. 167. Apparently not found by any living botanist, and the summit of Ben Nevis is almost destitute of phenogamous plants." *C. C. Brit.*, 490. "Don seems to have found it on Ben Nevis." *Bab. Man.*, 7th ed., 53.

This plant, there is little reason to doubt, was found by Don in Scotland, and probably on Ben Nevis; and as Mr. Watson elsewhere asserts that with Don the "summit of mountains" means



“declivities many feet below,” the summit of Ben Nevis being almost destitute of plants, does not disprove Don’s assertion.

This is probably overlooked from its similarity to forms of *procumbens*, and, as the *Caltha* has been, will doubtless eventually be rediscovered.

*Stellaria scapigera* Willd.

“We now believe the plant to exist nowhere in a wild state, but to be a mere cultivated form of *graminea*. Don cultivated it extensively in his garden at Forfar. It was originally described by Willdenow from a plant in the Berlin garden. He does not say from whom it was received, but it is not even conjectured to have been from Scotland, and has not been found anywhere else. It increases rapidly by division, but not by seed, although that sometimes is freely produced. In the Glasgow Botanic Garden, *S. graminea* springs up in the vicinity of pots in which *S. scapigera* had been cultivated.” *Arnott’s Br. Flora.*

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### TRIFOLIUM AGRARIUM L. AS A PROBABLE BRITISH PLANT.

IN 1872, Colonel Drummond Hay and I, when botanising between Dunkeld and Loch Cluny, found a clover which we, having access at the time to books treating only of the British Flora, put down as a very curious form of *Trifolium procumbens* L. Somehow or other I neglected to preserve specimens, and it is only recently that, in going over the Perthshire Herbarium of the Perthshire Society of Natural Science, with a view to the speedy publication of the Flora of Perthshire, I came across a specimen preserved by Colonel Drummond Hay, and found that without doubt it belongs to *Trifolium agrarium* L. This was not altogether unexpected, since several years ago Professor Trail told me that he had found near Aberdeen that two distinct species were confounded together under the name of *T. procumbens*,—*T. procumbens* and *T. agrarium*. Last year I again found the plant growing near Forteviot, and determined that as soon as I could get the opportunity I would compare it with the descriptions in some of the standard continental floras.

As doubtless the plant occurs elsewhere in Scotland, an indication of the points in which it differs from *T. procumbens* will assist botanists in detecting it.

#### T. AGRARIUM L.

*Stipules* oblong lanceolate, equal and not enlarged at the base.

*Leaves* with the middle leaflet without a longer petiole than the lateral ones.

*Style* subequal in length to the legume.

#### T. PROCUMBENS L.

*Stipules* half-ovate, enlarged and rounded at the base on the outer side.

*Leaves* with the middle leaflet with a distinctly longer petiole than the lateral ones.

*Style* only about one quarter the length of the legume.

In other respects *T. agrarium* may be at once distinguished from the usual form of *T. procumbens*, by its upright growth, the erect patent branches, foliage of a paler green, larger flower heads with peduncles subequal in length to the leaf which subtends them, flowers of a deeper yellow, and somewhat differently shaped leaves. It must be remembered, however, that there are two forms of *T. procumbens*, one of which resembles *T. agrarium* in several respects. This form is the var. *majus* Koch (*T. campestre* Schreb., *T. agrarium* Gmel.), which has the primary stem erect, with patent branches; larger flower heads with peduncles subequal to the leaf; and darker yellow flowers. This form I have not observed in Perthshire. The var. *minus* Koch (*T. procumbens* Schreb. *T. pseudo-procumbens* Gmel.) is the only form I have seen in Perthshire, and is distinguished from var. *majus* by its generally procumbent stems, smaller flower heads, with peduncles often twice as long as the leaf, and paler flowers. Koch observes that one variety passes insensibly into the other.

In the older British Floras, and in more recent continental works, there is much confusion in the nomenclature of the species of the group to which *T. agrarium* belongs, chiefly because of the difficulty of identifying from the descriptions of Linnæus the plants to which he had given the names. Dr. Boswell has, however, shown in his edition of *English Botany*, that the plant now referred by British authors to *T. procumbens* L. is the *T. procumbens* of Linnæus' herbarium; and that the *T. agrarium* of the herbarium is the plant described as *T. agrarium* L. by Koch in his *Synopsis Floræ Germanicæ* (ed. 2). (As an example of the confusion of names, it may be mentioned that Grenier and Godron, in the "Flore de France," have described *T. minus* Sm. under the name of *T. procumbens* L.; *T. procumbens* L. as *T. agrarium* L., and the true *T. agrarium* under its synonym *T. aureum* Poll.). It is perhaps doubtful whether the *T. agrarium* of Linnæus' *Species Plantarum* is the same as the *T. agrarium* of the Linnean herbarium.

It remains to be considered whether our specimens of *T. agrarium* are to be regarded as truly native, or as having been accidentally introduced. In France *T. agrarium* is a much less common plant than *T. procumbens*, though widely distributed. It is said to occur in woods and hilly pastures. In Germany, Switzerland, &c., it is a common plant in mountain meadows and at the borders of woods. In Scandinavia it is widely distributed. In Perthshire, Colonel Drummond Hay and I found it in a rough hilly pasture (uncultivated ground), near Loch Cluny, and here it has every appearance of being a native. I have also found it in pastures near Forteviot, but as the ground is cultivated it might have been introduced. I think that I have also seen it on banks near Dunkeld. Probably now that attention has been directed to the plant it will be found in other places.

F. BUCHANAN WHITE.

[It is by no means uncommon in fields and on roadside banks



in South Kincardineshire, and I have also seen it, though rarely, near Aberdeen. Its claims to be ranked as Scottish are doubtful, though it seems moderately well established in some quarters.—  
ED. *Scot. Nat.*]

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ON DOASSANSIA ALISMATIS Cornu, ENTYLOMA CANESCENS  
Schröt., and E. CALENDULÆ Oud.

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IN the last number (pp. 124-125) of this *Magazine*, I stated that I was not aware that these species had been previously recorded from the British islands. I have recently had the opportunity of examining the specimens included under the group *Protomyces* in Kew Herbarium, among which are Mr. Berkeley's own types. From these specimens I have ascertained the following facts of interest:—

*Protomyces Alismatis* B. and Br., represented by specimens on *Alisma Plantago*, from Fern (Rev. J. Fergusson), is certainly *Doassansia Alismatis* Cornu. There are also specimens in Berkeley's Herb. from Bungay, and from Sexton's Wood near Bedingham, on the same sheet, in *Alisma* leaves. Dr. Cooke tells me that he believes that *Æcidium incarcerationum* B. and Br. (Cooke's *Microscopic Fungi*, last edition, p. 200, described from examples from Bungay, but of which no type exists in the Herbarium), is identical with *Prot. Alismatis* B. and Br., and thus with *D. Alismatis* Cornu. The only point that causes me to feel doubt in this respect is that *Æ. incarcerationum* is said to have a specially thin peridium, which does not exactly suit with the *Doassansia* in structure.

*Protomyces macularis* Fckl. (*Symb. Mycol.*, p. 75; *Physoderma maculare* Wallr.) is represented in the Kew Herb. by a specimen from Siberia (1417 Thumen's *Mycotheca Univ.*) on a leaf of *Alisma Plantago*. So far as can be judged from an inspection of the leaf, without making a section, it does not differ from *D. Alismatis* Cornu.

On *Sagittaria sagittifolia* L. pustules occur, clearly of a fungus very similar to those on *Alisma*, and possibly of the same species; though an examination of sections would be needed to permit of certainty on this point. The pustules are rather smaller, and more crowded it may be; but no other difference can be detected with a lens. In Mr. Berkeley's Herb. the two plants are laid on the same sheet as belonging to the same species *Protomyces Alismatis* B. and Br., and were found in the same localities in England. The fungus on *Sagittaria* has been named *Protomyces Sagittariæ* by Fuckel (*Symb. Myc.* p. 75, Cooke *l.c.*, p. 227), but is evidently a *Doassansia*. Dr. Cooke assures me that, from an examination of type-specimens, he has convinced himself that *Uredo Sagittariæ*, Westendorp and Wall., is identical with *P. Sagittariæ* Fckl. It may be mentioned in passing that *Uredo Sagittariæ* Cooke, on a *Sagittaria* from New Jersey, and *Phyllosticta Sagittariæ* Rabenh (553 *Rabh. Fungi*), are abundantly distinct from the above.

The synonymy will thus be seen to be much involved, and it will be well, therefore, to sum up the results arrived at above:—

*Doassansia Alismatis* Cornu is *Protomyces Alismatis* B. and Br.; is most probably *P. macularis* Fckl., and is possibly *Æcidium incarcerationum* B. and Br. all occurring on leaves of *Alisma Plantago* L.

*Doassansia* (? *Alismatis* Cornu) on leaves of *Sagittaria sagittifolia* is *Protomyces Alismatis* B. and Br. *pro parte*, *Protomyces Sagittariæ* Fckl., and *Uredo Sagittariæ* West. and Wall. (non Cooke).

*Protomyces Fergussoni* B. and Br. is represented in Berk. Herb. (No. 5247) by a spot in a leaf of *Myosotis* from New Pitsligo. So far as can be

determined without microscopic examination of a section of the spot, it is, as suggested in my former article, identical with *Entyloma canescens* Schröter.

*Protomyces Hieracii* B. is the name given to a specimen in the Berk. Herb. (No. 5248) in a spot in a leaf of *Hieracium vulgatum*, forwarded by the Rev. Mark Anderson from Noran woods. It is identical with *Entyloma Calendula* Oudem, described in this *Magazine* on pp. 124-125.

JAMES W. H. TRAIL, M.D.

## MYCOLOGIA SCOTICA.

BY REV. J. STEVENSON.

(Continued from page 116.)

The following districts are to be recorded for the species enumerated:—

TWEED.—*Agaricus portentosus* Fr. ; *A. resplendens* Fr. ; *A. murinaceus* Bull. ; *A. lascivus* Fr. ; *A. gloiocephalus* Fr. ; *A. pisciodorus* Les, *Mycol. Scot. Supp.*, *Scot. Nat.* Vol. VI. p. 214 ; *A. lentus* Pers. ; *Polyporus caesius* Schrad ; *P. adustus* Willd. ; *Trametes mollis* Smrft ; *Geoglossum glabrum* Pers. ; *Peziza macropus* Pers.

TAY.—*Agaricus mappa* Fr. ; *A. brevipes* Fr. ; *A. griseus* Fr. ; *A. hypnophilus* Berk. ; *A. caperatus* Pers. ; *A. astragalinus* Fr. ; *A. alveolus* Lasch. ; *A. conopileus* Fr. ; *Coprinus lagopus* Fr. ; *Cortinarius tabularis* Fr. ; *Typhula phacorrhiza* Reich. ; *Dacrymyces chrysocomus* Bull. ; *Uredo statices* Desm., *Mycol. Scot. Supp.*, *Scot. Nat.* Vol. VI. p. 219 ; *Peziza coccinea* Jacq. ; *Erysiphe horridula* Lev. ; *Acrospermum compressum* Tode.

DEE.—*Exobasidium Rhododendri* Cr., *Mycol. Scot. Supp.* *Scot. Nat.* Vol. VI. p. 117 ; *Phyllosticta Violae* Desm., *Mycol. Scot. Supp.* *Scot. Nat.* Vol. VI. p. 118 ; *Asteroma Ulmi* Klotsch. ; *Phragmidium obtusum* Fr. ; *P. violaceum* Schultz, *Scot. Nat.* 1884, p. 123 ; *Puccinia striola* Link. ; *P. Cirsii* Lasch. ; *P. acuminata* Fckl. ; *P. amphibii* Fckl., *Mycol. Scot. Supp.* *Scot. Nat.* Vol. VI. p. 118 ; *P. Pimpinellae* Lk., *Mycol. Scot. Supp.* *Scot. Nat.* Vol. VI. p. 119 ; *Uromyces Geranii* Berk. ; *Cystopus spinulosus* De By. ; *Lecythea Valerianae* Berk. ; *Ustilago vinosa* Tul. ; *Urocystis Violae* B. & Br. ; *Aecidium Valerianacearum* Duby. ; *Peronospora gangliformis* Berk. ; *P. calotheca* De By. ; *P. arborescens*, B., *Mycol. Scot. Supp.* *Scot. Nat.*, 1883, p. 35 ; *R. rufibasis* B. & Br. ; *R. interstitialis* B. & Br. ; *Dactylium spirale* Berk. & B. White ; *D. modestum* Berk. & B. White ; *Exoascus Pruni* Fckl. (*Ascomyces Pruni* Fckl.) ; *E. Alni* De By. (*Ascomyces Tosquetii* West.) ; *Rhytisma salicinum* Fr. ; *Uncinula bicornis* Lev. ; *Podosphaeria Kunzei* Lev. ; *Erysiphe horridula* Lev. ; *Chaetomium elatum* Kze.

MORAY.—*Agaricus immundus* Berk., *Mycol. Scot. Supp.* *Scot. Nat.* Vol. VI. p. 213 ; *A. acervatus* Fr. ; *A. clavus* L. ; *A. plexipes* Fr. ; *A. proliferus* Sow. ; *A. majalis* Fr. ; *A. sobrius* Fr. ; *C. turmalis* Fr. ; *C. tophaceus* Fr. ; *C. cinnabarinus* Fr., *Mycol. Scot. Supp.* *Scot. Nat.* Vol. VI. p. 217 ; *Lactarius vietus* Fr., *Mycol. Scot. Supp.* *Scot. Nat.* Vol. VI. p. 217 ; *L. pallidus* Pers. ; *L. pubescens* Fr. ; *Boletus flavidus* Fr. ; *B. cyanescens* Bull. ; *Cyphella capula* Holmsk. ; *Typhula Grevillei* Fr. ; *Hendersonia oreades* Dur. & Mont. ; *Septoria Epilobii* West. ; *S. Ficariae* Desm. ; *Ascochyta Pisi* Lib. ; *A. Dianthi* Berk. ; *Sporochisma mirabile* B. & Br. ; *P. Malvacearum*



Cda., *Mycol. Scot. Supp. Scot. Nat.* Vol. VI. p. 119; *P. amphibii* Fekl., *Mycol. Scot. Supp. Scot. Nat.* Vol. VI. p. 118; *Aecidium leucospermum* D.C.; *Ae. Galii* Pers.; *Ae. Valerianacearum* Duby.; *Isaria intricata* Fr.; *Sporocybe alternata* Berk., *Mycol. Scot. Supp. Scot. Nat.* Vol. VI. p. 121; *Macrosporium concinnum* Berk.; *Peronospora gangliiformis* Berk.; *P. Viciae* Berk.; *P. effusa* Grev.; *P. Urticae* Casp.; *P. Ficariae* Tul.; *P. calotheca* De By.; *P. sordida* Berk.; *Ramularia obliqua* (*Peronospora obliqua* Cke.): *Morchella semilibera* D. C.; *Stigmatea chaetomium* Fr.; *Diaporthe velata* Pers.; *Valsa crataegi* Curr.; *Sphaerella Rusci* De Not.

SOLWAY.—*Agaricus mappa* Fr.; *A. rubescens* Pers.; *A. rachodes* Vitt.; *A. granulatus* Batsch.; *A. melleus* Fl. San.; *A. rutilans* Schaeff.; *A. terreus* Schaeff.; *A. grammopodius* Bull.; *A. nebularis* Batsch.; *A. clavipes* Pers.; *A. phyllophilus* Fr.; *A. candicans* Pers.; *A. infundibuliformis* Schaeff.; *A. maculatus* A. & S.; *A. dryophilus* Bull.; *A. rubro-marginatus* Fr.; *A. sanguinolentus*, A. & S.; *A. galopus* Pers.; *A. vulgaris* Pers.; *A. dryinus* Pers.; *A. cervinus* Schaeff.; *A. lampropus* Fr.; *A. serratus* Pers.; *A. squarrosus* Müll.; *A. spectabilis* Fr.; *A. flammans* Fr.; *A. pumilus* Fr.; *A. calamistratus* Fr.; *A. geophyllus* Sow.; *A. semiorbicularis* Bull.; *A. tener* Schaeff.; *A. hypnorum* Batsch.; *A. mollis* Schaeff.; *A. aeruginosus* Curt.; *A. semilanceatus* Fr.; *A. foenicicii* Pers.; *A. papilionaceus* Bull.; *A. disseminatus* Pers.; *Cortinarius cyanopus* Secr.; *C. collinitus* Sow.; *C. elatior* Fr.; *C. caninus* Fr.; *C. torvus* Fr.; *C. armillatus* Fr.; *C. hinnuleus* Pers.; *Paxillus involutus* Batsch.; *Hygrophorus chlorophanus* Fr.; *Lactarius torminosus* Schaeff.; *L. blennius* Fr.; *L. deliciosus* L.; *L. rufus* Scop.; *L. serifluus* D. C.; *L. mitissimus* Fr.; *L. subdulcis* Bull.; *L. camphoratus* Bull.; *Russula nigricans* Bull.; *R. adusta* Pers.; *R. virescens* Schaeff.; *R. cyanoxantha* Schaeff.; *R. foetens* Pers.; *R. fellea* Fr.; *R. Queletii* Fr.; *R. emetica* Harz.; *R. integra* L.; *Marasmius peronatus* Bolt.; *M. ramealis* Bull.; *Lentinus cochleatus* Pers.; *Boletus luteus* L.; *B. chrysenteron* Bull.; *B. pachypus* Fr.; *B. edulis* Bull.; *Polyporus elegans* Bull.; *P. destructor* Schrad.; *P. dryadeus* Fr., *Mycol. Scot. Supp. Scot. Nat.* Vol. VI. p. 37; *P. fomentarius* L.; *P. igniarius* L.; *P. radiatus* Sow.; *P. terrestris* D. C.; *Stereum rugosum* Pers.; *Corticium quercinum* Pers.; *Calocera cornea* Batsch.; *Tremella foliacea* Pers.; *T. albida* Huds.; *T. viscosa* Berk.; *Naematelia encephala* Willd.; *Dacrymyces deliquescens* Bull.; *Lycoperdon pyriforme* Schaeff.; *Tilmadoche nutans* Pers.; *Arcyria punicea* Pers.; *Trichia varia* Pers.; *Torula pulveracea* Corda.; *Phragmidium violaceum* Schultz.; *Coleosporium Tussilaginis* Lev.; *Lecythea Saliceti* Lev.; *Roestelia cornuta* Tul.; *Peronospora parasitica* Corda.; *Rhizina undulata* Fr.; *Peziza cinerea* Batsch.; *Helotium citrinum* Fr.; *H. claro-flavum* Berk.; *Ascobolus furfuraceus* Pers.; *Dichaena strobilina* Fr.; *Nectria cinnabarina* Fr.; *Dothidea Junci* Fr.; *D. filicina* Fr.; *Ustilina vulgaris* Tul.; *Hypoxylon multifforme* Fr.; *Diatrype disciformis* Fr.; *Psilosphaeria moriformis* Tode.; *P. pulvispyrius* Pers.; *Sphaeria acuta* Mong.

The following countries are to be added for the species enumerated:—

ICELAND.—The names within brackets are the vernacular Icelandic names of the species. *Agaricus campestris* L. (*Aetisveppr*); *A. cricaceus* Pers.; *A. campanulatus* L.; *Hygrophorus conicus* Scop.; *Russula fragilis* Pers.; *Boletus luteus* L. (*Reidikula*); *B. bovinus* L. (*Kualulli*); *B. scaber* Fr.; *Phlebia radiata* Fr.; *Clavaria muscoides* L.; *Bovista plumbea* Pers.; *Lycoperdon giganteum* Batsch.; *L. caelatum* Fr.; *L. pusillum* Fr.; *L. gemmatum* Fr.; *Scleroderma bovista* Fr. (*Gorkula*, *Fissipepper*); *Puccinia Bistortae* D. C.; *P. variabilis* Grev.; *P. pulverulenta* Grev.; *Melanipsora salicina* Lev.; *Ustilago urceolorum* Tul.; *Aecidium Thalictri* Grev.; *Aspergillus glaucus* Link.; *Mucor mucedo* Linn.; *Helvella atra* König.; *Peziza cupularis* Linn.; *P. scutellata* Linn.; *P. cinerea* Batsch.; *Helotium*

*aeruginosum* Fr. ; *Rhytisma salicinum* Fr. ; *Sordaria discospora* Awd. ; *Sphaeria* (*Pleospora*) *herbarum* Pers.

AFRICA.—*Boletus flavidus* Fr. ; *Polyporus elegans* Bull. ; *P. nidulans* Fr. ; *P. igniarius* L. ; *P. velutinus* Fr. ; *P. aneirinus* Smrft. ; *P. callosus* Fr. ; *P. vulgaris* Fr. ; *P. molluscus* Fr. ; *P. sanguinolentus* A. & S. ; *Merulius corium* Fr. ; *M. serpens* Tode. ; *Radulum orbiculare* Fr. ; *Corticium cinereum* Fr. ; *Cyphella Curreyi* Berk. ; *Clavaria cristata* Pers. ; *Exidia glandulosa* Bull. ; *Geaster limbatus* Fr. ; *Lycoperdon pusillum* Fr. ; *L. saccatum* Vahl. ; *L. gemmatum* Fr. ; *Scleroderma verrucosum* Pers. ; *Physarum Schumacheri* Spr. ; *Tilmadoche nutans* Pers. ; *Didymium microcarpum* Fr. ; *D. physaroides* Pers. ; *D. squamulosum* A. & S. ; *Stemonitis fusca* Roth. ; *Arcyria cinerea* Bull. ; *Lycogala epidendrum* Bux. ; *Septoria Scabiosaecola* Desm. ; *Phragmidium obtusum* Link. ; *Puccinia coronata* Corda. ; *P. Menthae* Pers. ; *P. Lychnidearum* Link. ; *Uredo filicum* Desm. ; *Cystopus candidus* Lev. ; *Aecidium Compositarum* Mart. ; *Ceratium hydroides* A. & S. ; *Peziza coccinea* Jacq. ; *P. cinerea* Batsch. ; *Helotium claro-flavum* Berk. ; *Ascobolus furfuraceus* Pers. ; *A. ciliatus* Schum. ; *Dothidea graminis* Fr. ; *Xylaria polymorpha* Grev. ; *Hypoxyton concentricum* Grev. ; *Valsa salicina* Fr.

AUSTRALIA.—*Coprinus plicatilis* Curt. ; *Hygrophorus miniatus* Fr. ; *Russula sanguinea* Bull. ; *R. emetica* Harz. ; *Lentinus cochleatus* Pers. ; *Lenzites betulina* L. ; *B. pachypus* Fr. ; *Fistulina hepatica* Huds. ; *Polyporus brumalis* Pers. ; *P. perennis* L. ; *P. melanopus* Fr. ; *P. chioneus* Fr. ; *P. adustus* Willd. ; *P. applanatus* Pers. ; *Daedalea unicolor* Bull. ; *Merulius corium* Fr. ; *M. lachrymans* Wulf. ; *Solenia ochracea* Hoffm. ; *Hydnum laevigatum* Swartz. ; *Hydnum repandum* L. ; *H. ochraceum* Pers. ; *H. udum* Fr. ; *Phlebia radiata* Fr. ; *Thelephora intybacea* Pers. ; *Stereum purpureum* Pers. ; *S. rugosum* Pers. ; *Hymenochaete rubiginosa* Schrad. ; *Corticium laeve* Pers. ; *C. incarnatum* Fr. ; *C. comedens* Nees. ; *C. anthochroum* Pers. ; *Clavaria fastigiata* L. ; *C. muscoides* L. ; *C. coralloides* L. ; *C. stricta* Pers. ; *Calocera cornea* Batsch. ; *Tremella albida* Huds. ; *Exidia glandulosa* Bull. ; *Geaster striatus* D. C. ; *Hymenogaster Klotschii* Tul. ; *Badhamia utricularis* Bull. ; *Physarum cinereum* Batsch. ; *Fuligo varians* Sommf. ; *Craterium vulgare* Ditm. ; *Chondrioderma difforme* Pers. ; *Didymium farinaceum* Schrad. ; *Stemonitis ferruginea* Ehr. ; *Arcyria cinerea* Bull. ; *A. incarnata* Pers. ; *A. nutans* Bull. ; *A. ferruginea* Sauter. ; *Lycogala epidendrum* Bux. ; *Excipula strigosa* Fr. ; *Tilletia caries* Tul. ; *Morchella semilibera* D. C. ; *Leotia lubrica* Pers. ; *Peziza badia* Pers. ; *P. melaloma* A. & S. ; *P. scutellata* Linn. ; *Ascobolus furfuraceus* Pers. ; *Hysterium pulicare* Pers. ; *Hypomyces rosellus* Tul. ; *Nectria sanguinea* Fr. ; *N. coccinea* Fr. ; *Dothidea graminis* Fr. ; *Xylaria digitata* Grev. ; *Poronia punctata* Fr. ; *Hypoxyton multiforme* Fr. ; *Lasiosphaeria ovina* Pers.

TASMANIA.—*Polyporus lucidus* Leys. ; *Merulius corium* Fr. ; *M. pallens* Berk. ; *Hydnum udum* Fr. ; *Grandinia granulosa* Pers. ; *Clavaria juncea* Fr. ; *C. cristata* Pers. ; *Tremella frondosa* Fr. ; *T. foliacea* Pers. ; *T. lutescens* Pers. ; *T. albida* Huds. ; *T. viscosa* Berk. ; *Exidia glandulosa* Bull. ; *Hirneola auricula-Judae* L. ; *Dacrymyces deliquescens* Bull. ; *Lycoperdon pyriforme* Schaeff. ; *L. gemmatum* Fr. ; *Sphaerobolus stellatus* Tode. ; *Badhamia hyalina* Pers. ; *Fuligo varians* Sommf. ; *Craterium minutum* Leers. ; *Leiocarpus fragilis* Dicks. ; *Tilmadoche nutans* Pers. ; *Didymium squamulosum* A. & S. ; *Comatricha Friesiana* De By. ; *Stemonitis fusca* Roth. ; *Trichia varia* Pers. ; *T. chrysosperma* Bull. ; *Puccinia graminis* Pers. ; *Tilletia caries* Tul. ; *Aecidium Ranunculacearum* D. C. ; *Peziza cochleata* Bull. ; *P. aurantia* Vahl. ; *P. coccinea* Jacq. ; *P. scutellata* L. ; *P. virginea* Batsch. ; *P. hyalina* Pers. ; *P. firma* Pers. ; *P. cinerea* Batsch. ; *Helotium citrinum* Fr. ; *Bulgaria sarcoides* Fr. ; *Stictis radiata* Pers. ; *Hypocrea rufa* Fr. ; *H. citrina* Fr. ; *Nectria coccinea* Fr. ; *Melanospora caprina* Fr. ; *Poronia punctata* Fr. ; *Hypoxyton concentricum* Grev. ; *H. coccineum* Bull. ; *H. multiforme* Fr. ; *Eutypa lata* Tul.

Note.—The following new British species will appear in their proper place in a future supplement : *A. aureus* Mattusch, *Lactarius capsicum* Schulz, and several leaf parasites.



**CHARA FRAGILIS** Desv., var. **STURROCKII**, var. nov.—Stem 2-3 feet high, very imperfectly triplostichous. Spine-cells tubercular. Branchlets 1-3 inches long, with *all the segments ecorticate*. Bract-cells whorled. East Perth (coll. A. Sturrock.)

This is a very remarkable plant, and although we have included it under *C. fragilis* for the present, we think that an examination of a series of specimens may show characters on which to found a species. A form of *C. fragilis* var. *Hedwigii* occurs in the same loch, and though much like this plant in size, &c., it differs in the cortication of the stem, as well as in the presence of cortical cells in the branchlets. We understand from Mr. A. Bennett that Professor Nordstedt has proposed the name of *C. fragilis* var. *gymnophylla*; but in view of the complication of nomenclature resulting from having several vars. *gymnophylla* in the same genus, we think it best not to adopt such names for varieties which appear permanent, and have distinctive characters other than those implied in the name. H. & J. GROVES (in the *Journal of Botany*, 1884, p. 2).

**CLADONIA PYXIDATA** var. **LEPTOPHYLLA**. Flk. in Scotland.—Towards the end of last year I gathered this exceedingly rare Cladonia by the side of the Newton Stewart road, about 1¾ miles from New Galloway. It was scattered over a space of several square yards on a heathy roadside bank, was in excellent and abundant fruit, the capitate flesh-coloured apothecia having the appearance of large specimens of *Baeomyces rufus*. The Rev. W. A. Leighton in his "Lichen Flora," has the following very interesting remarks on this lichen:—"Of this I have seen no British specimens, but possess an authentic one from Dr. Nylander, collected in Java, 7000 ft. alt. Coëmans (Clad. Achar.) states that the Acharian herbarium at Helsingfors contains a specimen of this lichen from England, and that he considers it as a variety of *cariosa*, which it certainly generally resembles, but the different reaction keeps them quite distinct. He gives it as being found by Mr. Borrer in "Tilgate and St. Leonard's Forests, Sussex." The European Geographical distribution in addition to England is "France and Switzerland." Dr. Nylander in his "Synopsis" speaks of *Cladonia leptophylla* Flk. as found "super terram macram præsertim argillosam in Anglia, Helvetia, et Gallia parce." Schærer writes in almost similar terms. It is certainly a very rare lichen, and is one of a number of very good Cladoniæ found in this district of Kirkcudbrightshire. I am certain that the majority of the species of British Cladoniæ could be gathered here.—JAMES M'ANDREW.

## MEETINGS AND PROCEEDINGS OF SCOTTISH SCIENTIFIC SOCIETIES.

[NOTE.—Accounts of meetings during the month preceding date of issue of any number of this *Magazine* are too late for insertion in that number, but will appear in the following one.]

**ABERDEEN NATURAL HISTORY SOCIETY.**—18th December, 1883.—Four papers were read. 1. "On the Cultivation of Plants in Fertilised Moss," by Mr. J. Sim. Mr. Sim gave an account of his own experience of this method of cultivation, and pointed out its suitability for use in ornamenting the interior of rooms with living plants. In illustration of his remarks, he showed several plants belonging to different groups, all of which looked very healthy and vigorous. 2. "On Worm-Borings in Boulder Clay, shown in Excavations at Esslemont Avenue, Aberdeen," by Dr. A. Cruickshank. Dr. C. called attention to the peculiarity of worm-borings extending several feet down into the very hard red boulder clay, and remarked that some at least of the burrows ended in a pouch about the size of a walnut, in which lay a

collection of small stones. Some of the burrows were branched. In the discussion the suggestion was made that the burrows might be the work of marine annelids, before the elevation of the ground above the sea-level. 3. **"Supplementary List of the Fungi of the Province of Moray,"** by the Rev. Dr. Keith of Forres. 4. **Report by the Secretary (Mr. John Roy), on the Excursions made by the Society during the Summer.** These were three in number—viz., on June 2nd to Strachan and across the hills by Drumtochty to Fordoun; on July 14th, to Loch Kinnord; and on September 8th, to the Loch of Strathbeg, in Buchan, near Peterhead. The excursion to Loch Kinnord was devoted to dredging the loch for pondweeds; but the results were of less interest than had been hoped. During this excursion a visit was paid to an extensive deposit of Diatom earth (*Kieselguhr*), which is now being rather extensively worked on the estates of Lords Aberdeen and Huntly, to be used in the preparation of dynamite. The Loch of Strathbeg is a noted resort of wildfowl in winter, and it has also attractions for botanists in the plants that grow on a swampy strip of ground on its east shore, several of which are of very rare occurrence elsewhere in the north-east of Scotland. The loch occupies the upper end of what was formerly an inlet of the sea with a wide opening at its southern end, scoured clear by the tides. At this opening stood the royal burgh of Rattray, with the inlet as its harbour. In course of time the upper end of the bay became cut off from the sea by a broad sand and shingle bank, thrown up by storms, and a fresh-water loch replaced the bay. The level of the loch is now some feet above the sea, and the only communication between them is by a burn. The destruction of its harbour was fatal to the burgh, and the only remaining trace of the latter is the ruin of the church, one of the oldest ecclesiastical buildings in the north of Scotland.

January 15.—Prof. H. Alleyne Nicholson gave a very clear and fully illustrated lecture on **"The Organisms which occur in Limestone."**

February 19.—Professor J. W. H. Trail submitted the following papers, with verbal remarks on some of the more interesting points in them, the papers themselves entering too much into details to be read in full:—**"Supplementary Notes on Galls and their Makers in 'Dee,' and on a few from other parts of Scotland,"** and **"A List of the 'Casuals' in the Phanerogamic Flora of the North-East of Scotland."** He thereafter laid on the table a paper by Mr. Roy and himself, entitled: **"Additions and Corrections to the Records in Watson's Topographical Botany, Edit. II., of Vascular Plants indigenous in the Counties of Forfar, Kincardine, Aberdeen, and Banff."** A considerable number of additions fall to be made to the lists for these counties in the above well-known book; and a few of the records there given are doubtful or incorrect. Mr. Roy read a note on the occurrence of a small stone in the interior of the egg of a red grouse. Mr. F. Ogilvie exhibited a piece of granite from Kemnay Quarries containing a very large maced garnet.

Mr. Roy and Professor Trail, who had been appointed at the meeting on 15th January to represent the Society at the meeting of delegates in Perth on 9th February, reported what had been done at that meeting, and urged that the Society should join the Union then constituted. On the motion of Mr. Forrest, seconded by Mr. Cruickshank, the Society resolved to join the Union, and appointed Mr. Roy and Prof. Trail to be their representative members on the Council of the Union.



PROCEEDINGS OF THE BERWICKSHIRE NATURALISTS' CLUB.

—This well-known and energetic Society has recently published vol. X. part 7 of its proceedings. Like the earlier volumes, it is characterised by the care and excellence shown in its preparation, and sustains the reputation so long and worthily enjoyed by the veteran secretary, Mr. Hardy. An index of titles of its contents would facilitate reference to them, however.

The papers in it dealing with Scottish botany, zoology, and geology, are as follows:—The *Anniversary Address* by the President, the Rev. James Farquharson of Selkirk, occupies 64 pages, and gives a full account of the excursions of the Club during the summer of 1882. We observe that they were largely attended. They were to the following places:—On May 31st, to Haddington, and thence to the Garleton Hills. In this excursion the interest was chiefly archæological. The second excursion (date?) was to Hounam, and a very full account of the observations made during it was kept by Mr. Hardy, but space will not allow us to transcribe them. The third meeting was held on 26th July to visit Longformacus, in the Lammermoor Hills, the place of meeting being Dunse. Some notes of interest to botanists were made on the ornamental Coniferæ planted around the mansion-house of Longformacus. The occurrence of *Rubus Chamæmorus* is also confirmed, so that Berwickshire falls to be added to the county records for this plant. The fourth meeting was held at Corbridge, in the valley of the Tyne, on August 30th. The fifth meeting was held at Jedburgh on 27th September. A short description of the geology of the neighbourhood by Prof. James Geikie is given. The last meeting for the season was held on 11th October at Selkirk, but the weather proved unfavourable. The Haining was visited, and the party drove up the side of the Yarrow as far as Hangingshaw. At this meeting it was agreed that the meetings of the Club in 1883 should be held at Leitholm and Eccles, Holy Island, Aberlady, St. Mary's Loch, Wooler and the Cheviots, and Berwick. Several mushrooms from the district were recorded by Mr. Paul and Dr. Stuart. At the various meetings papers were read contained in the volume under review. Mr. Hardy, as Secretary, submitted obituary notices of nine members of the Club that had died during the year. Of these, Mr. Sadler, of whom an obituary notice has already appeared in our pages, is the only one that calls for special mention from us. Of him there are two other obituary notices in this volume by Dr. W. Craig and by Dr. C. Stuart respectively. Then follows a short note by Rev. D. Paul on "**The Fungi of Berwickshire,**" the substance of which appears in "*Mycologia Scotica.*" "**On the Bird Life of the Firth of Forth during the Storms of October and November, 1881,**" by Robert Gray, deals with their fatal effects on birds. Dr. J. Robson-Scott reports that a heronry at Swinden, Bowmont Water, has been deserted by the birds. "**Notes on the Marine Algæ of Berwick-upon-Tweed,**" by E. A. L. Batters, is a list of the species of Algæ that have been found by Mr. Batters, and that he is not aware of any record of the occurrence of in the district previously. The list includes 41 species, several of which are of much interest, but need not be detailed here, as the chief rarities will be found on p. 48 of this volume of the *Scottish Naturalist*. A "**List of Hill Forts, Intrenched Camps, &c., in Roxburghshire, on the Scotch side of the Cheviots,**" by Prof. J. Geikie, is a valuable contribution to the archæology of the district, and is based on observations made during the geological survey, so that it may be regarded as complete.

Next follows a paper on "**Lepidoptera in Roxburghshire**," by Adam Elliot, which will be found noticed subsequently in this *Magazine*.

"**Rooks and Rookeries**" by James Smail, is an interesting article on the habits of rooks; and deals at some length on the question of their food. The subject is one of considerable interest in itself, as well as in view of the very different opinions held on the relation of rooks to agriculture, hence we venture to extract a part of Mr. Smail's paper, in the hope that the Club will permit our doing so. The author also gives a list of the rookeries, excluding a few very small ones, in the counties of Berwick, Roxburgh, Selkirk, and Peebles; and in Northumberland. Their number in the Scotch counties is 152. Of winter rookeries, as distinguished from the breeding rookeries, there are 21 in these counties as reported to him, but he is of opinion that this number is too high. 16 rookeries have been destroyed in the above district of Scotland. The trees of almost all the large rookeries are Scotch Firs; though some moderately large ones are on hard-wooded trees, among which the Ash seems preferred.

The remaining articles are short. They include "**Ornithological Notes**" by Robert Gray, on birds of the east of Scotland from Fifeshire southwards; "**On the effects of Lightning in Smelting and Altering Gravel at Chapelhill, Cockburnspath, 10th July, 1882.**" by James Hardy; "**Notes on the Measurements of a few of the larger Trees at Edgerstone House, taken in January, 1883,**" by Sheriff Russell; "**Arrivals, Departures, and Occurrence of Birds near Belford, 1881-2,**" by John Aitchison; "**Reports on the Effects of the Great Storm of Wind, 14th Oct., 1881, on Trees and Animals,**" in the form of letters to the Secretary from various parts of the district covered by the Club; "**On some extraordinary abnormal Fruits of the Blackthorn,**" by James Hardy (with plate IV.).

We observe, in conclusion, that the Club has expressed its sense of the great services rendered to it by Mr. Hardy by presenting him with a microscope and accessories, the case bearing that it was "Presented to James Hardy, Esq., Oldcambus, together with a purse of above 100 sovereigns by 122 members of the Berwickshire Naturalists' Club at its jubilee meeting (29th June, 1881), in testimony of their appreciation of his long and able services as Secretary and Editor of the Proceedings of the Club, and of the high respect in which he is held for his many scientific attainments and valuable contributions in various departments of Natural History and Archæology, during a period of above 40 years." All lovers of these sciences in Britain will join in the wish that he may long enjoy the use of the gift, and that he may continue to make as valuable contributions to their progress among us in future as he has done in the past.

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**DUMFRIES-SHIRE AND GALLOWAY NATURAL HISTORY AND ANTIQUARIAN SOCIETY.**—At a meeting on 4th Jan., Mr. Henderson exhibited several specimens from Manitoba, with remarks on his experiences in that province of Canada.

Mr. James Shaw, Tynron, communicated observations on "**First blossoming of the Wild Flowers of Tynron.**" These observations were made at a height of from 300 to 1300 feet above the sea-level, though chiefly at the lower level. Commenting on his catalogue of plants Mr. Shaw says:—"The *Marsh Marigold*, *Wood Stitchwort*, and *Common Broom* are thus found a week behind in 1883. The "*Craw-taes*" or *Spring Blue-bell* (*Agraphis nutans*), and also the *Marsh Violet*, are noticed a fortnight later in 1883. The *Early Orchis*



plants were in bloom in April 1882, but were not noticed until the third week of May 1883. *Geum rivale* is equally behind. Some of the flowers noticed in blossom in the first week of June 1882 were not noticed until the third week of June 1883. *Lapsana communis* and *Scabiosa succisa* or "*Devil's bit*," noticed in blossom in the first week of July 1882, were not observed until the third week of July 1883. Generally speaking, the vanguard of any given species came to the front a fortnight later in 1883."

Mr. G. F. Black of the Edinburgh Museum of Antiquities followed with "**Notes upon the National Collection of Antiquities, Edinburgh**," dealing chiefly with the foreign section. The Chairman, Dr. Gilchrist, concluded the business of the meeting with "**Natural History Notes on Southport**."

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At the meeting of the **ROYAL SOCIETY OF EDINBURGH** on the 4th February, Lord Moncrieff delivered an address on "**The Past Hundred Years' History of the Society**," in which he reviewed the origin and progress of the Society, with especial references to the illustrious savants whose names are enrolled among its founders or its later members. The address is given in full in *Nature*, XXIX., p. 368-370 (Feb. 14th, 1884).

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**INVERNESS SCIENTIFIC SOCIETY AND FIELD CLUB.**—On Tuesday, December 4th, the Secretary read a paper by Mr. Colin Livingstone, Fort William, on "**The Travelled Boulders of Lochaber**." The district of Lochaber is very rich in traces of ice action during the "Glacial-period;" its lofty mountain ranges having been a centre from which the glaciers pressed outwards. Of the information to be gathered from a careful investigation of the district Mr. Livingstone made full use, and he has shown reason to believe that the ice had pressed downwards in the direction of Glenmore; though at one spot in Lochiel, on the north side, the distribution of the boulders somewhat conflicts with this belief.

At the meeting on 8th Jan., a paper was read on "**Old Ironworks in the Highlands**," by Mr. John H. Dixon of Inveran. The author treated specially of the works near Loch Maree, where he had seen traces of seven different works. He also sent a list of the different ores of the district around Letterewe, including *native ironstone* from the quarry and field at the furnace there, also from Innisglask, *hamatite* from Letterewe and from a heap at the Pool at Poolewe, *clay ironstone* from both localities named, and specimens of *iron slag*, *limestone*, *iron*, and *charcoal* from various points along the shores of Loch Maree. In the discussion that followed the reading of the paper, Mr. Mackenzie, of the *Celtic Magazine*, showed from the New Statistical Account, and from a record of the MacRas, that these works had been commenced probably about the beginning of the seventeenth century, and were consequently about 270 years old. They are, therefore, so far as can be ascertained, the earliest smelting works in Scotland; since those at Abernethy, the next earliest on record, were not commenced till 120 years later. The works at Loch Maree were discontinued when the wood in the neighbourhood had been consumed—wood having been the only fuel employed for smelting the iron.

Dr. Aitken thereafter read a paper on "**Dorsetshire Thunderbolts**," a name locally applied to nodules of *Marcasite* (*White Iron Pyrites*), that occur abundantly in the Chalk formations of the South of England.

**KIRKCALDY NATURALISTS' SOCIETY.**—29th January, Mr. James Shepherd read a paper on "Instinct," which has since been printed for private circulation. The subject is one at once exceedingly interesting and ill-understood. Mr. Shepherd has been successful in putting the facts before his hearers in a way that could not fail to engage their attention and interest; and his anecdotes of observations made by himself on pet animals are well worth attention.

**MONTROSE SCIENTIFIC AND FIELD CLUB.**—At the meeting of this Club on Tuesday, 12th February, Mr. W. J. Hardie gave a lecture on the *Teeth*, illustrated by models and diagrams. Dr. Howden reported that he had attended the meeting at Perth, on the 9th February, of delegates called to consider the federation of the Scientific Societies in the east of Scotland between Fife and Aberdeenshire. He gave an account of the proceedings at the meeting, and advised the Club to join the Union. It was unanimously agreed to do so.

**MONTROSE NATURAL HISTORY AND ANTIQUARIAN SOCIETY.** Feb. 20th.—The annual meeting of this Society was held in the Museum at noon. The Secretary, Mr. R. Barclay, reported a miscellaneous gathering of donations to the Museum during the year. From the list it is evident that the collections are, like those in most provincial museums, of a very mixed kind; and among other gifts during the year is one of a gold cup won by a horse of General Ramsay at Mysore in 1865, and bequeathed by him to the Museum. The cup is valued at 250 guineas, and the Society for it may have to pay £26 5s. of legacy duty. We do not wonder that some of the gentlemen present expressed the opinion that the gift was of the same nature as a "white elephant." The Society is desirous to extend the buildings of the Museum, and an Extension Fund has been commenced. Part of the money has been contributed, but, as usually occurs, only a minority of the members have as yet intimated subscriptions. In connection with the proposed extension, Dr. Howden moved: "*That, in any addition to be made to the Museum buildings, provision shall be made for the formation of a purely local collection, illustrative of the natural history of Angus and Mearns, and of an educational typical collection of classes, orders, and genera, for a lecture-room, a library, and a laboratory for scientific work.*" After he had spoken in support of his motion, it was seconded by Captain Forsyth Grant; and after a good deal of talk, it was remitted to the Directors to consider and report to the next annual meeting. It is to be hoped that the motion will receive full and fair consideration; and that, if the necessary expenses can be met in any way, it will be carried into action as soon as possible.

On the motion of Dr. Howden, the Society agreed to join the East of Scotland Union of Naturalists' Societies; and he and the Secretary were appointed to represent the Society in the Council of the Union.

**PERTHSHIRE SOCIETY OF NATURAL SCIENCE.**—December 6th, 1883.—Several new members were admitted into the Society, and donations intimated to the Museum. Thereafter, on the motion of the Secretary, it was resolved to add to the constitution of the Society: "In the event of any surplus arising from the annual voluntary contributions, subscriptions, donations, or other income or funds of the Society, the said shall be applied in furtherance of the objects of the Society as above stated, and no part thereof shall be applied in



making any dividend, gift, division, or bonus in money unto, between, or among any of the members of the Society." The object of adopting this rule is to relieve the Society in future of taxation, which had hitherto been felt a considerable burden. Dr. Buchanan White gave a verbal explanation of what had been done in regard to effecting a Union of the Societies in the east of Scotland; and he and Mr. R. Pullar were appointed representative members to a meeting of delegates of the various Societies in the east of Scotland, to be held as early as possible, with this object. A paper by Prof. J. W. H. Trail, of Aberdeen, on "**Dimorphism in Oak-Gall Makers and in their Galls**" was then read. The subject was treated only in relation to the Cynipideous oak-gall makers in Scotland, and descriptions of all the galls formed by this group that have as yet been recorded from Scotland were given to facilitate their recognition. The paper was illustrated by specimens and diagrams.

January 10th, 1884.—After the usual election of new members, numerous interesting donations to the Museum were announced. Among the more important of these were specimens of the timber of 17 indigenous trees of Perthshire, including longitudinal and cross sections, from the Duke of Athole, and specimens of Perthshire minerals and animals from various donors. Dr. White submitted notes on a *hedgehog's nest* found by him in his rock-garden, formed of long withered grass so arranged as to form a ball externally. In this the hedgehog was curled up for the winter. He also gave a list of *plants observed* by himself *in flower on the day of the meeting*, amounting to 29 species, a number of them being common weeds. Mr. Henry Coates then read a paper illustrated by means of diagrams, specimens, and microscopical preparations, on "**The Life History of a Garden Snail.**"

February 7th.—Several additions to the Museum were reported. Among these additions was a specimen of *Carex ustulata* presented to the herbarium by Mr. John Knox, Forfar. This specimen was gathered by George Don, and bears the label in his writing: "I discovered this plant on Ben Lawers in 1810." It has the aspect of a wild plant, and has on its roots the micaceous soil characteristic of the plants of Ben Lawers. No one but Don has ever gathered this species in the British Islands, hence doubt has been cast on his claim to have discovered it; and hence the very great interest attaching to the specimen now in the Society's Museum. An able and interesting paper on "**Evolution and some Things said regarding it,**" by Rev. Dr. Milroy, followed. After it was concluded, Mr. Henry Coates read notes "**On some Varieties of Helix nemoralis**" from the neighbourhood of Bargowan, and showed the shells. They were remarkable for the extraordinary amount of variation presented by them, which he had not seen equalled from any equally limited area. He had been able to recognize nine varieties, besides the type, among them; but thinks that Jeffrey's opinion, that there is but one species of snail included under the name *H. nemoralis*, is founded on arguments that are conclusive as against the view supported by Mr. J. W. Taylor, that there are two species confounded under this name. The varieties detected by Mr. Coates were as follows:—1, The type *quinque-fasciata* has a shell .75—.9 inch in diameter, of a brown or chocolate colour, with five brown bands (distinguished 1, 2, 3, 4, 5) and a brown lip; 2, *hortensis* Müll. has the shell rather smaller and more globular than in the type, the ground dull lemon yellow, and the lips white (this form is often regarded as a distinct species); 3, *minor* Moq. resembles *hortensis*, but is only about .31 inch in diameter of shell; 4, *hortensis-lutea* Moq. resembles *hortensis* save in absence of bands (0, 0, 0, 0, 0), the lip is like white porcelain, and the animal is bright yellow (this variety is not common, but Dr. White has found it in Glen Tilt at a height of 1,600 feet, 5, *libellula* Risso; and 6, *castanea* Moq. have a ground-colour of yellow and chestnut respectively, a brown lip, and no bands (0, 0, 0, 0, 0); 7, *hyalozonata*

Taylor has the bands translucent (one specimen of this variety in the collection has the mouth contracted, the lip white, the second whorl very large, and the spire rather produced); 8, *cincta* of French authors has a single narrow band (0, 0, 3, 0, 0), and the lip is brown; 9, *coalita* of French authors has the bands more or less coalesced (1-3 4-5, or 1-2 3-5, or 1 2-3 4-5, or 1-5, the hyphen indicating coalescence of the bands joined by it. In the last of these there is a very broad band formed that covers the greater part of the spire).

The Society formally opened the Museum with a *conversazione* lasting for the three days, December 20-22, 1883. The *conversazione* was a complete success, and a very lively interest was manifested by the numerous visitors to it in the collections that have been brought together. We may say, from personal observation of the Museum, that it may well be regarded as a model to be followed by other Societies in their efforts to promote a knowledge of and love for the study of the sciences of botany, zoology, and geology. From it may be realised how much can be done if only there exists the will to do the utmost. The Perthshire Society of Natural Science deserves the hearty congratulations of all kindred Societies, and the frank and willing recognition that it has set an excellent example to the other Scottish Societies in this matter.

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### SCIENTIFIC JOURNALS.

**THE ZOOLOGIST** (January, 1884).—"Note of some Rare British Birds in the Collection of Mr. J. Whitaker," by O. V. Aplin, mentions the following from Scottish localities:—*Falco Islandicus*, Gmel., from Kirkwall; *Milvus iclinus*, Sav., Sanday, Orkney; *Cyanecula succica*, L., taken on a fishing-boat off the Aberdeenshire coast, and sent by Mr. Sim; *Pagophila eburnea*, Phipps, from Aberdeen. "Wanton destruction of Animal Life in Shetland" is a protest against the following advertisement which is extracted from the "*Shetland Times*" of 12th January, 1884:—"Destruction of Vermin.—Mr. Urquhart will pay the undernoted prices for Vermin brought to him:—1s. for every Gyr or Peregrine Falcon, Osprey, Buzzard, Kite or Hobby; 6d. for every Black-backed Gull, Raven, Merlin, and every species of Hawk and Harrier; 3d. for every Hooded Crow; 6d. for every Weasel. By order of Committee of Commissioners of Supply. Lerwick, 12th January, 1884." [It is hardly necessary to say that we most heartily join in the protest against such wholesale destruction of our native fauna.—*Ed. Scot. Nat.*] "Method of recording Observations," by J. A. Harvie Brown, advocates systematic records of the occurrence of rare birds, &c. "Pale-coloured Kestrel from Skye," by O. V. Aplin.

**ENTOMOLOGIST'S MONTHLY MAGAZINE**, Vol. XX. (December, 1883).—"The Natural History of *Zygæna exulans*," by Wm. Buckler, is of interest, though worked out from Swiss examples, from the fact that the insect is confined in Britain to the Aberdeenshire Grampians. The larvæ were found to feed on *Silene acaulis*, *Cherleria sedoides*, *Trifolium alpinum*, *T. repens* and *T. pratense*, *Medicago lupulina*, *Geum montanum*, *Alchemilla alpina*, and *Sibbaldia procumbens*. They hibernate as larvæ. A full description of the various stages is given. "On the species of European Crambi more or less allied to *C. margaritellus*," by George T. Baker (cont. from Vol. XIX. pp. 239-244). (January, 1884)—"*Crambus furcatellus*" (recorded as plentiful in 1847 on a range of hills stretching from Killin to Ben Lawers), by J. B. Hodgkinson. (February)—"British Homoptera, Additional species," by James Edwards, records, with description, the capture of *Thamnotettix stu-*

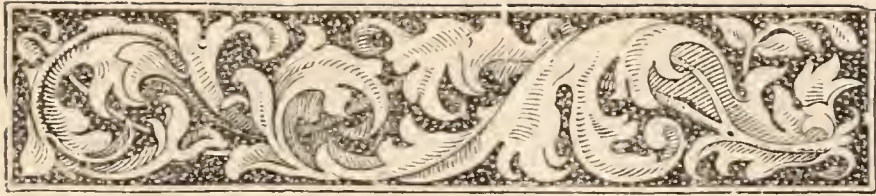


*pidula* Zett. at Pitlochry, by Mr. A. Beaumont; thus bringing its range ten degrees south of any previous record; Mr. Edwards says that it "may always be distinguished from *T. subfuscula*, the most nearly allied British species, by its greenish-yellow ground-colour, even when the dark markings on the elytra are obsolete or entirely wanting." "Captures in North Uist and St. Kilda," by C. W. Dale gives a list of insects taken by him during a visit to these islands last June.

JOURNAL OF BOTANY.—(January, 1884, pp. 1-5)—"Notes on the British Characeæ for 1883," by Henry & James Groves, contain the information accumulated by the authors during the year, in regard to the distribution of these plants in the British islands. The notes relating to Scotland are as follows:—"From the following (counties and subcounties) we are still without a record:—Wigton, Ayr, Renfrew, Lanark, Selkirk, Linlithgow, Kincardine, Aberdeen N., Banff, Westernness, Dumbarton, Cantyre, Eþudes M.S. and N., Ross E. and W., and Hebrides. We shall be especially glad of specimens, or even the loan of specimens, from these counties." The special records for Scotland are:—*Chara fragilis* Desv. Fife, Elgin, Argyle; var. *barbata* Caithness; var. *capillacea* Perth M. and E.; var. *Hedwigii* Roxburgh, Perth E., Forfar; var. *delicatula* Perth M. and E., Argyle; var. *Sturrockii*, Perth E.; *Ch. aspera* Willd. Perth E. in Ardblair Loch, Caithness in Walter Loch; var. *subinermis* Perth E. near Blairgowrie, Orkney in Loch of Harray; *Ch. polyacantha* Braun Kirkcudbright on Caldock Moor; *Ch. hispida* L. Elgin (a form near var. *rudis*), Sutherland W.; var. *rudis* Perth E. near Blairgowrie, Easternness in Loch Brodie; *Ch. vulgaris* Perth E.; var. *longibracteata* Perth E. (a very small form), Forfar; var. *atrovirens* Forfar; *TolyPELLA glomerata* Leonh. Sands of Barrie in Forfarshire; *Nitella translucens* Ag. Aberdeen S. in Kinnord (not Kinnaird) Loch; *N. opaca* Ag. Peebles, Perth E., Argyle, Orkney; a specimen of this plant was gathered by the Rev. E. F. Linton, near Killin, Mid Perth, at the extraordinary elevation of between 3,100 and 3,300 feet above the sea-level.

THE GEOLOGICAL MAGAZINE (January, 1884).—"On a new fossil Shark (*Ctenacanthus costellatus*), from the Lower Carboniferous rocks of Eskdale, Dumfries-shire," and "Description of a new species of fish (*Elonichthys ortholepis*), from the Lower Carboniferous rocks of Eskdale, Dumfries-shire," by Dr. R. H. Traquair. "On the denticulated structure of the Hinge-line of *Spirifera trigonalis* Martin," by John Young, F.G.S., made out from shells from the Lower Carboniferous strata of Lanarkshire (February). "On the Causes of Changes of Climate from Warm to Cold, and Cold to Warm, during long periods, and also of Coincident Changes of the Fauna and Flora," by John Gunn, M.A. (read before the British Association at Southport); "Notice of New Fish Remains from the Blackband Ironstone of Borough Lee, near Edinburgh, No. 5 (*Aganacanthus striatulus* n. gen. and sp.), by Dr. Traquair.

NOTICE TO CORRESPONDENTS.—Communications, either longer articles or notes on all branches of the Botany, Zoology, and Geology of Scotland, or bearing upon these sciences, are solicited. Contributors will oblige by sending their communications, clearly written on one side of the paper only, to the Editor, Professor Trail, M.D., Kent Cottage, King Street Road, Aberdeen, not later than the beginning of the month preceding the issue of the number in which the writer wishes it to appear. If unused MS. is desired in any case to be returned, the writer will oblige by stating the wish when the MS. is sent to the Editor, who will not, however, hold himself responsible for MS. in any case. The Authors alone are responsible for the contents of their papers.



## NATURAL HISTORY IN THE EAST OF SCOTLAND.

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At the first annual meeting of the EAST OF SCOTLAND UNION OF NATURALISTS' SOCIETIES, held at Dundee on Friday (June 6), preliminary reports were submitted in the following departments of natural science, prepared to indicate briefly the present information and the more important work yet to be done in each, within the district embraced in the Union:—**Mammalia**, *Dr. Buchanan White*, Perth; **Birds**, *Colonel Drummond Hay*, Seggieden, Perth; **Insects**, *Dr. White*; **Mollusca**, *Mr. H. Coates*, Perth; **Crustacea and Echinodermata**, *Mr. G. Sim*, Aberdeen; *other Invertebrata*, *Dr. Rorie*, Dundee; **Vascular Plants, Mosses, and Lichens**, *Dr. White*; **Freshwater Algæ**, *Mr. Roy*, Aberdeen; **Marine Algæ**, *Dr. Crichton*, Arbroath; **Fungi, and Plants as subject to, and as causes of disease**, *Prof. J. W. H. Trail*, Aberdeen; **Suggestions regarding Laboratory Work**, *Mr. Brebner*, Dundee; **Geology and Palæontology**, *Messrs. Durham and Walker*, Newport; **Mineralogy**, *Rev. W. Peyton*, Broughty-Ferry; **Meteorology**, *Mr. Cunningham*, Dundee.

*Dr. Howden*, Montrose, was prevented by illness from reporting on the **Reptiles, Amphibia, and Fishes** of the district.

It was resolved to have these reports printed, along with the President's address, which bore on the same lines of work. Committees were thereafter appointed (with the above-named gentlemen as conveners, and to include any member of the *Union* that desires to be upon them), to collect information with the view of preparing exhaustive catalogues and reports on the various departments above specified.

It may be stated that reporters are especially required for the groups of **Mosses and Lichens**, and any one willing to undertake to report on these groups in the East of Scotland, is requested to communicate with Mr. F. W. Young, High School, Dundee.

The work of the committees will for the most part be done by correspondence with the conveners. For the successful accom-



plishment of the work sketched out by the Union, all interested in furthering its aims are earnestly requested to assist, as very much remains to be accomplished. The conveners above named will be glad to receive information in any way bearing upon their respective departments, and such aid will be duly acknowledged in the reports. Those willing to assist should communicate with the conveners.

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## THE PERTSHIRE NATURAL HISTORY MUSEUM.

BY F. BUCHANAN WHITE, M.D., F.L.S.

(*Concluded from page 157.*)

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SINCE the previous portion of this article appeared some improvements have been adopted in the method of exhibiting the Perthshire Mammals, which it may be well to notice before proceeding further.

Each of the classes which is represented in the district has a large placard indicating the chief characters; each genus has a smaller card showing the generic characters and the number of British and Perthshire species; each species has also a card giving information about its general, British, and Perthshire distribution, and its habits and food; and each specimen bears a label with name, locality, date, and donor, &c. By this means more information is given than was done by restricting the labels to the specimens.

To resume where we left off. As yet the only order of the Insecta that has been arranged is the Lepidoptera, which, as has been already mentioned, are contained in cabinets below the table-cases. In order to illustrate the local distribution, room for a whole row (from the back to the front of the drawer) of specimens has been allotted to each species. Each specimen has on the pin underneath it a number referring to the number in the "cabinet-book," in which the locality, date, and donor are duly entered. The greater part of the local Lepidoptera are already represented in the collection, but, in most cases, as yet by a few specimens only. Collections of several other orders of Insecta have been obtained, but are not yet arranged.

Of the other Invertebrata no local collections have yet been made.

In the Botanical Department the herbarium of Flowering Plants

and Vascular Cryptogams is contained in cabinets below one of the table cases, and is already rather extensive, all the Perthshire species, with very few exceptions, having been obtained. The specimens are glued down upon ordinary herbarium paper. In a private collection it is perhaps not desirable to fasten the specimens, but in a public collection this is necessary to prevent their being injured. As in the other departments, it is intended to illustrate, as fully as possible, the local distribution by specimens; and already many species have a long series of illustrative examples. Collections of the other orders of cryptogamic plants are being formed, but there has not yet been time to arrange them. In addition to the herbarium, a collection of the indigenous timber trees of Perthshire is being at present arranged in a series of wall cases. The trees, including the larger shrubs, are about twenty in number, and each is (or will be) represented as follows:—(1) A longitudinal cut, about 3 feet long, to show the bark; (2) a polished plank, about 3 feet long, to show the nature of the wood; (3) a polished cross section of the trunk; (4) a young branch to show the arrangement of the twigs and buds; (5) specimens of the leaves, flowers, and fruit—the latter, if necessary, in liquid; (6) specimens of the wood, &c., showing injuries by insects, &c.; (7) specimens of the chief insects and fungi which are injurious to the tree; (8) a photograph of a Perthshire specimen of the tree. All the specimens are of course accompanied by explanatory labels.

Though a number of specimens have been accumulated, no permanent arrangement has yet been made in the geological and mineralogical department. A representative collection will be exhibited on sloping shelves in a high case, and the main collection will be kept in drawers in cabinets. In illustration of the local geology, the walls of the museum above the cases afford an opportunity for the display of drawings of sections, of which several are already in position and others are being prepared.

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## THE SCIENTIFIC METHOD IN BIOLOGICAL CLASSIFICATION.

BY REV. WILLIAM L. DAVIDSON.

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### I. DEFINITION.

**T**HERE is a distinction of no slight importance drawn by logicians between a “verbal” and a “real” proposition. A proposition is verbal when the predicate simply unfolds what is



already given in the subject ; a proposition is real when the predicate adds something to what the subject already contains. Thus, when I say "knowledge is certain perception," I simply unfold the meaning of the word knowledge ; but when I assert that "knowledge is power," I here predicate something of knowledge which is not included in the mere conception of it : knowledge and power are in themselves two entirely different notions, and by bringing them together, and affirming the one of the other, I state new truth, I give additional information. Obviously, the one kind of proposition (the verbal) simply tells us *what a thing* (the subject of the proposition) *is* ; the other (the real) goes farther, and tells us something *about* that thing. The latter is, strictly speaking, informational ; the former is not.

Now, a distinction similar to this has to be drawn between the two parts of the biological "mark." So much of it is simply the analysis of the particular group in question, and, therefore, answers to the verbal proposition ; but so much of it is informational, and is thus a real predicate. And these two parts ought not to be jumbled together.

For the sake of clearness, let us revert for a moment to the botanical "characters" that have hitherto occupied our attention. They are all strictly definitions. The Ordinal mark of the Ranunculaceæ, for instance (p. 157), is just the assemblage of characters that distinguish the Ranunculus family. But when I proceed further and say—"This order prefers a cold damp climate ; has such and such a geographical distribution ; numbers so many species ; has acrid, caustic properties, more or less poisonous, very volatile in the foliage and the herbaceous parts, sometimes very virulent in the roots ; possesses certain affinities with the Papaveraceæ, Berberidaceæ, &c., and shows certain resemblances to the Rosaceæ, the (monocotyledonous) Alismaceæ, &c.," I go beyond mere definition, and the kind of information I now give should be carefully separated from my list of purely defining characters.

In the best botanical works, this separation is distinctly made. See, for example, the *Genera Plantarum* already referred to, or Lindley's *Vegetable Kingdom*, or almost any of the chief authorities. But certain defects are still apparent in the working out of the distinction, and it may not be out of place, before concluding, to call attention to these.

The informational part of the mark consists, according to current usage, of these four things—geographical distribution,

number of species, medicinal properties, and affinities; and, in the case of local Floras, there are usually added habitat and time of flowering. But are there not other peculiarities—such as the life-history of plants, the diseases to which they are liable, and the economical uses to which they are put? and are not these equally worthy of notice?

Take first Life-history. This surely is a point of very great interest and of considerable importance; and yet, where do we find it referred to in our taxological books? The omission is certainly unfortunate—indeed, altogether inexcusable, more especially when we consider its value, alike from a scientific standpoint and to the commencing student. For, *e.g.*, plants pass through various phases of development before they reach their mature state, and, in many of them, a plant at an early stage of its growth is so unlike the same plant later on that it may easily enough be mistaken by the beginner as belonging to a different group altogether. A good example is the Common Ash (*Fraxinus excelsior*) which in its growth develops three different kinds of leaves. First come the two cotyledonary leaves, which are coriaceous and strap-shaped, quite unlike in form, in surface, and in consistence to the others. Then come the *simple* ovate serrate leaves; and last of all, *pinnate* leaves, with the leaflets ovate and serrate. Similarly with the *Acer Pseudo-platanus*, or so-called Plane tree. The first leaves are the two epigeal cotyledons, smooth, strap-like, and uncut. Crenate leaves, wrinkled and ovate or cordate, follow. Then come crenate-serrate leaves, with five well-marked pointed lobes. So with many of the lower plant organisms. There is the remarkable phenomenon of heterœcism, and this species of parasitism cannot be adequately represented without distinct reference to life-history. Striking examples have been lately mentioned by the editor himself in the second and third numbers of the new series of this journal.

But notice should also be taken of the diseases of plants. Not only is this necessary for the sake of completeness, it is further demanded by higher considerations. As is well known, disease in the vegetable kingdom means loss in the animal kingdom; and intellectual and pecuniary interests are both involved in proper information being communicated on this head. Now, it is an ascertained fact that there are various groups of plants that are liable to distinct diseases (fungal or other), and, in so far as this is an ascertained fact, it admits of being definitely stated. Thus, among the Speedwells, Germander Speedwell (*Veronica Chamæ-*



*drys*), after the season has well set in (say in the end of June or beginning of July), has its growth perceptibly arrested, and the leaves and incipient flowers are seen to be here and there formed into little roundish (or hazel-nut shaped) woolly balls, which are found, when opened, to contain a number of small orange-coloured maggots, reminding one of those found in some of the fungi when decaying. This is quite obvious to any observer; and yet we do not find it noted in the text-books. Again, we have the leaves of certain plants (*e.g.*, Chickweed winter green, *Trientalis europæa*) subject to the attack of peculiar fungi; but we have to discover the fact for ourselves, unless we have a teacher beside us directing our attention to it. Once more, the gall-nuts of the oak and the galls on the stem of Lady's Bedstraw (*Galium verum*) are conspicuous features, and yet neither of them finds a place in the information given by the systematic botanist.

The same must be said of the economical and other uses of plants, the medicinal properties excepted. Although these are frequently of great value, they are commonly passed by, and others of a less important character given in their stead.

But a point remains of considerable interest and no slight significance. It is time now, I think, to refer in the group-mark to the *geological* aspect of plant-life. It is not, indeed, as yet possible to make this a leading character, except in a very limited number of cases; but where geological investigation has succeeded in throwing light upon any particular class, sub-class, order, or genus (as it has done, for instance, in the case of the Lycopodiaceæ and the Gymnosperms), the revelation should not be ignored. I do not, of course, mean that the systematic botanist is to usurp the function of the palaeontologist; but if his object is (as it ought to be) to have in his group-mark *multum in parvo*, he will never rise to the height of the *multum* unless he includes every relevant item, and bestows special care on those items that are specially relevant; and *parvo* can mean for him nothing else than "compressed truth," "terse expression;" it does not stand for inadequacy and incompleteness, but for absence of verbosity and diffusiveness.

THE MANSE, BOURTIE,  
24th May, 1884.

(*Concluded.*)

## O B I T U A R Y.

ALLEN THOMSON, M.D., F.R.S.

I N Professor Allen Thomson Scotland has lost another of a generation, fast passing from our midst, that have made their names "household words" in science.

His father was Professor of Military Surgery and of Pathology in the University of Edinburgh, and he was himself born in that city on April 2nd, 1809. He studied at the University of Edinburgh, and graduated there as M.D. at the age of 21, and became F.R.C.S.E. in the following year. Very soon thereafter he commenced to lecture on anatomy in the extra-mural school. Among his contemporaries were several men who afterwards became leaders in the biological sciences. Of these Dr. W. Carpenter, the well-known physiologist, alone is still alive.

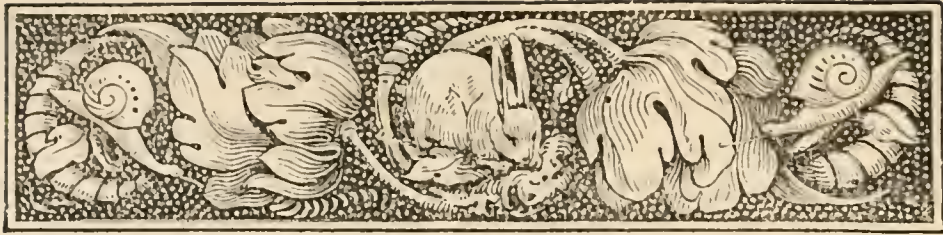
In 1839 Dr. Thomson was appointed Professor of Anatomy in the University of Marischal College, at that period distinct from, and a rival of King's College and University. In 1841 he received the appointment to the Chair of Physiology in Edinburgh, and in 1848 he obtained the Chair of Anatomy in Glasgow University. This position he held till 1877, when he resigned the duties, and soon took up his residence in London. About the beginning of the present year he found it necessary to submit to an operation on his right eye; but in a short time his left eye became affected, and for some time the power of vision was almost lost, and he suffered greatly. At last, symptoms appeared indicating brain disease, and on March 21st he died in London.

His name will be chiefly associated in science with embryology, in which he occupied a foremost place in this country. He is regarded, we believe, by physiologists as having contributed to the advance of science, rather by the clearness and thoroughness of his criticisms of the work of others, and by the accuracy that he thus introduced into the study of embryological and other physiological studies, than by great original discoveries. His merits were willingly recognised by his scientific brethren, and he was a fellow of the leading societies; and in 1877 was President of the British Association during its meeting in Plymouth.

But besides his scientific eminence he was distinguished for the able part he took in public affairs, and for his influence with the community of Glasgow, gained by the part taken by him in more than one great public undertaking. To his labours in connection with the erection of the new buildings of Glasgow University, the success of the undertaking was in no small measure due. He also was an active supporter of the erection of the Western Infirmary in Glasgow.

Of his disposition and character it does not fall to us to speak, but they were such as to win for him the respect and esteem of his colleagues, pupils, and numerous friends.





## ZOOLOGY.

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### RARE CETACEA ON THE SCOTTISH COASTS IN 1884.

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*Megaptera longimana* Rud.—All our readers interested in the fauna of our seas will recollect the pursuit of a large whale in the Tay, and its subsequently being found floating dead off the coast of Kincardineshire. Probably many of our readers have seen the carcass, which was preserved and conveyed through the country for public exhibition. The skeleton has, we understand, been presented to the Dundee Museum. This species of whale has been taken very seldom on the British coasts.

*Delphinapterus leucas* Pallas (*Beluga Catodon* L.) the *Beluga* or *White Whale*.—Of this species also but very few examples have been taken on our coasts. We believe the last example till this year was captured near Dunrobin. Its tail had been caught between two of the stakes of a salmon net. On April 30th of this year another example was obtained on the coast of Caithness, at Dunheath, where it was entangled in the salmon nets. It was forwarded to Professor Struthers of Aberdeen University, and was inspected by crowds of people in one of the quadrangles of Marischal College, where it was allowed to remain for two or three days to afford an opportunity to all interested of seeing the rare visitor to our coasts. It was a female, 12·5 feet long; pectoral fins, 16 inches long by 10 inches broad; tail-fin 32 inches broad; blow-hole, 18 inches behind snout; ear, very small, 6 inches behind eye; teeth, 9 in each side of each jaw. Good photographs of the animal were taken while lying in Marischal College.—ED. *Scot. Nat.*

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### BIRDS AS ENEMIES TO TURNIP CROPS.

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THE following statements appeared in the *Aberdeen Free Press* of May 31st and June 2nd, 1884:—

A NEW ENEMY TO THE TURNIP CROP.—A new enemy has appeared among the turnip crop, which threatens to prove a source of considerable annoyance and loss to the farmers. Frost, fly, finger-and-toe, farmers are accustomed to encounter and fight against among their turnips; but hitherto, at least in this part of the country, the birds have not attacked this the most costly of all the crops. The turnip crop has been started this season under moderately favourable auspices, although in some instances frost and fly have hurt the young plants. But in certain districts of Kincardine and Aberdeen shires, the birds by the hundred have begun to feed voraciously upon the seed just as they appear above ground, and before the blades are opened. The tops of the drills are thickly covered with the slender stalks attached to the seed, which shows the great havoc the little depredators are making among the braird. For some time farmers were puzzled to know the cause of the damage to their crop, this being the first time they had ever observed anything of the kind. But they soon discovered what it was, and means have been

taken to protect the crop by a liberal use of powder and shot. The attack on the turnip seed, which, it would appear, is not unlikely to jeopardise the crop, has, it is stated, not been made by foreign, but by local varieties of birds, among which sparrows are said to predominate. The fact that not until the present season have their ravages been observed among the early sown turnips is therefore all the more inexplicable. It would be interesting, and might be of advantage to farmers, could light be thrown on this phenomenon.

To the Editor of the *Free Press*.

SIR,—Birds have for long been known in Ireland as very destructive to the young turnip crop, and precautions are almost universally adopted by farmers, especially in the case of late sowings, to prevent their ravages. Fortunately, it is for a very short time—not more than a day—when the plants are just coming through the ground, and before they are visible above the surface, that they are exposed to these attacks; and vigilance during this period, along with the liberal use of powder and shot, or even of powder alone, is generally sufficient to prevent serious damage. If, however, these steps are not taken, the birds make a complete clearance of the young plants as they rise with the seed on the tips of their leaves; only the stalks are left, and re-sowing becomes necessary. The birds most destructive are linnets, green and grey, and not sparrows.

Owing to the mild winter, birds are much more plentiful than usual this year, which may perhaps in some measure account for the phenomenon now noted regarding their attacks on the turnip crop.—Yours, &c., J. C.

May 31st, 1884.

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ON FINDING AN EGG WITH A STONE IN IT.—On Culbleen, above Loch Kinnord, I came upon a Red Grouse's (*Lagopus Scoticus*) nest, containing five eggs. The nest had evidently been deserted for some time. On blowing one of the eggs, I found a small stone, a piece of disintegrated granite, probably like those used by the bird for digesting her food. Query—How could the stone have got into the egg? TOM ROY.

[We had the opportunity of examining the stone, which is a fragment of granite about the size of a seed of the common field vetch. It is most probable that the stone was imbedded in the *white* of the egg, though its exact position is unknown. The only intelligible explanation would seem to be that the stone had in some way passed into the cloacal orifice of the oviduct, and had been carried up (? by spasmodic contractions of the duct) to beyond the situation where the shell is secreted.—ED. *Scot. Nat.*]

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#### LEPIDOPTERA IN ROXBURGHSHIRE.

FROM a paper under this name by Mr. Adam Elliot in the Proceedings of the Berwickshire Naturalists' Club, vol. X., No. 1, the following notes are extracted, as the species to which they refer are not recorded for "Tweed" in the lists of Scottish Lepidoptera that were published in this Magazine in past years:—*Colias Edusa*, recurrent and extremely uncertain in its appearance, although seen in both the eastern and western districts; *Cænonympha Davus*, in particular spots of the Border hills; *Trochilium bembeciforme*, common in the larval condition in stems of *Salix alba*; *Clostera reclusa*; *Demas Coryli* is generally distributed though scarce; *Nonagria lutosa* was twice taken in 1880; *Caradrina blanda* several in 1881; *Agrotis saucia*; *Triphæna subsequa* S. V. occurs as a very dark form; *Noctua conflua*; *N. umbrosa*; *Teniocampa munda*; *Orthosia suspecta*; *O. Upsilon*; *Anchocelis lunosa*; *Epunda*



*riminalis*; *E. lutulenta*, with a beautiful variety *luneburgensis* (? Ed. Scot. Nat.); *Hadena Chenopodii*; *H. rectilinea* once taken; *Calocampa vetusta*; *Venusia cambrica*, in some fir woods where *Pyrus Aucuparia* grows; *Macaria liturata*; *Aspilates strigillaria* in one locality, and not abundant; *Eupithecia pygmeata* on marshy ground in the higher localities; *E. castigata*; *E. indigata* along the borders of fir woods; *E. absynthiata* moderately common; *Scotosia dubitata* very uncertain in its appearance; *Cidaria corylata* taken in the imago state, and also reared from larvae on *Salix Capraea*.

Mr. Elliot also gives a short list of Micro-lepidoptera of Roxburghshire, but as there is no standard list of these insects for Scotland as yet, it is deemed advisable at present not to enter upon this group.

## REVIEWS.

**The Oban Pennatulida.** (*Nature*, 8, 11, 1883, p. 46.) Report by Prof. A. Milnes Marshall, M.D., and William P. Marshall. Birmingham, 1882.

THIS report consists of a detailed description of specimens dredged during an excursion of the Birmingham Natural History Society in July, 1882. The specimens all belonged to the species *Funiculina 4-angularis*, *Pennatula phosporea*, and *Virgularia mirabilis*. (Here follow some criticisms on scale of measurements used and on terminology.)

The description and figures of *Funiculina* are the first in English that deal with the internal structure, and in some respects are more complete than Koelliker's. The supposed species *F. Forbesii* is shown to be the same as the Mediterranean species, but in a younger stage, the largest of the Oban specimens being identical in appearance with the typical *F. 4-angularis*.

*Pennatula phosporea* has the male and female organs fully described and figured for the first time. The male elements are shown to be produced in spherical capsules, which at first sight resemble ova.

*Virgularia mirabilis* has the formation of new polypes described. The stomachs arise as invaginations of the surface of the rachis into the cavity of large canals lined by endoderm. The reason for the truncated state of the upper ends of the rachis is suggested to be the attacks of fish, which bite the ends off.

A complete critical list of the literature of the species is given, and an account of the distribution in nature, and also in museums. The figures in the report are excellent. The specimens did not allow of the histology being completely worked out.

### Report of Observations of Injurious Insects and Common Crop Pests during the year 1883, with Methods of Prevention and Remedy, by E. A. Ormerod.

IN the April number of this Magazine we drew attention to the Report for 1882, and indicated the observations of special interest to us north of the Tweed, as communicated by observers in various localities in Scotland. We have now to continue our review to include the Report of the recent year; and we may say at once that it is characterised by all the customary care and accuracy of its well-known compiler, than whom there is no one more competent in the British Islands to do such a work. A feature even more noticeable than in the former report is the number of statements in regard to the methods of checking insect ravages, and of the measure of success attending their use. All interested in this subject will find this, like the former reports, well worthy their attention.

As before, we shall notice specially only those communications that were received from Scotch localities. **Cabbages** and **Cauliflowers** suffered in several places—near Glasgow, in Fifeshire, and at Falkirk—from the attacks of two-winged flies of the genus *Anthomyia* (*A. floralis*, *A. radicum*, and *A. Brassicæ*); and these attacks were observed to be most troublesome where

fresh farm-yard manure had been used. The remedies found most useful were lime-water and gas-lime. Carrots were seriously injured at Newton near Glasgow by *Aphides*; and in the three localities named above (and probably pretty generally) by larvæ of the *Carrot-fly* (*Psila Rosa*). Dressings of soot and of paraffin oil were as usual found useful in checking the latter. The *Parsnip-fly* (*Teph. Onopordinis*) was noticed as destructive to field parsnips at Newton. Mr. Brown of Watten, Caithness, notes damage to all farm crops from the grubs of "*Daddy-long-legs*" (*Tipula* sps.), especially on the clay soils. From several English stations it is noted that such attacks were worst *after Clover ley*, and also that artificial manures had enabled the plants to repair the injuries suffered by them. The wireworm is mentioned as having been checked in Rothsay by scattering sawdust soaked in paraffin over the soil broadcast.

*Gooseberry sawflies* (*Nematus Ribesii*) were troublesome in various localities, but were checked either by application of hellebore to the bushes, or of gas-lime to the soil below them.

Mr. Coupar communicates methods of preventing the injury done by the *Pine Weevil* (*Hylurgus piniperda*) from near Seone, recommending traps for them, made by laying the tops of young trees about in the plantations, propped up at one end. The beetles lay their eggs under the bark of these pieces, and the eggs can be readily destroyed by burning the sticks.

Turnips are stated to have been considerably damaged by the same flies as are noted above on Cabbage, as also at Seone by the *Turnip-fly* (*Haltica nemorum*), and in Caithness by the *Gamma moth* (*Plusia gamma*), and by what seems to have been *Plutella Cruciferarum*, both the latter being of course in the form of larvæ at the time they did the damage.

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#### Books on British Zoology recently published by the Ray Society.

The publications of this well-known Society having fallen considerably behind date of late years, a strenuous effort has been made recently to clear off arrears, the result being that two volumes were issued in 1882, one volume in 1883, and one volume in 1884 as yet. These were as follows:—In 1882, Bowerbank's **British Spongiadae**, vol. IV., edited by the Rev. A. M. Norman (as the volume for 1879), concluding the monograph of this group; **A Monograph of the British Phytophagous Hymenoptera**, by Peter Cameron, Vol. I. (being the volume for 1881); in 1883, Vol. IV. of the **Monograph of the British Aphides**, by G. B. Buckton (being the volume for 1882), and in 1884, Michael's **British Oribatidae**.

As will be seen from the titles of all these works, the Ray Society now devotes its energies to the furtherance of a knowledge of the fauna (though, we understand, ready to include the flora also on due occasion), of the British Islands. In this restriction of the field, for some time at least, we doubt not that it will command the approval of most, if not of all, to whom the Society commends itself as worthy of support. The field, even when thus limited, is amply sufficient to try the powers of any such association to cover. It will also be observed that the works mentioned above, except the last, are all only volumes, none of the groups treated of for a good many years past being dismissed within the limits of a single volume, with the exception of the very small group of *Oribatidae* which are exhaustively treated in the volume devoted to them. In this we are inclined to think that a mistake is made, the publications on any group being rendered too expensive, and purchasers thereby too few, to allow of the wide circulation, and the consequent wide support desirable for such a Society. That the monographs are very complete in general, needs not to be said; but we believe that they would be rendered more widely useful by greater regard to brevity, and less tendency to discursiveness in some cases. Alike in the direction of saving time and of diminishing expense is this desirable, as works of reference like these ought not to be confined to public libraries, but should be in the hands of the specialists in the various groups.



In each of the works above mentioned we meet with information of interest and of value in regard to what is known of the distribution of the members of the group discussed in it in Scotland, or, among the *Spongiadæ*, in the neighbouring seas; and the information of an indirect kind that may be learned from them as to the *lacunæ* in our knowledge of the Scottish fauna in these groups, is no less valuable and interesting, though less satisfactory to our pride.

Looking into the monographs a little more closely, we may take them in the order of publication.

The volume on **British Spongiadæ** is indispensable to all that are workers in this group of animals, as well as to the proper interpretation and comprehension of the synonymy of the species described in the three earlier volumes, published by Dr. Bowerbank himself. In this volume are various tables of much interest, including a classified list, geographical distribution, 166 pages of a review of the species described in the earlier volumes, with synonyms of the species, and a catalogue of works and papers on sponges, by the Editor, occupying 29 pages. A number of additional species are also described here.

The monograph on **British Phytophagous Hymenoptera**, by Mr. Cameron, is, as might be expected from the author of it, a very exhaustive and valuable work, though, as yet, only certain groups of the sawflies have been discussed. From the author's thorough familiarity with those insects, in respect to their occurrence in Scotland, as far as they have yet been worked in this country, we are furnished with a very full representation of the state of present knowledge in respect to their distribution with us.

The usefulness of the book is largely increased by the introduction, which commences with a good account of the structure and habits of the perfect insects, especially with reference to the characters of chief value in the determination of the various groups in classification. Thereafter follows an account of the modes of reproduction, with a full account of *Parthenogenesis*, as observed in the group of sawflies, and of the metamorphosis undergone by the larvæ. Under this head are given tables of the food-plants, with the species that attack each, and a synopsis of the larvæ, founded upon differences of structure, &c., so as to facilitate the discovery of the species of any previously unobserved larvæ. Some useful remarks follow, on the relative value in classification of the characters obtainable from the perfect insects, and from the larval condition; and very useful information is given in regard to the best methods of collecting and preparing the insects, and more especially their saws, for study.

A most useful feature of the book is the presence of synoptical or analytical tables of the genera, as also of the species in each genus, a feature the importance of which is felt by all working naturalists, but the difficulty and labour involved in which can be fully realised only by those that have attempted similar work.

The systematic part of the monograph is wrought out with constant regard to the avoidance of superfluous details, while giving all requisite information, alike on the synonymy, on the distinctive characters, and on the distribution, both in Britain and elsewhere, of each species. The plates are well-selected and carefully executed, and the volume is one of the best that has been issued for some years by the Society. We trust that the second volume may soon follow to complete the monograph, especially as in it we may look for an account of the gall-making Hymenoptera. In the meantime, we venture to urge the desirability of rendering assistance to Mr. Cameron, if it is in the power of any of our readers, by forwarding, for his inspection, examples of Phytophagous Hymenoptera from any part of Britain, but especially from those provinces from which, as yet, no information is forthcoming.

The **Monograph of the British Aphides**, by Mr. G. B. Buckton, com-

were previously unknown, or at least nothing was known of their life-history or plotted in the fourth volume, quite recently issued by the Ray Society, is undoubtedly a very important addition to the literature of this family of insects as well as the only really comprehensive work on those species that have been met with in Britain. Nevertheless, even a passing inspection of the volumes shows that there is still much to be done ere we can claim a thorough acquaintance with the group.

That few entomologists have occupied themselves with the Aphides explains the fact that their distribution, except in the case of species noted for their powers of doing injury to cultivated crops, is for most species very little wrought out; and, for the same reason, we cannot doubt that the number of species will be largely increased, when more general attention is paid to them. In the meantime, we may notice a great deficiency of information from Scotland. In this group, not less than in various others, there is great room for Scottish workers.

The existence of this work, by Mr. Buckton, renders it comparatively easy to commence the study, with some hope of being able to ascertain what is already known about British Aphides, as the figures are excellent aids to the determination of the species, and the descriptions are in all cases full, and a life-history is in many cases given.

The usefulness for convenience of reference would, perhaps, have been greater had the diagnostic characters been separated out from the mass of type in some way. Under a good many of the species, it is somewhat difficult to pick out at once the important points from among the details that accompany them. Condensation might have reduced the size and price of the work, while not detracting from its real value.

In this volume we find articles on several subjects of interest in the economy of Aphides, of which we may note those on their "Economical Relations to Ants," on their reproduction, on fossil species, with descriptions and figures of all as yet published, on the natural and best artificial checks to their increase, and on the preservation and mounting of Aphides for the microscope and for the museum. A "Bibliography" of the authors that have written on Aphides concludes the volume. We cannot doubt that the publication of the monograph will give a powerful stimulus to the study of these insects among us in Scotland, no less than in other parts of Britain.

"**The British Oribatidæ,**" by Albert D. Michael, F.L.S., &c., is the volume issued to subscribers for the year 1883, and appeared in May, 1884. The group of mites treated of in it form a well-defined division of the Acarida, but one that has found few students previously. Beyond scattered articles in magazines, the only works that attempt a scientific study of these animals are Koch's "Deutschlands Crustaceen," &c., his "Arachnidensystem," and Nicolet's Monograph of the Oribatidæ of the neighbourhood of Paris. In the preface to his work, Mr. Michael says:—"The reader will kindly remember that this book is the record of work done in the scanty leisure of a very busy man; it does not profess to be a monograph." That it is a most valuable addition to previous records on the subject is plain to the eye of any zoologist that examines the book with the slightest care. A very striking feature in it is the number of species of which the author was able to trace the transformations, despite the care that was required in the case of each, sometimes for periods of over a year. In this way he was enabled, through identifying the various and often very different forms passed through by the same creature, to show that many of the species described by Koch and others were only immature conditions of other and well-known species.

As regards our knowledge of the British species of the group, the progress made by him is yet greater, inasmuch as "some five years ago there was hardly a record of the capture of any species in the British Isles, and very little was known concerning them." In this work Mr. Michael describes forty British species, of which most are figured in the fine plates, while in many of them the immature stages are described and often figured. Many of these



of the habits. In this respect, therefore, the book marks a great advance on our material for a comprehensive monograph of these creatures.

The author has greatly facilitated the labours of future students by the very full bibliography, as well as by his criticisms of the classifications that have been proposed by writers on the Acarida. Chapters on the habits, the best modes of collecting and of preserving for future reference the specimens collected, and on the anatomy, both external and internal of these mites, add much to the completeness of a work that, despite the disclaimer in the preface, must be ranked among monographs of the best and most useful kind.

Of the forty species, the following are specially recorded as from Scotland:—*Oribata Edwardsii Nic.*, near Loch Maree, and *Cepheus bifidatus Nic.* and *Tegeocranus femoralis Nic.*, found near Glasgow by Mr. Cameron; but the following are said to be common and generally distributed, and therefore probably are Scottish species:—*Pelops acromios Herm.*, *P. farinosus Nic.*, *P. lævigatus Nic.*, *Oribata mollicomus Koch*, *O. lapidaria Lucas*, *O. globula Nic.*, *O. orbicularis Koch*, *O. piriformis Nic.*, *O. setosa Koch*, *O. punctata Nic.*, *O. alata Herm.*, *O. cuspidata sp. n.*, *O. Lucasii Nic.*, *Leiosoma simile Nic.*, *L. ovatum Koch*, *Cepheus tegeocranus Herm.*, *Tegeocranus latus Koch*, *T. coriaceus Koch*, *T. labyrinthicus Michael*, *T. marginatus sp. n.*, *T. elongatus Michael*.

## SCOTTISH GALLS.

BY PROF. J. W. H. TRAIL.

**D**URING the past two seasons I have met with a number of galls not previously recorded by myself from Scotland, though a few of them have been published as Scottish by Dr. Greville ("Scottish Cryptogamic Flora," &c.), or by Mr. Cameron. Dr. Buchanan White has also, with his usual kindness, sent me several that he had found in Perthshire or in Forfarshire. Most of the galls described below are the work of Mites (*Phytoptus*), or of *Anguillulidæ*, and are by no means conspicuous; but a few are sufficiently readily seen to prove that even among the larger galls in Scotland there are still some remaining to be discovered, even in localities that might be supposed to be well wrought. I shall be glad of any assistance, however little, in working out the distribution of Scottish galls.

**THALICTRUM MINUS**, var. **MONTANUM**, Wallr.—Carpels galled by *Cecidomyia Thalictri H.Lw.*, were rather common on the shore of Loch Rannoch at Kinloch Rannoch in September, 1882. The carpel becomes swollen to twice or thrice the natural size, and becomes ovate or nearly globular. Its colour changes through yellowish to brown. In other respects externally it does not differ much from a ripe healthy carpel in appearance. On section the walls are found to be about the usual thickness of those of a ripe carpel; but the seed is absent, and its place is occupied by one

or two orange coloured larvae of the midge, which pupate in the ground. Most of the galls in the beginning of September were empty. Usually only one carpel in a flower is galled, the rest remaining untouched ; but sometimes two or more may be affected. Mr. Fitch has recorded similar (?) galls on *Th. flexuosum* as found by Dr. Power in Scotland. (*Ent. Monthly Magazine*, vol. xviii. p. 116.)

CARDAMINE PRATENSIS L.—The flower-buds are galled by *Cecidomyia Cardaminis* Winn. They become deformed and swollen, reaching 8 or 9 mm. in diameter. They never open, but remain of a rounded or ovate form. All parts of the bud become thick and fleshy, the outer sepals usually enlarging more than the inner. The sepals remain green, or they may be reddish-brown in part. The apical half of the petals is visible, of a dull purple-red colour, with a border of the usual shade. The orange-red larvae lie between all parts of the flower-bud, there being often as many as 20 or 30 in a bud. They pass into the ground to pupate. These galls were very common in June, 1882, and again in 1883, in damp places on Scotston Moor, near Aberdeen ; usually from 2 to 6 of the lower buds in each inflorescence were galled. Mr. Peter Inchbald has recorded in the "Entomologist" his finding these galls in England in 1882, and again in 1883.

VIOLA LUTEA Huds.—The margins of the leaves are rolled spirally upwards and inwards, usually along the whole length of the leaf, sometimes along only a part of the leaf on one side. The tube thus formed may reach 1mm. in diameter. On transverse section there are found to be 2 or  $2\frac{1}{2}$  turns in the spiral. The galled portion is rather fleshy in texture, and the surface is somewhat uneven, and is paler green than the rest of the leaf, but the gall is very inconspicuous. In the tube lie several mites of the genus *Phytoptus*.

I have met with these galls on a hill beside Glen Callater, in Aberdeenshire, at 2000 feet above the sea, and on Ben Lawers, in Perthshire, at 3500 feet above the sea ; in both cases in autumn, 1882. Dr. Fr. Thomas (*Nova Acta Leop. Carol. Akad* xxxviii., p. 282), has described similar galls on *V. silvestris* from Germany and from the Tyrol, where I have myself found the latter gall near Salzburg.

STELLARIA HOLOSTEA, L.— }  
 CERASTIUM TRIVIALE Lk.— } On these two plants, as  
 has been indeed already noted in this magazine (*vol. iv.*, p. 13),  
 under the former plant, on which especially they abound, one



finds pseudo-galls formed of short and stunted shoots, the leaves of which remain more or less closely imbricated and semi-conduplicated, fleshy, and yellowish-green in colour. They are the work of a species of *Aphis*, named *Brachycolus Stellariæ Hardy*. The galls are found on the plants above-mentioned during the summer; but in autumn the insects migrate to different grasses. I have found them on *Holcus mollis* and *Agrostis alba* near Aberdeen, and on these they form similar pseudo-galls. These Aphides are widely distributed on the Continent of Europe, and I have met with them on *Cerastium* near Bergen, in Norway, and in the Brenner Pass in the Tyrol, in which latter locality I have seen the galls on the *Stellaria* also. The insects are described and figured in Buckton's "*British Aphides*" (vol. ii., p. 147, t. lxxxv., figs. 1, 2, and 3). They are usually numerous in each gall, between the leaves. I have seen them only in the apterous state.

STELLARIA GRAMINEA L.—Some clumps of this plant near Fortingall, in Perthshire, were found in the month of September 1882, much attacked by mites (*Phytoptus*). Almost every shoot was affected; the leaves on its apical part and the bracts on the flower-shoots becoming conduplicate, slightly swollen and fleshy, with a yellowish tinge in the green colour as compared with the normal condition. Each leaf becomes somewhat sickle-shaped with the mid-rib along the convex edge, or spirally twisted once or twice. The outer (*i.e.*, lower) epiderm is little if at all altered in structure, nor are the middle cells of the leaf much changed; but the cells of the inner epiderm become less marked from those of the mesophyll, nor are hairs developed on them. The mites are numerous in the folded leaves. Similar galls on *S. glauca* have been described by Dr. Thomas from Brandenburg, in Germany (*Giebel's Zeitschr.*, 1877, p. 362).

TILIA EUROPAEA L., GRANDIFOLIA Ehrh. :—

a. Nailgalls of a mite (*Phytoptus*), the galls being named *Ceratoneon extensum* Bremi (*Sc. Nat.*, vol. iv., p. 203), sent me from Dunkeld by Dr. White; abundant in autumn 1882 on some trees between Aberfeldy and Kenmore, in Perthshire.

b. *Erineum tiliaceum* Pers. (*Sc. Nat.*, vol. v., p. 204), white hairy patches on back of leaf; the makers (*Phytoptus*) live among the hairs.

c. ? *Erineum bifrons* Lepell. S. Farg. of Fee's "*Memoire sur les Phylériées*," p. 41, no. 32, is the work of a species of *Phytoptus*. The galls are situated in the axils of the larger nerves of the leaf

frequently in pairs along the mid-rib, or singly along the large lateral nerve, where these emit branches outwards. As many as 30 or 40 may be seen on one leaf, but usually they are less numerous. They form rounded hard knobs above, 2 or 3 mm. in diam., and covered with a close coat of short pale brown unicellular simple hairs. On the lower surface there stands a dense tuft of similar hairs; and on separating these one finds an opening between them, leading into a hollow, from the interior of which the hairs arise. The mites live between the hairs. These galls were detected in abundance by Dr. White on the same trees as the two former, near Aberfeldy, in September. They are also found in Germany (Dr. Thomas in *Giebel's Zeitschr.*, 1869, p. 336), and in Austria (Dr. Fr. Loew, in *Verh. Z. B. Ges. Wien* xxiv., p. 506). Dr. Thomas is of opinion that the gall is the same as Amerling's *Malotrichus Tiliæ*.

VICIA SEPIUM L. :—

a. Galls of *Cecidomyia Onobrychidis Bremi* (*Sc. Nat.* ii., 70), composed of a mass of conduplicate fleshy leaflets, the mass being either terminal or axillary.

b. Galls of *Apion Gyllenhallii* Schrk., quite similar to those of the same insect on *V. Cracca* L. (*Sc. Nat.* iv., 169). They form swellings on the stem, or branches, or petioles, or peduncles just above a node, or above the base of the part affected, if that is a lateral member. The gall becomes about twice as thick as the normal diameter of the part; but does not otherwise differ much from it in appearance. Its walls are thin, and enclose a space in which the larva lives. The galls are local, but are not rare in one or two places near Aberdeen in August.

PYRUS AUCUPARIA Gærtn :—

a. Blister or pustule-galls in the leaves, the work of a species of mite (*Phytoptus*), (*Sc. Nat.*, ii., 79); very common in many parts of Scotland.

b. *Erineum Sorbi* Kunze, also the work of a species of *Phytoptus*, forms irregular patches on the lower surface of the leaf, more or less densely covered with blunt cylindrical or slightly clavate hairs, incurved at the tip, pale yellowish when young, but passing through yellowish-brown to rusty or dark brown when mature. The mites live between the hairs. The patches are usually from 3 to 12 mm. across. Greville records this *Erineum* from Kinnordy and elsewhere (" *Sc. Crypt. Flora*," t. 263, f. 1). I have found it on Deeside from Banchory to Ballater, and Dr.



White has met with it in Perthshire. Both the *Erineum* and the blister galls often may be found on the same leaflet, but usually they occur apart.

PYRUS MALUS L., ACERBA D.C. (Crab-apple):—

*Erineum pyrinum* Pers., like the last the work of a species of *Phytoptus*, forms irregular patches on both surfaces of the leaves, but most abundantly on the lower surface. Often the patches coalesce so as to extend along the nerves, or even to cover almost the entire surface. They have a velvety aspect, due to consisting of a close growth of short hairs at first pale, but changing to rusty brown. The hairs are from three to five times as long as the leaf is thick, simple, usually rather twisted or hooked near the tip, blunt, and thin walled. Between them live the mites. Dr. White sent me specimens in June, from Dalguise, on the banks of the Tay in Perthshire; and I also met with it near Kenmore in September. It is recorded by Greville (l.c., I, t. 22, *Flora Edin.*, p. 449), on *P. Malus* and on *P. communis* from Craigie Hill, near Edinburgh. Possibly this gall is the work of the same mite as causes *E. Sorbi*.

GALIUM PALUSTRE L.:—

(a) Galls of *Cecid. Gallii* Winn., consisting of a terminal rosette of leaves (*Sc. Nat.* I, 156).

(b) Galls of *Phytoptus*, in form of leaves of the upper whorls being convolute along the margins, or from the tip, so as to form tubes of a yellowish, reddish, or brownish-green colour, inside which the mites live. The appearances presented are very similar though on a smaller scale, to those seen in *G. Aparine* (*Sc. Nat.*, IV, 15, b), and on *G. verum* (l.c. p. 204, e); and are very probably the work of the same species of mite.

GALIUM SAXATILE L.:—

I have already (*Sc. Nat.* IV., p. 15 and p. 169), described three forms of galls from this plant, viz. :—

(a) *Phytoptus* galls like those described from *G. palustre*;

(b) Flowerbuds, or fruits swollen and tenanted by mites (*Phytoptus*.)

(c) Flowerbuds swollen and tenanted by larvæ of *Cecid. Gallii* Winn.

To these I have now to add a fourth gall, very common in Braemar, from about 800 to 3500 feet above the sea level, and also in Perthshire at the same elevation.

(a) This gall also is the work of a species of *Phytoptus*, and

comes nearest to (*b*), but differs from it in aspect decidedly. The flower-buds alone are attacked, but frequently the whole inflorescence is affected, and remains short and stunted, forming a rounded mass. Sometimes the gall remains green, though usually it becomes reddish brown in colour. Each inflorescence forms a mass about 5mm. in diameter. The flowers open, but all their parts are slightly fleshy and remain abortive, with no marked differences in colour.

I could not find any trace in Braemar of gall (*a*), but in autumn of 1882 I found them near Aberdeen, and had previously found them in Orkney. Of gall (*d*) I did not find any trace either near Aberdeen or in Orkney. The latter gall has been described from various localities on the Continent. The mites live in the flowers.

#### LEONTODON AUTUMNALIS L. :—

On this plant I found mite-galls on the leaves in considerable numbers in the beginning of October, 1883, among low growing grasses on the cliffs of the Kincardineshire coast near Aberdeen. The galls consist of the leaf-margins altered so as to become thickened, fleshy, and dull red or purple. The surface of the gall is covered with abundant red hairs, which give it a slightly velvety appearance. Very frequently the margin of the leaf is rolled upwards and inwards, in some cases for the greater part of its length. Occasionally the galls are hardly larger than a pin's head, but usually they are over an inch in length; but they are never conspicuous. On microscopic examination of the gall, the mites are to be found in small numbers among the hairs. On section the tissues in the interior of the leaf are found little altered, though the epiderms on both surfaces are much modified, and the hypoderm is thickened, and has its cells slightly enlarged and modified in shape. I can find no previous record of the occurrence of galls on this plant.

#### HYPOCHOERIS RADICATA L. :—

(*a*) Galled ovary (*Sc. Nat.* IV, 16.)

(*b*) Leaf-galls caused by *Anguillulidæ* belonging to the genus *Tylenchus*, Externally they are small thickenings, usually near or around the mid-rib, about 2 to 5 mm. long by twice the thickness of the mid-rib. The surface differs little from that of the rest of the leaf, save in its yellowish green colour. In structure it much resembles the gall on *Hieracium Pilosella* next to be described. The galls were not rare on a spot on the Links north of Aberdeen in August, and one specimen was found in Rannoch



in September, 1882. Eggs and young animals were common enough in the galls at that season.

#### HIERACIUM PILOSELLA L. :—

(a) Galls of mites (*Phytoptus*), being inrolled leaf-margins, are exceedingly common on the Links north of Aberdeen in autumn, though local apparently. Frequently several of the leaves in a rosette remain small, with the pale lower surface visible, owing to the margins continuing to be closely involute from the base even to the tip of the leaf usually, though at times only in spots here and there. Not seldom almost every leaf on some of the smaller plants is attacked, and the plant soon withers up. The affected leaves are rather thick and fleshy, but are little altered in colour, though conspicuous from the exposure of the lower surface. The margins usually make one and a half or two turns, forming a tube in which one finds a few mites. The inner tissues of the leaf are very little altered, beyond being slightly hypertrophied in the cellular tissues, and the epiderm is far less modified than in *L. autumnalis*. The mites are of rather large size for the genus *Phytoptus*. There are no hairs specially developed in the interior of the tube. I had observed similar deformities on *H. Pilosella* in Perthshire, and elsewhere in Scotland, before I had recognised their origin. They have been recorded from Germany and Switzerland (Thomas and Schlechtendal), and from Austria (F. Loew).

(b) Leaf-galls of *Tylenchus* sp.? They are very inconspicuous, and consist of a spot in the leaf, usually towards the margin, about 2 to 4mm. across, irregular in outline, about twice as thick as a healthy leaf, hence slightly prominent on both surfaces; differing but little in aspect from rest of leaf, except in being slightly paler, or sometimes reddish-brown, in colour.

The differences brought about by the gall-makers can be understood only by a comparison with a healthy leaf in section. The latter shows, from above downwards, the epiderm, then two or three layers of rather closely packed palissade cells, elongated at right angles to the surface, then two or three layers of irregularly branched cells, elongated in directions nearly parallel to the surface, and showing large intercellular spaces among them. Among these cells lie the fibrovascular bundles, usually close below the palissade layers. Then comes the lower epiderm, bearing numerous and variable branched hairs.

In the galls the loose mesophyll below the palissade layers

seems to be the first part attacked. The cells become less regular in form, and lie with the long axis in any direction, and are separated by wider interspaces. The next cells attacked are the lower palissades, and the upper palissades soon follow, the cells all resembling those of the loose mesophyll, without differentiation of the tissues as in the healthy leaf. Neither epiderm nor fibrovascular bundles undergo any noticeable change in structure. The interspaces were well filled in August with eggs and young worms; but neither males nor females could be found, hence there may be a doubt as to the maker of the gall being a *Tylenchus*. These galls are common on the Links near Aberdeen, but I have not found them associated with diseased *Hyp. radicata*, though the plants are often common in the same spot. The galls on the two are, however, so much alike that one may fairly enough suppose them to be the work of the same species.

#### HIERACIUM VULGATUM Fries :—

On this plant I have found, near Aberdeen and near Dumfries, galls so similar in every respect to the galls of *Phytoptus* on *H. Pilosella* (and like these galls the work of *Phytoptus*) that I can hardly doubt that they are the work of the same species of mite. They differ from the galls described above only in their rather larger size, and in absence of hairs and consequent greener colour.

#### CAMPANULA ROTUNDIFOLIA L. :—

*a.* Galls of *Cecidomyia Campanulæ* Muell., consisting of a swollen fleshy bud or group of buds, that never develop fully (“*Sc. Nat.*” I., 187).

*b.* Galls of *Gymnetron Campanulæ*, consisting of swollen ovaries (“*Sc. Nat.*” *l.c.*) Both these galls are common in the district near Aberdeen in July and August.

*c.* Galls of a mite (*Phytoptus*), consisting of a very inconspicuous inrolling upwards of the margin of the leaf, usually from base to tip on each side, so as to form a roll or tube about 1 mm. in diam., and slightly fleshy, but not differing otherwise in appearance from other parts of the leaf. Inside the tube the mites may be found. In July I found these galls in the neighbourhood of Aberdeen, and in September in Rannoch in Perthshire. Mr. Hardy, the well-known naturalist of Berwick, recorded the results of his own observations on the work of mites in Berwickshire in the *Zoologist* a number of years ago, including among them this gall. It has also been recorded from Switzerland and from Germany by Dr. Thomas (in *Schweizer Milbengallen*, 1872).



## VACCINIUM VITIS-IDAEA L. :—

I formerly described briefly (*Sc. Nat.*, i., 158) galls on this plant found by me in Braemar; but could offer no conjecture as to the maker, as the galls had been lost. In the autumn of 1882 I again have found these galls in Braemar; and have found in each a few yellow larvae of a *Cecidomyia* between the involute imbricate red fleshy leaves of the terminal buds.

Mr. Cameron describes (*E.M.M.*, xii., 190) a Saw-fly, *Nematus crassipes* var. *Vacciniellus* Cam. reared by himself from galls on *V. Vitis-Idaea*, but does not describe the gall, which I have not myself met with.

## GENTIANA CAMPESTRIS L. :—

In August 1882 I found, in Braemar, two plants of this species bearing flowers tenanted by small pale yellow larvae of a *Cecidomyia*. Some of the flowers were abnormal in having buds growing in the axils of the petals and from the centre of the ovary; but the larvae also were present in other buds which differed from the normal condition only in having the parts of the flower slightly swollen and fleshy, with the sexual organs ill developed. Larvae were numerous inside the ovaries, the seeds in which were quite abortive or else ill developed; and they also were present in small numbers between the other parts of the flowers. Dr. Dickie has described (*Edinb. Bot. Soc. Trans.* ii., pp. 192-196) abnormal flower-buds like the above from near Aberdeen; but he makes no mention of the presence of larvae in these found by him.

## PLANTAGO LANCEOLATA L. :—

a. Galls of *Mecinus pyraster* Herbst (*Sc. Nat.* ii., p. 252, and *iv.*, p. 16), oval swellings of the scape near the top, less often of the petiole. These weevil-galls are not rare in a good many places in the North-east of Scotland.

b. Galls of one of the *Anguillulidæ* (? *Tylenchus* sp.), so similar in structure to those just to be described on *P. maritima* that it is needless to describe them on both plants. They are of larger size on *P. lanceolata*, occasionally almost extending from edge to edge of a leaf; and are less markedly different in colour from the rest of the leaf, than they are in *P. maritima*. I have found these galls in one or two localities near Aberdeen, from May till October; also at Banchory Ternan on Deeside, and at Rescobie in Forfarshire.

## PLANTAGO MARITIMA L. :—

Galls of *Tylenchus* (? sp. n.) in the leaves and leaf-stalks, seldom

in the scapes. Possibly they may be the work of the same species as makes the second kind of galls just mentioned on *P. lanceolata*, as the galls are so similar on the two plants. On *P. maritima* they are conspicuous, as they enlarge the part attacked to as much as four times the normal breadth, and usually assume a pale yellowish green, less often a red or purple shade. There is often marked distortion in the structure of the galled parts. The deviations from the healthy state caused by the gall will be best understood after a brief sketch of the transverse section of a healthy leaf. A normal section shows a very regular arrangement of its tissues, viz., the epiderm all round the mesophyll, which is made up of oval thin-walled cells, lying so that their long axis is at right angles to the surfaces. Usually about 9 layers of cells can be made out between the epiderms, those in the middle usually being rounder and smaller than the others. There is no distinction recognisable into palissade cells and loose layers, and the interspaces, though numerous, are all small and nearly equal. The fibro-vascular bundles lie in a row in the middle layers of the leaf, and are hardly at all altered in the galls. One can usually distinguish a mid-rib, and on each side of this two lateral bundles; and between the five large are several smaller bundles.

The galls differ from the above in structure almost solely in the mesophyll, of which only a part may be altered, or the gall may extend the full breadth of the leaf. At times the galls reach 15mm. in breadth, but they are in general considerably smaller. On making a transverse section of a gall, one finds the cells of the mesophyll much elongated and irregular in form, assuming the type known as branched parenchyma, so that large intercellular spaces are formed. In these spaces lie numerous "worms," which I was able, after examining all stages and both sexes, to refer to the genus *Tylenchus* of Bastian, but they differ from any species of which I can find descriptions in Bastian's *Monograph on the Anguillidae* (*Trans. Linn. Soc.*, vol. xxv). The epiderms of the galls have fewer stomata in proportion, and their cells are hardly so regular as in the healthy leaf. The galls are abundant on the coast of Kincardine all summer and autumn.

#### VERONICA OFFICINALIS L. :—

Flowerbuds galled by *Cecidomyia* (? *Veronicæ Bremi*), quite similar to those already described by me (*Sc. Nat.*, iv., 170) on *V. Serpyllifolia*. The buds swell to twice or thrice their normal size, and remain unopened or open but slightly. They may be rather pale green, or the petals may show slightly and of the



usual colour. The parts of the flower become slightly thickened and fleshy, and remain abortive, at least in function. The larvæ, yellow or orange in colour, live between them; and one finds cocoons in the galls occasionally. I have these galls from Bourtie in Aberdeenshire, found in the end of August 1883. The galls on *V. Serpyllifolia* are rather common near Aberdeen.

PEDICULARIS SYLVATICA L. :—

Galls of mites (*Phytoptus sp.*) sometimes are very numerous towards the tips of the shoots; in some plants distorting almost every leaf on at least the upper half of the stem, in others being confined to only a few of the upper leaves, rarely occurring on only a single leaf. Not rarely the sepals also are attacked, but without marked injury to the development of the flower. Plants when severely attacked become very much changed in appearance. The affected parts are of a dull purple-red or brown-red, somewhat thickened and fleshy, revolute, and generally more or less covered with grey hairs; and they may also be more or less stunted in size. On transverse section the mesophyll is found to be but little changed; but the epiderms are loosened from it, and the cells exposed to light are filled with coloured cell-sap, usually purplish-red. From the epiderm cells hairs grow out, generally simple, consisting of a row of cylindrical cells, the last cell of the row being bluntly rounded. There may be up to 15 cells in each hair. The hairs are often a little twisted, owing to slight irregularities in the form of the cells; occasionally they arise so close together as to seem to fork at the base. They are pale or coloured according to the exposure they undergo to light. The mites live in small numbers among them. I met with these galls in considerable numbers in the end of June on Scotston Moor, near Aberdeen, this year. Similar galls have been described by Dr. Thomas as occurring on *P. palustris* in Thuringia.

RUMEX ACETOSELLA L. :—

Flowers galled by *Cecidomyia Rumicis* H. Loew. The buds become considerably swollen and rather fleshy, are orange-red in colour in most cases, and remain closed. The sexual organs abort; and one or more orange larvæ, or white cocoons may be found in each flower-bud. Many flowers are attacked usually on a plant; and the galls in 1883 were extremely abundant near Aberdeen, though, owing to their small size, one is apt to overlook them. The midges are very easily reared from them. This insect is included in Walker's "*Insecta Britannica*," III., p. 100.

(*To be continued.*)



## PHYTOLOGY.

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THE BOTANICAL WORK OF GEORGE DON OF FORFAR.

BY G. C. DRUCE, F.L.S.

(Continued from page 178.)

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“*Stellaria scapigera* seems to have been found by Don by the sides of rivulets between Dalwhinnie Inn and the old Kirk of Laggan, Perth, and by Loch Nevis, Inverness. Is apparently a monstrosity of *S. graminea*, and probably from Don’s garden, some plant he met with being mistaken for the same as the one he had in cultivation.” *Boswell E. Bot.* It is figured in *Eng. Flora*, vol. xviii., 1269, and the following details given. “Mr. G. Don obligingly communicates *wild* specimens of this new and curious *Stellaria*. He gathered it at different times from the year 1794 to 1803 on the sides of rivulets in Perth and about Loch Nevis. The plant was received by the younger Linnæus from Kew Garden, but its native country was altogether unknown till Mr. Don’s fortunate discovery.” *Sm. Eng. Flora.*

“Prov. 15-16. Perth, Inverness. G. Don in *Eng. Fl. Ambiguity*,” *Cyb.* 1225. According to Boswell Syme, this is apparently a monstrosity of *S. graminea*; whereas Prof. Babington can scarcely believe this is a state of *S. graminea*. Prof. Arnott says its seeds produce *S. graminea*.” *Comp. Cyb. Br.*, 492.

In Don’s fasciculus, No. 10, is a specimen of *S. scapigera*, localised: “sides of rivulets on the mountains of Badenoch between Loch Ereachd (Ericht) and Loch Laggan, and by the side of a rivulet on a mountain to the eastward of Loch Nevis, Inverness.”

Does the fact of Don having this plant in his garden prove he never found it wild? Is there not an equal probability of his first finding it wild as he stated, and then introducing it to his garden? If the plant be a monstrosity of *S. graminea*, it must originally come from somewhere (it is not suggested it is a mere garden sport), and why not as likely be found in Scotland as in Germany?



*Lychnis Alpina*, L. :—

Arnott says in *Brit. Flora* :—“ We have strong reason to believe the plant was sown on Culrannoch almost sixty years ago.” This brings it to the time Don worked Clova. “ This interesting plant was first discovered in Little Culrannoch by the indefatigable Mr. G. Don.” *Gard. Flora, Forfar*.

“ Mr. G. Don first made this interesting discovery on rock near the summit of Clova mountains in August, 1795. The plant is there very scarce, being only found, anywhere, on the most elevated spots. We have preferred drawing Mr. Don’s original specimens, though dry, to any garden one.” *Eng. Bot.*, vol. xxxii. 2254.

“ Discovered by G. Don on summits of Clova mountains in 1795, and found by Dr. Graham and others on the summit of a hill called Little Kilrannoch, between Glen Prosen and Glen Callater. Dr. Graham estimated the hill as 3,200 feet. It was pointed out to me by a shepherd from the head of Canlochen Glen, and at that distance I thought it scarcely above 3,000 feet.” *Cyb. Br.*, 1204.

*Hypericum barbatum*, Jacq.

“ Perthshire.—Don never confirmed.” *Students’ Flora*. “ We do not believe it has ever been found wild in Perth.” *Arnott’s Br. Flora*.

“ No one has found it since, and if ever it occurred there it was doubtless an escape from cultivation, as it is most unlikely an Austrian plant not occurring in Scandinavia, France, or North Germany could be wild in Scotland.” *Boswell, E. Bot.*

Sir James Smith says some of the specimens sent by Don reached him in a sufficiently fresh state to be drawn for E. B. plate. Vol. xxviii. Plate 1986.

“ Prov. 15, Perth. G. Don sole authority. Ambiguity. A garden plant.” *Cyb.* 1254.

In the English Flora, Smith accepts this as a true native, and without a word of doubt, attributing it to “ bushy places in Scotland,” as though there were any number of localities for it in addition to the one specially mentioned “ by the side of an hedge in Strathearn.” Smith was too exclusively a botanist of the study, not of living nature, to warrant any reliance on his decision about the genuine nativity or otherwise of plants in Britain. *Comp. Cyb. Br.*, 494.

“ Was found in Perthshire by Don, but was probably not a native.” *Bab. Man.*, vii. 67.

The last statement is one which will commend itself to most of your readers. A specimen is in Miss Palmer's collection.

“Austr. Styr, Hung. &c.” *Nyman*.

*Potentilla tridentata*, Sm.

“Clova mountains. Don never confirmed.” *Stud. Flora*.  
“Werron Hill, Clova. G. Don, but by no one else.” *Arnott, Br. Fl.*

“Prov. 15. Forfar. G. Don sole authority. Error,” *Cyb.* 1.348, iii. 418. “Not British or European.” *Comp. Cyb. Br.*, 501.

“Said to have been found by Don on Werron Hill and East rocks, Loch Brandy, Clova, but no doubt *Sibbaldia procumbens* has been mistaken for this American plant.” *Boswell, E. Bot.*

“Incog. The late Mr. G. Don appeared quite confident that he had seen or collected this species in Forfar, and there is even a specimen preserved in Sm. Herb which is labelled as though actually collected on the Hill of Werron in that county by Don, with the date of April 3, 1809. Is it possible that Mr. Don could have mistaken plants of *Sibbaldia* or *Potentilla Fragariastrum* for this species, and have sent or pointed out to Smith an example of *P. tridentata* as being the same species he had seen on Werron or other hills? I do very much suspect that this is the true solution of some of the mystery which attaches to several of Mr. Don's habitats—namely, that intending to send or show the same species, he or Smith inadvertently confused it with some other species.” *Cyb. Brit.*, 1.348.

“*P. tridentata*, justly regarded by Mr. Don the most beautiful of its genus, was found by him on a mountain called Werron, in Angus. Linn. Trans. x. 343.” *Sm. En. Flora*. Vol. xxxiv. 1389.

“This hill has since been searched by Mr. Kerr and a party from Montrose, but without success. It may, however, have occurred only in one spot, and such a spot may elude again and again the keenest researches of the mountain Rambler. An authentic specimen, gathered by Don, is in Mr. Kerr's herbarium; and there is also a specimen among the remains of an herbarium formed by Mr. Douglas Gardiner in 1813, which had likely been given to him by Don, as they were intimate friends.” *Gard. Fl. Forfar*.

“An American plant, said to have been found at Clova; was probably *Sibbaldia*.” *Bab. Man.* vii. 103.

At a meeting of the Edinburgh Botanical Society, March 14, 1850, Mr. M'Nab exhibited a dried specimen of *P. tridentata* sent



by Mr. Westwood, of the Botanical Garden, Dollar, as a part of a plant picked by him and Mr. C. Stewart on Ben Wyvis, about ten years ago.

The only way in which Don could possibly have mistaken this plant for *Sibbaldia* was in gathering a specimen out of flower, planting it in his garden, and then *P. tridentata* being afterwards believed to be the same; but this suggestion requires such an amount of ignorance on the part of Don that I cannot adopt it. Remember in his original record Don says the plant is the most beautiful of its genus; "its beautiful white flowers at once distinguish it;" and also one must bear in mind that *Sibbaldia* must have been to Don one of the commonest plants, and must have been known to him in all its forms. Surely one who could differentiate the characters of the cut-leaved Saxifrages, and the Alpine Poa and Aira forms, could have never confounded these two plants. Mr. Watson suggests *Potentilla Fragrariastrum*, a slightly more probable solution. Mr. Gardiner makes a still more pertinent suggestion. It must be remembered that both this and *Ranunculus alpestris* are positively stated by Don to have been gathered by him on the same day, April 3, 1809, a date on which I venture to doubt no botanist of critical acumen has visited either locality.

The fact is, Don's critics, when they do not call him a knave, suggest he is a fool. Don, were he alive, would prove, as did Newman in his "Apologia," that he was neither the one nor the other.

*Potentilla intermedia* Nessel. *P. opaca* Sm.

"*P. opaca*. Clova mts. Don, never confirmed, but the specimens are *intermedia* Nessel." *Stud. Flora*.

"Province 15, Perth and Forfar. G. Don only. Error. Incog. Repeatedly as the hills of Clova have been searched by the best collecting botanists of Scotland and England since the time of Don, this species has not again been found." *Cyb. Brit.*, 1,345.

"Clova mts., Mr. G. Don." *Flor. Forf.*

"*P. intermedia*, Ness. (*Opaca* Sm. *Eng. Fl.*, 2,449, vol. xxxviii.)

Said to have been found by Don on the hills of Clova and Braes of Balquhiddar and seashore, opposite Dundee; but not found by any other botanist, and his authority alone is not sufficient to establish its occurrence." *Boswell, Eng. Bot.*

"Is not known as a native." *Bab. Ma.*, ed. vii., 102.

Mr. David Don, son of George Don, in a paper contributed to the Wernerian Society, says that the *Potentilla* was first discovered by his father, and that he himself saw specimens when

they were freshly brought from their native habitats, and his description is drawn-up from specimens in his father's herbarium.

In the fasciculus No. 165 it is localised "Mountains of Angus and the west of Clova."

*Eng. Bot.* 35,2449, says that Mr. Don, of Cambridge, has had the true *opaca* sent him from Scotland. There is a specimen in Miss Palmer's collection.

Nyman in the *Conspectus* gives it for SCOTIA, Scandinavia, Dania, Germania, &c.

*Sanguisorba media*, L. *S. (officinalis) media*, Don, not Linn.

"One of Don's reputed discoveries not confirmed." *Stud. Flora.*

"Prov. 13 or 16, West of Scotland." G. Don. *Comp. Cyb. Br.* 509.

"Incog. Said to have been found by Mr. Don in the West of Scotland; but some variety of the British species, *S. officinalis*, would seem to have been mistaken for the American plant." *Cybele Brit.*, 1.360.

Dr. Boswell in E.B. repeats Mr. Watson's suggestion.

One need add nothing to Mr. Watson's statement; Don knew but little, I suppose, of synonymy.

Mr. Borrer says he has Don's specimen; it is *S. officinalis*, with a longer head than usual, such as he had repeatedly found in the lake district.

*Alchemilla conjuncta*, Bab. *A. argentea*, G. Don.

*Cyb. Br.*, 1.363, 3.423, says: "Incog. 12-15. Said to have been collected on the Clova mts. Mr. Don's specimens are still in herbaria, but I suspect some mistake; the specimen appears to be like those from gardens."

"George Don distributed examples from the Forfarshire hills ostensibly; but Don habitually sent garden examples of supposed wild plants, so that his testimony alone goes for nothing. Mr. A. O. Black also reported the plant from Forfarshire, and showed examples; but Mr. Black was convicted of reporting a planted American shrub, as if also a true native of that county; so that, relying on his testimony, we ought equally to include the *Diervilla Canadensis* among truly British plants now and for ever." *Comp. Cyb. Brit.*, 470.

"Clova mts., Mr. G. Don. A specimen is in Mr. Borrer's herbaria, but I have never been able to recognise it among the hundreds of specimens of *A. alpina* examined for that purpose." *Gard. Flor. Forfar*, pp. 64.

Professor Babington informs me that he has specimens collected



by Mr. A. O. Black in Glen Dole, and that most of the garden plants originally came from Don. The exact station in Glen Dole is about 300 feet from the base of the Glen Dole of Craig Rennet, on left hand side of the first *large* ravine which comes down from Craig Rennet on entering Glen Dole.

*Saxifraga muscoides*, Wulf.

“One of Don’s reputed discoveries.” *Stud. Flora.*

Prov. 12. (?) Highlands. Error, *Cyb.* 1416.; *Eng. Fl.* ii. 272; *Eng. Bot.* iv. 287. *Comp. Cyb.* 516.

“*S. moschata* Sm. Mr. Don of Cambridge has given us specimens from his garden, the roots of which he had from the Highlands of Scotland.” *Eng. Fl.* 332314.

Not given in the *Flora of Forfar.*

“Don’s original record is ‘*Saxifraga nova species*,’ which I believe to be the *S. muscoides* of Willdenow. *Plants of Forfar.*”

“*S. muscoides.* Pyren., Arvern., Juras, Alps, Apen.” *Nyman.*

This can scarcely be called one of Don’s reputed discoveries, as he himself makes no positive statement of having found it.

*Saxifraga pedatifida*, Ehrh.

“One of Don’s reputed Scotch discoveries. His specimens are the common garden *S. trifurcata.*” *Stud. Flora.*

“Don does not pretend to have found it, but sends a garden specimen, saying he has heard it has been found in Scotland.” Dr. Boswell signed “letter, 1864.” *Comp. Cyb. Br.* 517.

“Said to have been found on rocks at the head of Clova; also reported from Achill Isle by D. Wynne; but there seems no satisfactory evidence of the latter being the true plant.” *Eng. Bot.*

Mr. Watson, in *Cyb. Brit.* 1417, thus refers to it:—

“Native. (?) Said to have been found by Don in rocks near the head of Clova. In his account of the Botany of Forfarshire, Don says, in his usual vague or careless language, ‘Summits of the Clova mountains,’ but with him the summits sometimes mean declivities very far below, and usually intending rocks at 700 or 800 yards, the actual summits are 1,000 yards or upwards, though there are peaks and ridges of only 800 or 900 yards above the sea-level.”

Arnott says “probably a mistake.” *Br. Fl.* It is figured in *Eng. Flora*, vol. xxxii., p. 2,778; and it is there stated that “Mr. Don and the late Mr. J. Mackay both gathered this plant in the Highlands, the former on the mountains of Clova, Angusshire. Our figure is unavoidably taken from a cultivated specimen.”

“Rocks near the head of Clova. Mr. G. Don.” *Flora of Forfar*.

“Probably of garden origin.” *Bab. Man.*, v., 143.

If Don habitually did distribute his garden plants, as if they had been gathered wild on the mountains, that does not prove that he did not find *S. pedatifida* in Clova mts. Smith says that both Don and Mackay gathered this plant. (See *Linn. Soc. Trans.*, x., 240.)

The Achill locality is also distrusted, but among some *Saxifraga* collected by Mr. Andrews in Achill occurred true *pedatifida*, of which I possess a specimen.

Miss Palmer's plant from Don is a garden specimen.

*S. pedatifida* is given by Nyman for Gallia mer., Ardenne, &c. *Chærophyllum aureum*, L.

“Scotland. Don, not confirmed.” *Stud. Flora*.

“Prov. 14-15. Edin., Forfar. G. Don only. Error or casual. *Cyb.* 1463.” *Comp. Cyb. Br.* 520.

“Between Arbroath and Montrose, Forfar, and at Corstorphine, Edinburgh. Mr. G. Don.” *Eng. Bot.*

“I discovered this plant some years ago by the side of the corn fields between Arbroath and Montrose.” Mr. G. Don in *Flora Forfar*.

It is given in No. 207 of the fasciculus, and is also included in Miss Palmer's collection.

“This is one of those rare plants discovered by Mr. G. Don, with which few botanists are at all acquainted.” *Eng. Flora*, 302103.

A plant introduced by cultivation. Nyman gives for it : Pyren. Ceven, Arvern, Lozere, Del, Juras, Germ. mer., &c.

*Chærophyllum aromaticum*, L.

“Scotland. Don, not confirmed.” *Stud. Fl.*

“Prov. 15. Forfar. G. Don sole authority. (?) Error,” *Cyb.* 1463. *Comp. Cyb. Br.*, 520.

“River Lunan, near Guthrie, Forfar. Don.” *Eng. Bot.*

“I discovered this in 1870 by the side of the river called Lunan and Vennie, not far from Guthrie, in a truly wild state.” Mr. G. Don in *Flora Forfar*, pp. 86.

Mr. D. Don, in the paper in Wernerian Society's transactions, says this plant was seen by him when brought home by his father, as in the case of *P. opaca*.

Another casual plant, a native of Eastern Europe.



SECOND SUPPLEMENTARY LIST OF FUNGI FOUND WITHIN  
THE PROVINCE OF MORAY.

(The former lists are published in the SCOT. NAT., Vol. II., IV., V.)

BY REV. JAMES KEITH, LL.D.

1. Agaricus L.

(1) Amanita.

1041. virosus, Fr. Bireh wood above Railway Station at Grantown and at Dunphail. Aug., Sep.  
1042. mappa, Batsch. In woods. Forres, Cawdor, Grantown. Aug., Sep.  
1043. spissus, Fr. In woods. Rothiemurehus. Aug.

(2) Lepiota.

1044. Friesii, Laseh. In stubble-field, Rafford. Sep. Rare.

(3) Armillaria.

1045. bulbiger, A. & S. In fir woods. Ord-ban, Rothiemurehus. Aug.  
1046. robustus, A. & S. In fir woods. Forres, Grantown, Rothiemurehus. Aug., Sep.  
Mistaken for *A. aurantius*, Schæff., and published under that name in my first list.

(4) Tricholoma.

1047. sejunctus, Sow. In woods. Cawdor. Sep. (Crypt. Soc.)  
1048. immundus, Berk. Among grass. Forres and Nairn. Sep.  
1049. melaleucus, P. On grassy path. Ord-ban, Rothiemurehus. Sep.

(5) Clitocybe.

1050. tumulosus, Kalehb. On thistle roots. Forres. Sep.  
1051. pithyophilus, Secr. In fir woods. Clunyhill, Forres. Sep.  
1052. vermicularis, Fr. In fir woods. Chapelton Wood, Forres. Sep.

(6) Collybia.

1053. acervatus, Fr. On fir stumps, Rothiemurehus. Aug.  
1054. clavus, L. On small stieks and potato stems in Greeshop Wood, Forres. July, Oct.  
1055. plexipes, Fr. On the ground among beeches, Altyre Wood, Forres. Sep.  
1056. ambustus, Fr. On burnt ground. Forres and Dunphail.

(7) Mycena.

1057. strobilinus, Fr. On wood, probably fir cone, buried in the ground, in Altyre Woods, Forres. July.  
1058. proliferus, Sow. In Manse Garden, Forres. July.  
1059. speireus, Fr. On mossy trunk of willow in Greeshop Wood, Forres. Oct.  
1060. pterigenus, Fr. On dead brakes. Altyre Woods, Forres. Nov.

(8) Omphalia.

1061. hepaticus, Batsch. Altyre Woods. Sep. (Crypt. Soc.)

(9) Pleurotus.

1062. aereus, Fr. In fir woods, Rothiemurehus. Sep.

(11) Entoloma.

1063. jubatus, Fr. Lawn at Brodie Castle, Forres. Aug.

1064. *majalis*, Fr. Altyre Woods, Forres. May.  
(12) *Clitopilus*.
1065. *undatus*, Fr. On grassy banks, Rothiemurchus. Aug., Sept.  
(13) *Leptonia*.
1066. *chalybæus*, P. In pastures. Forres and Grantown. Sep.  
(14) *Nolanea*.
1067. *mammosus*, Fr. In pastures. Rothiemurchus. Aug.  
(15) *Pholiota*.
1068. *radicosus*, Bull. In birch wood above Railway Station, Grantown.  
Sep.
1069. *pumilus*, Fr. In damp mossy spot, Grantown. Sep.  
(16) *Hebeloma*.
1070. *asterosporus*, Q. On the ground. Rothiemurchus. Aug.  
(17) *Flammula*.
1071. *flavidus*, Schæff. On fir stump. Dunphail. Oct.
1072. *inopus*, Fr. On fir stumps. Forres, Grantown, Rothiemurchus.  
Aug., Nov.  
(18) *Naucoria*.
1073. *tenax*, Fr. In fir wood, Grantown. Aug.
1074. *myosotis*, Fr. On the grassy margin of Loch Garten, Strathspey.  
Aug.
1075. *sobrius*, Fr. On grassy spots in woods. Altyre and Edinkillie. July.  
2. *Tubaria*.
1076. *paludosus*, Fr. On Sphagnum, Grantown. Aug.  
3. *Cortinarius*.  
(1) *Phlegmacium*.
1077. *claricolor*, Fr. In birch woods. Forres, Grantown, and Rothiemurchus.
1078. *turmalis*, Fr. In woods. Rothiemurchus. Sep.
1079. *cyanopus* (Seer). In woods. Forres, Cawdor, Grantown, Rothiemurchus. Aug., Sep.
1080. *serarius*, Fr. Greeshop Wood, &c., Forres. Sep.  
(2) *Myxacium*.
1081. *mucifluus*, Fr. In fir woods, Grantown. Aug.
- 1081a. *delibutus*, Fr. In birch woods. Grantown and Rothiemurchus. Aug.
1082. *stillatitius*, Fr. The Bechan, Grantown. Aug.  
(3) *Incloma*.
1083. *alboviolaceus* (Pers.). Among beeches in Altyre Woods. Sep.
1084. *tophaceus*, Fr. Among birches. Ord-ban, Rothiemurchus. Aug.  
(4) *Dermocybe*.
1085. *cinnabarinus*, Fr. In wood at Rothiemurchus. Aug.  
(5) *Telamonia*.
1086. *impennis*, Fr. In meadows under alders. Waterford, Forres. Sep.,  
Oct.
1087. *flexipes* (Pers.). Altyre Woods, Forres. Sep.
1088. *incisus* (Pers.). Greeshop Wood, Forres. Sep.
1089. *paleaceus* (Weinm.). Altyre and Greeshop Woods, &c., Forres. Sep.  
(6) *Hygrocybe*.
1090. *leucopus* (Bull.). Fir woods, Grantown. Sep.



1091. scandens, Fr. Greeshop wood, Forres. Oct.  
 1092. decipiens (Pers.). Forres and Grantown. Sep., Oct.

## 4. Hygrophorus.

1093. eburneus, Fr. On Ord-ban, Rothiemurchus. Aug.

## 5. Lactarius.

1094. rubescens, Fr. Ord-ban, Rothiemurchus. Aug.  
 1095. hysginus, Fr. The Duloch, Grantown, and Ord-ban, Rothiemurchus.  
 Aug.  
 1096. flexuosus, Fr. Ord-ban, &c., Rothiemurchus. Aug.  
 1097. pallidus, Fr. Ord-ban, Rothiemurchus. Aug.  
 1098. vietus, Fr. Ord-ban, Rothiemurchus, Aug.  
 1099. subdulcis, Fr. The Bechan, Grantown. Aug.  
 1100. helvus, Fr. Castle Grant Woods, Grantown, and Ord-ban, Rothiemurchus. Aug.  
 1101. picinus, Fr. Ord-ban, Rothiemurchus. Aug.  
 1102. fuliginosus, Fr. The Bechan, Grantown, and Ord-ban, Rothiemurchus. Aug.

## 7. Russula.

1103. vesca, Fr. Castle Grant Woods, Grantown. Aug.  
 1104. Queletii, Fr. In fir woods. Forres, Grantown, Rothiemurchus.  
 Aug., Sep., Oct.

## 8. Marasmius.

1105. porreus (Pers.). Among oak leaves, Darnaway. Nov.  
 1106. erythropus (Pers.). Among leaves in mixed wood, Brodie. Sep.  
 1107. saccharinus (Batsch.). On decayed fern, Dunphail. Oct.

## 9. Lentinus.

1108. Scoticus, B. & Bv. On birch stick above Cothall. Feb.

## 10. Boletus.

1109. elegans, Schum. Rothiemurchus. Aug.  
 1110. flavidus, Fr. In marshy ground in fir wood at Loch Morlich. Aug.  
 1111. cyanescens, Bull. The Bechan, Grantown. Aug.

## 11. Polyporus.

1112. polymorphus, Rostk. On a stick, Kinrara. Aug.  
 1113. reticulatus, P. On a piece of birch bark, Darnaway. Sep.

## 12. Trametes.

1114. Pini, Fr. On fir trees, Darnaway, Grantown, and Rothiemurchus.

## 13. Hydnum.

1115. scabrosum, Fr. In fir woods. Chapelton Wood, Forres, and at Rothiemurchus. Sep.  
 1116. nigrum, Fr. In fir woods. Rothiemurchus. Sep.  
 1117. melaleucum, Fr. In Chapelton Fir Wood, Forres. Sep.  
 1118. udum, Fr. On a stick, Darnaway. Sep.

## 14. Cyphella.

1119. muscigena, Fr. On mosses. Altyre. Sep.  
 1120. Capula, Fr. On nettle stems, Greeshop Wood. July and Sep.  
 1121. gibbosa, Lev. On old potato stem at Manse of Dyke. July.

## 15. Clavaria.

1122. stricta, P. Ord-ban, Rothiemurchus. Aug.  
 1123. argillacea, Fr. Beside Scourie Bridge, Forres. Sep.

## 16. Typhula.

1124. erythropus, Fr. On dead stems of herbaceous plants in Greeshop Wood. Oct.

1125. *Grevillei*, Fr. On leaves in Greeshop Wood. Oct.  
 1126. *filiformis*, Fr. On leaves in Greeshop Wood. Oct.  
 17. *Pistillaria*.  
 1127. *quisquiliaris*, Fr. On fern stems, Dunphail. Oct.  
 18. *Physarum*.  
 1128. *sinuosum*, Bull. Cawdor. Sep. "Crypt. Soc."  
 19. *Craterium*.  
 1129. *mutabile*, Fr., (*C. aureum* Sehum.) On a whin stiek, Darnaway. Aug.  
 20. *Stemonitis*. (*Lamproderma*.)  
 1130. *areyrioides*, Somm. On decayed eabbage stalk, Forres, July.  
 21. *Enerthenema*.  
 1131. *papillata* (Pers.). On a fir board, Rothiemurehus. Aug.  
 22. *Arcyria*.  
 1132. *einerea*, Bull. On a stiek, Darnaway. Sep.  
 23. *Septoria*.  
 1133. *Polygonorum*, Desm. On *P. Persiearia*, Forres. Sep.  
 1134. *Epilobii*, West. On *E. montanum*, Dunphail. July.  
 1135. *Ficariæ*, Desm. On *Ranunculus Ficaria*, Dunphail. July.  
 24. *Ascochyta*.  
 1136. *Pisi*, Lib. On pea leaves, Forres. May.  
 1137. *Dianthi*, Berk. On *Lychuis* leaves, Forres. July.  
 25. *Excipula*.  
 1138. *strigosa*, Fr. On grass stem, Forres. June.  
 26. *Torula*.  
 1139. *graminis*, Desm. On grass, Forres. March.  
 27. *Sporochisma*.  
 1140. *mirabile*, B. & Br. On beech stump at Chapel of Blair, Forres. July.

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#### ON THE SPECIES OF *ENTYLOMA* PARASITIC IN SPECIES OF *RANUNCULUS* IN SCOTLAND.

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THE only species of *Entyloma* of which any record can be found as occurring in Britain in any species of *Ranunculus* is *E. Ungerianum* De Bary (*Protomyces microsporus* Unger), said to occur in *R. Ficaria*, and recorded first by Berkeley from specimens sent from New Pitsligo (*Ann. Mag. N.H.*, No. 1471, under Unger's name). In "*Grevillea*" (vi. 73), it is mentioned under the former name, under which it stands in Cooke's "*Microscopic Fungi*," 1878, 233, and in "*Mycologia Scotica*," p. 255. In each case the record stands for *R. Ficaria* as the food-plant. In "*Mycologia*" it is recorded as from Forres also.

I have for some time thought that the identification of the species with Unger's was wrong; inasmuch as I have for two or three



years been familiar with an *Entyloma* in the leaves of *R. repens*, from near Aberdeen, from Forfarshire, from Perthshire, and from Forres, which agrees with the descriptions by Unger (“*Exanthe-mata*,” 345), in all respects, besides being in the same food-plant mentioned by him, but which is perfectly distinct from the *Entyloma* in *R. Ficaria*. In the belief that they would prove to be distinct species, I have examined carefully with the microscope specimens of the two, and I find that they correspond entirely with two described in Winter’s “*Pilze*,” in Rabenhorst’s “*Kryptogamen-flora*,” as given below.

**Entyloma Ungerianum** De By. (*Protomyces microsporus* Unger), in the leaves of *Ranunculus repens*, less often in *R. acris*, in deformed and conspicuous patches of the leaf. The patches occupied by the fungus are 1-3 mm. wide, and become very convex on one side, very concave on the other side of the leaf, and often occur in large numbers on the leaf-blade, or, as described by Unger, on the leaf-stalk. At first they are pale yellowish-green, but they soon become gradually browner, and at last wither. The surface of the spot never shows any sign of sporidia as in the form described below from *R. Ficaria*. The spores are densely crowded in the spots frequently; they are irregularly marked with surface-ridges, owing to unequal thickness of wall, are nearly globular or oval, 12-20 mk. in diameter, and in colour vary with age from nearly colourless to pale brown. This species seems to be local, but far from rare.

**Entyloma Ficariæ**, F. von Waldh. [*Fusidium Ranunculi* Bon., *Protomyces Ficariæ* Cornu and Roze, *Protomyces microsporus* Berk. (nec Unger). *Entyloma Ungerianum* Cooke (nec De By.)], in the leaves of *Ranunculus Ficaria*, causing flat pale spots about 1-3 mm. across, visible on both surfaces, but especially below, at first pale green, then dirty white, with a whitish dust on the surface, produced by the development of sporidia from the spores while still in the leaf; after a time the spots become brown as they begin to wither. The spores are rounded, or slightly polygonal, from mutual pressure, and push out mycelium or conidiiferous tubes very readily. They measure 8-12 mk. in diameter, and vary with age from almost colourless to pale yellow-brown. Their wall is almost uniform in thickness, and is thinner than in the last. I have convinced myself by an examination of specimens of *Cylindrosporium Ficariæ* B. and Br., No. 1458, in the *exsiccati* published by Mr. Berkeley himself (No. 212), and by Dr. Cooke (*exs.* ii., No. 172), that this supposed species is certainly nothing else

than the conidia of the *Entyloma* formed on the surface of the leaf.

This *Entyloma* is exceedingly abundant on *R. Ficaria* wherever I have looked for it, and doubtless is so almost everywhere. It is exceedingly distinct from the true *E. Ungerianum* of De Bary.

On the same leaves with it I have found with singular frequency *Peronospora Ficariæ* developed, the two fungi often occupying the same spot of the leaf. Indeed, so constantly have I found the two on the same leaf that it was some time before I found a leaf that contained one without the other, and I was for a time inclined to suspect some genetic connection between them. But more extended investigation showed that they were not so universally associated as that belief would require to corroborate it.

While writing on *Entyloma*, it may not be amiss to mention that I am persuaded that we have a much larger number of species in Scotland than is generally suspected, since several are known to occur without producing any remarkable external deformity of the host. I have myself found cells of *Entyloma* in dead flower-stalks of *Plantago lanceolata* and of *Hypochaeris radicata*, and have seen what looked much like them in the dead tissues of other plants also.

JAMES W. H. TRAIL, M.D.

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## BOTANICAL NOTES.

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*Trifolium agrarium* L.—Last July, in company with Messrs Sturrock and Knox, I saw several plants of this species between Fingask Loch and Blairgowrie, but not native, as they had been introduced with “seeds.” As a *casual* plant, I have seen it in central England in newly laid down grass fields, but it does not appear to be permanent.

*Carex vesicaria*, var. *dichroa*, Anders.—A sedge which I found on the Killin side of Ben Lawers in July, 1874, and which I at first thought to be *C. pulla*, and afterwards considered an Alpine variety of *vesicaria*, Mr. Ar. Bennet has recently determined to be *C. vesicaria* b. *dichroa*, Anders, not previously recorded as British.

G. C. DRUCE, F.L.S.

Oxford, 23rd May, 1884.

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## NOTES FROM THE “GARDENERS’ CHRONICLE.”

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“Resting Spores of the Lilac Fungus” (*Ovularia Syringæ* Berk), by W. G. Smith (Oct. 6, 1883), describes the method of cultivating the fungus. The affected leaves were laid one above another in a broad plate; a little water



was put into the plate, which was then tilted slightly, so that the ends of the leaves touched the water and permitted it to be drawn up slowly. The plate was then covered with a bell-glass, the glass with a duster to exclude light, and the whole was kept in a warm room. On examining the leaves about three weeks afterwards, Mr. Smith found that the mycelium of the fungus had run abundantly over and inside of the decaying leaves, and that it had produced an abundant crop of resting spores. These are half as large again as those of *P. infestans*, with which they agree in structure, and shine like mirrors. Mr. Smith suggests the above method of cultivation as likely to be successful with other *Peronosporæ*, of which the resting spores are as yet unknown.

“On *Barya aurantiaca*, *Plowright and Wilson, n. sp.*” (Feb. 9, 1884, p. 176) gives descriptions and figures of a new fungus grown by Mr. A. S. Wilson from the ergot of *Claviceps purpurea* on *Glyceria fluitans*, from Kinmudy, near Aberdeen. The *Barya* is parasitic on the *Claviceps* ergot, sometimes pushing up its erect growths from the same sclerotium as bears the mature hymenium of the *Claviceps*, but usually the *Claviceps* does not develop its hymenium on the sclerotium attacked by the *Barya*. The description given by the authors is as follows:—

“*Stroma vertical, clavate or subcapitate, 10-20 mill. high by 1-3 mill. in diameter; when young floccose, white] with conidiiferous hyphæ, and bearing yellow perithecia with orange ostiola on its upper two-thirds. Conidia elliptico-lanceolate, borne in chains on the end of branching conidiiferous hyphæ, 10-12 by 2-3 mk. Perithecia pyriform, yellow, almost free, with elongated necks, which with the minute ostiola are orange, 250-300 by 150 mk. Asci cylindrical, 200-250 by 30 mk. Sporidia filiform, flexuous, continuous, as long as the asci. The base of the stroma springs from a floccose mass of yellowish-white mycelium. On Claviceps purpurea on the ergot of Glyceria fluitans.*”

Experiments to infect the ovaries of wheat, rye, and *Poa trivialis* with the mature sporidia of *B. aurantiaca* directly were without result. In appearance it resembles some species of *Cordiceps*, but its sporidia do not break up into joints as in them. It resembles *Hypomyces* in habit, but differs in its fruit, as the latter genus has short oblong or fusiform uniseptate sporidia.

In *Grevillea*, in March, 1884 (p. 77), Dr. Cooke has named this fungus *Claviceps Wilsoni*, and has given a description of it under that name, noting that it “differs from all other species in the elongated clavate capitulum, and in the lax manner in which the perithecia are produced. In the June number of *Grevillea*, p. 100, he notes *Barya aurantiaca* Plow. and Wils. as a synonym of his *Claviceps Wilsoni*, and adds: “This has nothing in common with the genus *Barya*, to which it has been referred, that being only a cæspitose *Acrospermum*.”

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## NEW WORKS ON BRITISH BOTANY.

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*Sowerby's English Botany*, edited by Dr. Boswell, seems likely to be completed at last in a short time. The twelfth volume has been commenced, to include the Vascular Cryptogams, and also such species of Phanerogams as have been discovered in Britain since the completion of the account of the flowering plants some years ago. Parts 84-86 have already appeared, with 152 pages of letterpress and plates 1825 to 1863.

They treat of the *Marsileaceæ*, *Lycopodiaceæ*, and *Equiseta* in part, and the *Ferns*, of the British Islands; and, of course, include the distribution of these plants in Scotland, so far as known to the Editor, than whom there is probably no man more competent to speak on this matter. An examination of the parts issued shows that Dr. Boswell has done his part of the work with all his wonted care, though even here it might be possible to add minor details to the information given by him. For example, we observe under *Lycopodium inundatum*, in speaking of the distribution, Kincardineshire is mentioned with some uncertainty, while Aberdeenshire is entirely omitted. The plant is very local in both counties, but occurs rather plentifully in more than one locality on Deeside, where it was, we believe, detected by Mr. Roy, of Aberdeen.

Unfortunately, some of the plates show the very unsatisfactory colouring, only too familiar to those that have had occasion to use the earlier volumes of the work. In some cases, *vide Selaginella selaginoides*, the figures cannot be said to be at all characteristic.

A first glance at the plates roused fear that a new genus had been adopted for *Isoetes echinospora*, which appears under the name *Poetes*, hence it was with a feeling of relief that we, on turning to the letterpress to realise the worst, discovered that *Poetes* was but a misprint for the familiar designation. But though noticing these defects, in the hope that they may not be met with in the subsequent parts, we are glad to welcome the last volume of this well-known and valuable flora, the fullest and most complete on British plants yet published; and we venture to express a hope that it will itself aid in rendering it possible, in no long time, to witness the publication of a national flora, worthy in the plates, no less than in the letterpress, to rank alongside of the "Flora Danica," or Reichenbach's "Deutschlands Flora."

Part VII. of Braithwaite's *British Mossflora* has been published (6 plates) continuing the *Dicranaceæ*.

Parts VI (*Ulotrichaceæ* and *Chatophoraceæ*), VII (*Chroococcaceæ* and *Nostoc*), and VIII (*Nostocææ* and *Lynghyæ* of Cooke's *British Fresh-water Algæ*) have recently appeared. We observe that the author gives (as an appendix to *Chroococcaceæ*) descriptions of the *Chytridiæ* yet known as British. We believe that he is, however, disposed to regard them as Fungi, despite including them here.

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## MEETINGS AND PROCEEDINGS OF SCOTTISH SCIENTIFIC SOCIETIES.

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[NOTE.—Accounts of meetings during the month preceding date of issue of any number of this *Magazine* are too late for insertion in that number, but will appear in the following one.]

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**PERTHSHIRE SOCIETY OF NATURAL SCIENCE.**—*March 6th*—*Annual Meeting*.—Numerous donations were intimated to the local collection in the Museum. Reports were then submitted by the Council, the Treasurer, the Librarian, the Editor, and the Curator of the Museum. The attendance at the meetings has been considerably increased during the past session. Four excursions were made during the summer of 1883. The membership of the Society now reaches 321. The Museum has been visited since it was opened by a constant succession of people, the total number of visitors up to the date of the report having reached 7000. The financial position is satisfactory, the income for the year being £113 13s. 5d, and the expenditure £104 5s. 9d. The library now contains upwards of 460 volumes, of which 325 belong to the lending department. The curator—Col. Drummond Hay—makes an appea



to all friends able to help to aid in securing for the Museum a complete set of the rarer mammals and birds of Perthshire. He was also retiring President; and in his valedictory address he took as his subject the present state of the collections, and their chief desiderata, required in order to render them thoroughly representative of the fauna, flora, and geology of the valley of the Tay.

*April 3rd.*—Donations were reported to the collections. Thereafter Mr. Ellison read a paper on "How an Insect Flies," entering somewhat exhaustively into the subject.

*May 1st.*—After the usual intimation of further donations to the Museum had been made, Dr. White exhibited catkins of a willow (*salix fragilis*) bearing male flowers, with a few female flowers scattered among them towards the base of each catkin. Some of the catkins showed a tendency to bifurcate. Dr. Robertson, Errol, then read a paper on "Fruit Culture, and some of the Hindrances to its more General Cultivation."

The excursions of the Society for 1884 are to be eleven in number, as follows:—May 10th (half-day) to Craighall; May 22nd, Kincardine Glen; May 31st, Aberfeldy, Castle Menzies, and Weem; June 14th (half-day), Abercairny; June 28th, Ben Chonzie; July 12th (half-day), Invermay; July 26th (half-day), Birnam; August 9th, Banks of the Tay between Caputh and Cargill; August 28th, Errol to Cairney Pier; September 6th (half-day), Necessity Brae; Sept. 20th (half-day), Invergowrie.

**STIRLING NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY.**—This Society for a few years past has published an annual account of its proceedings, along with the papers that have been read at the meetings; and we have been favoured with that for 1882-3, recently published. From it we are glad to see that the Society seems to be in a prosperous condition, and bids fair to do good work, though it may be suggested to the consideration of the Council whether some of the papers may not be given in abstract, so that the Society's strength may be directed rather to publishing real additions to what is already known of the fauna, flora, and archæology of the midland counties of Scotland. All that have had experience in the management of such Societies soon realise that not a few of the papers read are hardly deserving of permanent preservation, though serving at the time a good office in exciting the interest of the members in the subjects that fall under the attention of the Society.

The range of subjects noticed in the volume is a wide one, including various archæological notes of local interest. The papers of such general interest as to deserve special notice from us are the following:—Mr. Croall, the President, in his address indicates the progress that has been made during the year in local biology. The excursions had not proved quite so successful as during the previous year. It was agreed, among other changes in the rules, that the Society shall "*form and take the custody of specimens, and form a reference library.*" "Shell Middens and other Interesting Remains at Tents Moor, Fife," by Rev. R. Paul, gives an account of the shells and other remains found in these mounds. The shells consist exclusively of four species—the cockle, the mussel, the periwinkle, and the common whelk. In the middens themselves neither pottery nor flint implements were found, though the latter are abundantly scattered over the moor. "Notes on Local Plants," by Mr. G. M'Dougall, is rather misleading, as those mentioned are, many of them, not found nearer than Ben Lawers apparently; while those from near Stirling are almost all certainly plants that have escaped from cultivation. "Notes on Recent Shells" notes the occurrence at Forglen, near Bridge of Allan, of beds of shells of ten or twelve species, such as are still living on our sea-coasts. In an account of the excursions of the Society, independently and in conjunction with the Edinburgh and Glasgow Geological Societies, the more interesting plants met with are noted; and at the end of the volume is a short list of additions to the flora of Stirling recorded during the year. These are *Honckenya peploides*, *Erodium moschatum*, *Ononis arvensis*, *Alchemilla conjuncta*, *Peucedanum Ostruthium*, *Carduus crispus*, *Campanula rapunculoïdes*, *Veronica Buxbaumii*, *Borago officinalis*, *Glaux maritima*, *Plantago*

*lanceolata*, *Sparganium simplex*, and *Bromus sterilis* among flowering plants. It is hardly necessary to mention that some of these are certainly not true natives.

Of mosses the following additions are recorded :—*Sphagnum compactum*, *S. rubellum*, *S. subsecundum*, *Phascum cuspidatum*, *Gymnostomum rupestre*, *Weissia controversa*, *Dicranella subulata*, *D. majus*, *Fhyscomitrella patens*, *Polytrichum formosum*, *Cryphaea heteromalla*, *Eurynchium piliferum*, *Hypnum stellatum*, and *H. sarmentosum*.

ABERDEEN NATURAL HISTORY SOCIETY.—March 18th.—Mr James Taylor read two papers, one on *Sclerotium durum*, and some allied forms, and the other, Notes on some plants found along the coast from Aberdeen to the south of Stonehaven. The most interesting plant was *Erythraea littoralis* Fries, (recorded in Dickie's *Botanist's Guide*, under the name *E. linarifolia* Pers., from one spot on the coast where it has for years been extinct) rediscovered in a new locality.

April 15th.—Mr. G. Sim read a paper entitled **Twenty minutes on the Aberdeen beach**, the object of which was to explain the cause of *faults* and unconformable beds observed in sandpits. Mr. S. Burnett read notes, chiefly zoological, made during a trip by land and sea in 1878 round the north and west coasts of Scotland, including visits to several islands off the coasts; and also notes recorded during visits to the south of England, the Channel Islands, Brittany &c., chiefly respecting birds and the plants observed by him.

The Society resolved to hold two excursions during the summer.

EAST OF SCOTLAND UNION OF NATURALISTS' SOCIETIES.—Space requires us to defer to the next number a report of the first annual meeting of the Union, held at Dundee on Friday and Saturday, 6th and 7th June.

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## SCIENTIFIC JOURNALS.

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ENTOMOLOGISTS' MONTHLY MAGAZINE (*March*).—"Agathidium Rhinoceros, near Colinton," by Alfred Beaumont (a few taken on a patch about twenty yards square). (*April*) "Additions to the Entomology of the Isle of Harris," and "Captures in the Isle of Skye," both by C. W. Dale. (*May*) "Notes on Tenthredinidæ," by P. Cameron (describes two new species of *Nematus*—viz., *N. orbitalis* and *N. sylvestris*. The larvæ of both feed on willow; the former is noted as taken in Cadder Wilderness, and at Ballantrae, in Ayrshire; the latter presumably is found in the same localities, though no locality is mentioned). "Description of a Variety of *Philopotamus montanus* Don, from Scotland," by Kenneth J. Morton (the variety is named *Chrysopterus*, and is described fully. The specimens (three males) were taken South Lanarkshire). In all the three numbers, Mr. Charles G. Barrett continues his "Notes on British Tortrices," in which are found at times references to Scottish species.

ZOOLOGIST (*March*) "Rough-legged Buzzard in Shetland," by T. Edmondston, jun., believed to be the first record of its occurrence in the Shetland Islands. "Waxwing in Shetland," shot last January at Norwick, Unst. (*April*) At a meeting of the Zoological Society in London on March 4th, Mr. Howard Saunders exhibited and remarked on specimens of two gulls, *Xema Sabini* and *Larus Philadelphia*, both in breeding plumage, and both killed in Scotland. (*June*) "Capture of a White Whale on the Coast of Caithness," by Mr. J. E. Harting (noticed elsewhere in this Magazine).

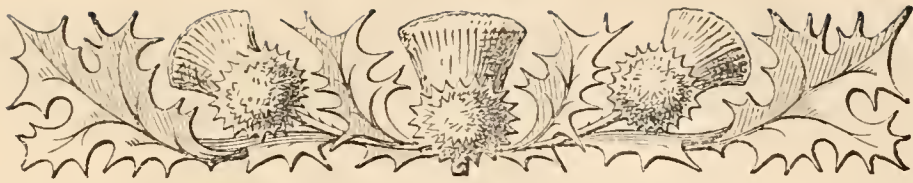


**JOURNAL OF BOTANY** (*April*).—Mr. Britten gives an account of the life, so far as it can now be ascertained, and of the botanical work of Francis Masson, a botanist of last century, born at Aberdeen in August, 1741. In 1772, he was sent from Kew, where he had been employed as a gardener, to the Cape of Good Hope, by the advice of Sir Joseph Banks, to collect seeds and plants for the Royal Botanic Gardens at Kew. There he spent many years, with only the break of an occasional visit to England. He finally left the Cape in 1795. In 1797, he was sent on similar work to North America, and died there, at Montreal, in December, 1806. He introduced many new plants to the conservatories of his native land from all the countries visited by him. The most of his dried plants are now in the British Museum, though a few are scattered in other herbaria. (*May*) Mr. Britten continues his account of Masson's work in an article entitled "Masson's Drawings of South African Plants."

"New Localities for Rare Mosses," by H. N. Dixon, among other notes, *Ceratodon conicus* Lindb, from Dalwhinnie, Inverness (1883), in fruit; recorded hitherto only in the barren state from Newhaven and from Ireland; *Campylopus atrovirens*, var. *falcatus* Braithw, from Loch Coruisk, in Skye (1883), barren; *Didymodon cylindricus* Schimp. From Kintail, Ross-shire (1883), in fruit.

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**GREVILLEA** (*June*), contains the following notices of species not previously recorded for Scotland. "New British Lichens," by Rev. James Crombie, is an enumeration, with descriptions of new species, of Lichens described in "*Flora*" by Nylander from examples sent him from British localities. Among them are "*Lecanora (Placodium) miniatula* Nyl. in "*Flora*," 1883, p. 98 (subsimilar to *L. lobulata* Smmrf., with the *thallus subminiata planer* and the *spores smaller*, .007-.010 mm. long by .004-.005 mm. thick. On quartzose rocks, Morrone, Braemar (Crombie). Probably only a variety or subspecies of *L. tegularis* (Ehrh.)" "Additions to the British Cladoniae," also by Mr. Crombie, notes *C. degenerans* var. *pleiopleidea* Nyl., rare among the N. Grampians, Morrone, *C. coccifera*, var. *incrassata*, Flk. (*-C. macilenta*, f. *deminuta*, Crombie), rare in the West Highlands and among the central Grampians. *C. macilenta*, var. *scabrosa*, Mudd, f. *incrassata* Cromb. "*Podetia* larger, turgid, densely and coarsely granulato-squamulose, probably not infrequent among the Grampians. *C. bacillaris*, var. *subcoronata* Nyl., not common in N. England, the S. Grampians, and N. W. Ireland. *Cladina sylvatica*, f. *tennis*, Lamy, probably not uncommon, var. *grandis* Flk., local and rare in N. England, S. Scotland, and amongst the Grampians. "New British Fungi," by Dr. M. C. Cooke, mentions the occurrence in ovaries of *Agrostis pumila*, from Glen Cluny (presumably in Braemar) of *Tilletia sphaerococca* F. de Waldh. (*Bull Mosc.* 1867, p. 255) characterised thus:—"Mycelium black spores, globose or obtuso-ovoid (.026-.03 mm.), dark brown reticulations of the epispore more prominent than in *Tilletia caries*." •



# INSECTA SCOTICA.

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## THE TRICHOPTERA OF SCOTLAND.

BY JAMES J. KING AND KENNETH J. MORTON.

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IN order to maintain the uniformity of the catalogues of the "Insecta Scotica" we have, in the following list of Trichoptera, followed the plan of the catalogues of Lepidoptera and Coleoptera, by Drs. Buchanan White and Sharp respectively, published in the earlier volumes of the "Scottish Naturalist." At page 161 of vol. i., first series, will be found full details of the thirteen divisions into which the country is divided, for the purpose of indicating the distribution of each species; but as this volume may not be in the hands of some, it may be well to repeat these divisions here.

### *Eastern Districts.*

1. TWEED.—The part drained by the Tweed and other rivers entering the sea between Berwick and Cockburnspath.
2. FORTH.—The part drained by the Forth and other rivers between Cockburnspath and Fifeness.
3. TAY.—The part drained by the Tay and other rivers between Fifeness and Cratown.
4. DEE.—The part drained by the Dee and other rivers between Cratown and Pitsligo.
5. MORAY.—The part drained by rivers between Pitsligo and Ord of Caithness, and by the Caledonian Canal as far west as Loch Oich.
6. SUTHERLAND.—The part drained by rivers between Ord of Caithness and Cape Wrath.
7. ORKNEY.
8. ZETLAND.

### *Western Districts.*

1. SOLWAY.—The part drained by rivers between the Liddel and Culzean Castle.



2. CLYDE.—The part drained by the Clyde and other rivers between Culzean Castle and Loch Awe; includes Arran and Islay.

3. ARGYLE.—The part drained by rivers between Lochs Awe and Aylort; includes Mull, Tiree, and adjacent islands.

4. WEST ROSS.—The part drained by rivers between Loch Aylort and Cape Wrath; includes Skye.

5. HEBRIDES.

An attempt has been made to show the degree of scarcity or abundance of each species, followed by an indication of the condition of water affected by it in its preparatory states, in the neighbourhood of which the perfect insect may usually be found. Be it remarked, however, that many caddis-flies—such for example, as the species of *Stenophylax*, certain *Limnophili*, and others—are essentially nocturnal and very retiring in their habits, and thus their rarity may be more apparent than real. As regards habitats, the indications given must not be applied too rigorously, as some species can accommodate themselves to slightly differing conditions—for instance, a species ordinarily a pond-frequenter may sometimes occur about slowly running streams; besides, the larger species possess strong powers of flight, and may often be found in fir-trees, &c., long distances from water of any kind.

It is to be regretted that, for some of the districts, we have been unable to obtain any information whatever, and for others the records are very meagre. It has not been considered advisable, in the present state of our knowledge of the distribution of these insects, to indicate the probable occurrence of a species in any district in which it has not been taken.

Much remains to be done before we have anything like an accurate knowledge of our native caddis-flies, and this can only be considered a preliminary list; it is hoped, however, it may have the effect of turning the attention of Entomologists resident in Scotland to this much neglected and interesting group, as well as to the other divisions of the *Neuroptera*. Caddis-flies may easily be taken along with Lepidoptera, and should be set in precisely the same way.

To make the list as complete as possible, Lepidopterists and others would confer a great favour by sending us any odd specimens they may have beside them, or may take during the coming summer, with a note of the localities whence procured; these would be taken good care of, and returned in due course.

The nomenclature used is that of the systematic catalogue in

the appendix to M'Lachlan's monographic "Revision and Synopsis of the Trichoptera of the European Fauna."

INÆQUIPALPIA.

PHRYGANEIDÆ.

NEURONIA Leach.

RUFICRUS Scop. Not rare. Weedy ponds.

DISTRIBUTION—EAST. o o Tay o o o o o  
WEST. o Clyde o o o

PHRYGANEA L.

GRANDIS L. Not rare. Deep ponds.

DISTRIBUTION—EAST. o o o o o o o o o  
WEST. Solway Clyde o o o

Probably confined to low-lying districts.

STRIATA L. Common. Deep ponds.

DISTRIBUTION—EAST. o o Tay Dee Moray o o o  
WEST. o Clyde o o o

VARIA F. Common. Deep ponds.

DISTRIBUTION—EAST. o o o Dee Moray Sutherland o o  
WEST. Solway Clyde o o o

OBSOLETA (Hag.) M'Lach. Common. Deep ponds and lakes.

DISTRIBUTION—EAST. o o Tay Dee Moray Sutherland o o  
WEST. o Clyde Argyle o o

This insect is probably general throughout Scotland, excepting in low-lying districts in the South ; some of the specimens are very large.

PHRYGANEA MINOR, Curt., is recorded from Scotland by Curtis on the authority of J. C. Dale.

AGRYPNIA Curt.

PAGETANA Curt. Apparently rare. Marshes and still waters.

DISTRIBUTION—EAST. o Forth o o o o o o o  
WEST. o Clyde o o o

LIMNOPHILIDÆ.

COLPOTAULIUS Kol.

INCISUS Curt. Common. Marshes.



DISTRIBUTION—EAST. o Forth Tay o o Sutherland o o  
 WEST. Solway Clyde o o o

### GRAMMOTAULIUS Kol.

ATOMARIUS F. Not common. Marshy districts.

DISTRIBUTION—EAST. o Forth o o Moray o o o  
 WEST. o o o o o

### GLYPHOTÆLIUS Steph.

PELLUCIDUS Retz. Not uncommon. Ponds and lakes.

DISTRIBUTION—EAST. o Forth o o Moray o o o  
 WEST. Solway Clyde o o o

### LIMNOPHILUS Leach.

RHOMBICUS L. Frequent. Ponds and lakes.

DISTRIBUTION—EAST. o o Tay o Moray Sutherland o o  
 WEST. Solway Clyde o o o

BOREALIS Zett. Very local. Marshes.

DISTRIBUTION—EAST. o o Tay o Moray o o o  
 WEST. o o o o o

SUBCENTRALIS Brauer. Rare. Marshes.

DISTRIBUTION—EAST. o o Tay o Moray o o o  
 WEST. o o Argyle o o

FLAVICORNIS F. Common. Marshes.

DISTRIBUTION—EAST. o o o o o Sutherland o o  
 WEST. Solway Clyde o o o

MARMORATUS Curt. Very common. Ponds and lakes.

DISTRIBUTION—EAST. o Forth o Dee Moray Sutherland  
 Orkney o  
 WEST. Solway Clyde o o Hebrides

Some of the varieties that occur in Scotland are well marked.

STIGMA Curt. Very common. Ponds.

DISTRIBUTION—EAST. o Forth Tay Dee Moray Sutherland o o  
 WEST. o Clyde o o o

Commonest at some little elevation, say 1000 ft.

**XANTHODES** McLach. Not uncommon. Ponds and lochs.

DISTRIBUTION—EAST. o o o o o o o o o  
 WEST. Solway Clyde o o o

**LUNATUS** Curt. Very common. Standing water.

DISTRIBUTION—EAST. o o Tay Dee Moray Sutherland  
 Orkney o  
 WEST. Solway Clyde o o o

Some of the specimens from the Highlands are very dark and well marked.

**ELEGANS** Curt. Very rare. Frequents heathy and moorland districts.

DISTRIBUTION—EAST. o o Tay o o o o o  
 WEST. o o o o o

**POLITUS** McLach. Scarce.

DISTRIBUTION—EAST. o Forth Tay o o o o o  
 WEST. o o o o o

Said to frequent both standing and running water.

**IGNAVUS** (Hag.) McLach. Locally common. Moorland lochs.

DISTRIBUTION—EAST. o Forth Tay o Moray o o o  
 WEST. o o o o o

**NIGRICEPS** Zett. Locally common. Moorland lochs.

DISTRIBUTION—EAST. o Forth Tay o Moray o o o  
 WEST. o o o o o

This insect does not appear until well on in the autumn and hence may be overlooked.

**CENTRALIS** Curt. Very common almost anywhere. Marshy districts.

DISTRIBUTION—EAST. o Forth Tay Dee Moray Sutherland o o  
 WEST. o Clyde Argyle o o

**VITTATUS** F. Very common almost anywhere. Marshy districts.

DISTRIBUTION—EAST. o Forth o Dee Moray Sutherland  
 Orkney o  
 WEST. o Clyde o o o

Specimens from Sutherlandshire are very grey instead of the usual straw colour.



**AFFINIS** Curt. Apparently not very common. Marshy districts.

DISTRIBUTION—EAST. o Forth o Dee Moray Sutherland o o  
WEST. Solway Clyde o o Hebrides.

**AURICULA** Curt. Rather common. Shallow running water.

DISTRIBUTION—EAST. o Forth Tay o Moray Sutherland o o  
WEST. Solway Clyde o o Hebrides

Occurs in pine woods some distance from water.

**GRISEUS** L. Common. Marshes and ponds.

DISTRIBUTION—EAST. o Forth Tay Dee Moray Sutherland  
Orkney o  
WEST. Solway Clyde o o o

**LIMNOPHILUS BIPUNCTATUS** Curt. Rare.

DISTRIBUTION—EAST. o o o o Moray o o o  
WEST. o o o o o

**EXTRICATUS** M'Lach. Common. Running waters, probably also deep ponds and lakes.

DISTRIBUTION—EAST. o o o Dee Moray o o o  
WEST. Solway Clyde o o Hebrides

**HIRSUTUS** Pict. Rare.

DISTRIBUTION—EAST. o o Tay o o o o o  
WEST. o o o o o

**LURIDUS** Curt. Common. Slowly running shallow waters.

DISTRIBUTION—EAST. o Forth Tay o Moray Sutherland o o  
WEST. Solway Clyde o o o

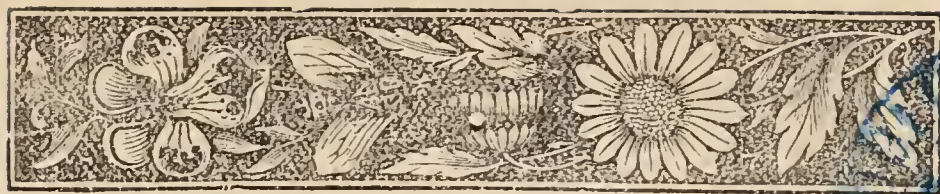
**SPARSUS** Curt. Very common everywhere. Marshy districts.

DISTRIBUTION—EAST. o Forth Tay Dee Moray Sutherland  
Orkney o  
WEST. Solway Clyde o o o

The varieties of this insect are almost endless, and some of the Scottish ones are very fine.

**FUSCICORNIS** Ramb. Scarce. Slowly running streams and deep ponds.

DISTRIBUTION—EAST. o o o o o o o o o  
WEST. Solway Clyde o o o



# PHYTOLOGY.

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## TWO NEW BRITISH USTILAGINEÆ.

*Entorrhiza cypericola* (Magnus) Weber, and *Melanotænium endogenum* Unger.

BY PROF. JAMES W. H. TRAIL, A.M., M.D., F.L.S.

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THE Fungi described below agree in being parasites within the cellular tissues, especially the cortex of the plants attacked by them, and in producing marked distortion where they are found to occur, but in other respects they are widely different.

*Entorrhiza cypericola* is found in swellings at the tips of the rootlets of *Juncus bufonius*. The specimens of these swellings, found by me near Aberdeen, were generally white, oval, smooth, or nearly so, and varying from the size of a small pin's head to that of a small pea. In Germany they have been observed like the above, but are often larger, and often branch a little, as if by abortive roots, at the lower end. At the further end of the swelling the root cap may be detected on a careful examination, especially in section. Externally, the growths look much like galls, *e.g.*, such as are formed by species of *Anguillulidæ* on the roots of various grasses (*e.g.*, *Elymus arenarius*), and other plants. On making a transverse section of the tumour, it is at once clear that the altered tissue is entirely confined to the parts outside the central cylinder, in which lie the unaltered fibro-vascular bundles. The cells of the cortex are seen to be more or less enlarged, with the long axis of each at right angles to the surface of the roots, except one to three layers of hypoderm, which, like the epiderm, are found to be made up of cells enlarged in directions parallel to the surface. The outer layers, after a time, tend to become brown in colour, rendering the whole tumour brown. In the first-mentioned cells of the cortex lie many spores of a fungus connected together by mycelium filaments, which, though very delicate, are quite distinct. These filaments are zig-zag or wavy, or spirally



twisted, or collected into inextricable coils, and they may be simple or may branch slightly. They give the usual reactions when chemically treated, and show an exceedingly delicate membrane or wall. Usually, the masses give off branches which surround the nuclei of the cells of *Juncus*, or bore through from cell to cell to form masses anew. The spores are produced at the tips of wavy or spiral branches, thinner than the ordinary branches from which they arise. They become round, and thereafter become oval, and reach an average size of about  $\cdot 02$  by  $\cdot 017$  mm.

The spore is enclosed in a wall of two layers—the inner is thin and delicate, while the outer becomes covered with rather large low warts, and is deep yellow or red-yellow in colour usually, though sometimes it remains pale. The spores mature in order of succession from the base of the tumour towards the tip. They remain in the tumour all winter after its tissues have become disorganised.

I have found these tumours common on the roots of *Juncus bufonius* in one spot on the sandy links across the Don; and I have also gathered them at Park on Deeside. In both localities they were as described above. Professor Balfour told me a week ago that he had this summer found considerably larger branching tumours in the neighbourhood of Glasgow, on what he believed to be the roots of *Juncus lamprocarpus*. Probably these are also caused by the same or by a closely-allied fungus.

The earliest notice of the tumours on *J. bufonius* was published by Professor Magnus in the *Verhandl. d. bot. Vereins d. Prov. Brandenburg*, 1878, p. 53, in which he described them briefly, and named the fungus in them, and in similar tumours on roots of *Cyperus flavescens*, from near Berlin, *Schinzia cypericola*.

Herr C. Weber, a pupil of Professor De Bary, has recently (13th June, 1884), published in the *Botanische Zeitung* (vol. xlii. pp. 369-79, t. 4), a valuable paper on this fungus, worked out on material from *J. bufonius* obtained near Strassburg. From that paper I take the following additional information, insufficiently shown in my specimens:—

Experiments with the spores show that germination begins only in the spring following their production. It is easily brought about by placing them on a damp stratum. From each spore one or more (up to four) promycelia proceed, with no regularity of origin, but bored through the epispore anywhere. They may become five times as long as the diameter of the spore. They are usually simple, and almost always wavy. They may show a division wall

at some point. At or near the tip a sporidium forms, very rarely more than one, nearly straight, or usually more or less curved, and narrowed to both ends. The sporidia are very much smaller than the spores.

Herr Weber never succeeded in following the germination of the sporidia on fresh plants of *Juncus bufonius* under any conditions. He concludes, as a result of his observations, that the fungus is a peculiar type of the *Ustilagineæ*. From the ordinary forms of this group it differs chiefly in the numerous promycelia, in the small size, and the spirally-curved form of the sporidia. It is, therefore, not a *Schinzia*, and he accordingly places it in a new genus (which he calls *Entorrhiza*), among *Ustilagineæ*.

**Melanotænium endogenum**, a fungus first noted by Unger in his *Exantheme der Pflanz* as attacking the stems, especially at the nodes, of *Galium mollugo*, is very abundant on the sand-hills along the Aberdeenshire coast, and probably elsewhere, in the stems of *Galium verum*. The plants attacked by it become markedly different from healthy plants in their whole aspect. They remain stunted, erect, and not unlike a miniature *Equisetum* in habit. The stems become dark, usually dull purplish or blackish throughout, or at the nodes with streaks of the same colour down the stem and along the mid ribs of the leaves below. The leaves otherwise are sickly yellowish-green, markedly different from the green of the healthy plant. The flowers usually remain undeveloped. On transverse section the cortex of the plant is seen to be much crowded with the spores of the fungus, usually collected in groups, the spores in which are more or less angular from mutual pressure. They are brown, but vary considerably in shade or depth of colour, probably differing with their age and development. The plants attacked by this fungus are very conspicuous, and it cannot be confounded with any yet recorded from the British Islands.

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LIST OF CASUALS AND INTRODUCED PLANTS IN N.E.  
SCOTLAND, ESPECIALLY IN DEE.

BY PROF. J. W. H. TRAIL, A.M., M.D., F.L.S.

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MY original intention in making up the following notes was merely to put together the results of personal observations made either in my out-door work, or in examining some collections that have passed through my hands; but as the work



progressed, it seemed to me advisable to modify this first design, and to include all the casuals of this district of which I could find a record. It will be readily understood that "The Botanist's Guide" of my teacher and predecessor, Dr. Dickie, has been my chief source of information, apart from personal investigations. In several cases I have found myself constrained to differ from him in the conclusions to which I have come in respect to the claims of certain plants to be regarded as indigenous in the north-east of Scotland; hence some of those admitted by him seem to me to be open to dispute as natives, while others placed by him among introduced species might fairly claim a place in our native flora. It must, however, be constantly borne in mind that such questions are, by the nature of the case, very hard to decide beyond dispute. There is good reason to believe that no small proportion of species admitted without controversy or mark of doubt into British Floras, were originally introduced by man, though unintentionally so. I refer to the numerous weeds of cultivated ground, such as the poppies, some sparges, speedwells, and others that it would be tedious to specify. There are certain others that can hardly be called weeds of cultivation, but that are seldom, if ever, to be seen at a distance from human habitations, and that delight to grow on ruins or on ground rich in nitrogenous substances—*e.g.*, on dung-stances. Among such may be instanced the nettles, the common goosefoot, &c. If left to struggle for existence with other plants, unaided by the interference of mankind, these species are apt to be crushed out of the situations formerly occupied by them, and thereby prove their inability to have in the first instance spread as unaided colonists into the places where we now see them. Again, we find that plants show very different powers of establishing themselves in a new locality, when by any chance they are brought into it. Some species are so well fitted to survive in the struggle that in a few years they oust the original occupants to a great extent, and themselves spread so widely, and become so abundant, that they would readily be regarded as native, were we not able, through fortunate circumstances, to trace their past histories.

Of such plants in our own neighbourhood, *Mimulus luteus*, *Veronica Buxbaumii*, *Ægopodium podagraria*, *Lupinus perennis*, and *Elodea canadensis*, are examples. Some grasses have a wide distribution given them from being employed in the mixtures used by

farmers in agriculture, such as the *Serrafalcus* group of *Bromus*, and *Lolium italicum*.

Another source of uncertainty that adds a good deal to the difficulty of deciding on the claims of some species arises from the fact that in the middle ages numerous species of herbs were cultivated because of their real or supposed medicinal virtues, or as pot herbs, and that a large proportion of these ceased to be cultivated when other species of greater value or beauty were brought from distant lands. Not a few of the plants formerly cultivated had to some extent naturalised themselves in the gardens, but on falling into disrepute they came to be regarded merely as troublesome weeds, and their former reputation being lost, the fact that they had once been cultivated was forgotten, and, along with this, their origin fell out of view. Probably more species than we are aware of have been introduced in this way.

But even among the species in the introduction of which man has had no share, direct or indirect, the claim to be native rests not a little on the length of time since they were introduced, and on their suitability to the new conditions in which they are placed. Probably all floras are receiving slow additions by causes apart from the influences of man ; and it is opposed to all the lessons of nature to endeavour to establish hard and fast laws in this department of Botany, no less than in others, in which this is already fully recognised. But while not attempting to lay down such hard and fast rules, we may aid in coming to a knowledge of the laws that regulate the changes that the flora of any locality undergoes by noting carefully the first appearance of plants newly introduced into it, whether by man, consciously or unconsciously, or by causes independent of him.

We may learn something of the laws that enable certain forms to conquer in the struggle for existence, by observing which of the new comers into our plant-world can hold their ground, and the conditions under which they succeed in doing so, and we may be able to detect the causes whereby others, under the most favourable circumstances, apparently die out and disappear. It is as a contribution in this direction that this list has been prepared.

An analysis of the list will show a considerable addition to the number of "casuals" recorded in the "Botanist's Guide." A few of these are somewhat striking species, and are not very rare ; but most of them are, as might be supposed, merely sporadic in their



appearances. Only a small proportion of the "casuals" that reward one's search seem at all able or likely to establish themselves, and most of them die out in the course of a year or two at most.

It will be observed on a moderately careful scrutiny of the list that the "casuals" fall naturally into a few great groups in respect of their introduction into the district. These groups are :—

1. Trees or shrubs intentionally introduced into plantations. These species may not spread, or they may produce fruits, which may be dispersed by the wind (poplars and willows), or by birds (service-tree, &c.)
2. Introduced with or as part of field crops—*e.g.*, beans, tares, clovers, medick, grasses, &c.
3. Introduced into gardens for their beauty, or for culinary value, and thence spreading by stolons or seeds, or thrown out among weeds and rubbish of the garden.
4. Accidental introductions, with imports—*e.g.*, in wool, in Esparto grass, or other commercial products, or in ballast. Corn-field weeds belong to this group.
5. Mode of introduction doubtful, springing up sporadically. There are few in this group.

Specimens of all the following "casuals" from the north-east of Scotland, except those quoted solely from "The Botanist's Guide," are in the herbarium collected by myself.

*Guide* : Dickie's "Botanist's Guide" ; *J. T.* : Prof. James W. H. Trail ; *T. E.* : Mr. Thomas Edwards, of Banff ; *J. R.* : Mr. John Roy.

#### RANUNCULACEÆ.

*Ranunculus aconitifolius* L. (flore pleno). Den of Craigston, Turriff.

*Eranthis hiemalis* L. Alford on Donside (*J. T.*) ; in a plantation in the grounds of Duff House, Banff (*T. E.*). Introduced.

\* *Helleborus foetidus* L. Rubislaw Den, near Aberdeen (*J. T.*). Introduced.

\* *H. viridis* L. Recorded in *Guide* from Rubislaw Den.

\* *Aquilegia vulgaris* L. Along the Dee commonly, at Rubislaw, and elsewhere. Escape.

BERBERIDACEÆ.

- \* *Berberis vulgaris* L. Very doubtfully native, though widely distributed. Probably planted, or afterwards scattered by birds.

PAPAVERACEÆ.

- Papaver somniferum* L. Occasionally in sandpits and in other places where rubbish is deposited, but not holding its ground.
- P. Rhoëas* L. Rare, at Heathcote (15th Oct., 1880, J. T.); a corn-field introduction. The other poppies are doubtful natives.
- \* *Meconopsis cambrica* Vig. Occasional, Banchory-Ternan and elsewhere (J. T. and *Guide*). Escape.

FUMARIACEÆ.

- \* *Corydalis lutea* D.C. Has been gathered on a garden wall beside Raeden, near Aberdeen, by Mr. Robert Davidson. Peterculter House (*Guide*).

CRUCIFERÆ.

- \* *Brassica Rutabaga* D.C. and *B. Rapa* L. Both occur frequently enough beside the margins of fields and streams as escapes.
- \* *Sinapis alba* L. Near Aberdeen, and at Dunottar.
- \* *Koniga maritima* Br. Coast near Aberdeen ("British Flora").
- Erysimum Cheiranthoides* L. Once found on a recently stripped bank beside a road near the village of Banchory (July, 1875). The plants were abundant, but very stunted.
- Hesperis matronalis* L. Outcast or escape from gardens, not rare; Aberdeen at Rubislaw (T. E.), at Park (T. E.), at Slains (J. T.)
- Neslea paniculata* Desv. A fine plant in flower and fruit, on the bank of rubbish at New Bridge of Don on north side (July, 1883.)
- \* *Camelina sativa* Crantz. Occasionally near Aberdeen—*e.g.*, near Raeden (R. D.), and on reclaimed Inches (T. E., June, 1883).
- Lunaria biennis* L. In hedge near Old Aberdeen (June, 1876, J. T.)

RESEDACEÆ.

- Reseda odorata* L. On rubbish heap in sandpit near cemetery in King Street Road (Aug., 1883, J. T.). Outcast.



- \* *R. lutea* L. Formerly on the Inch at Aberdeen (*Guide*).
- \* *R. luteola* L. Though given as native in some parts of Scotland, and by Dickie for the north-east, this seems to have no claim to be so considered here, since its appearances are so uncertain, and are of such a nature that they can be accounted for only on the supposition that it is introduced with farm seeds. I have met with it near Aberdeen only in the summer of 1877, when it occurred in six or seven localities.

## VIOLACEÆ.

*Viola cornuta* L. Was found by me rather abundantly (in July, 1877), on a rubbish heap in Rubislaw Quarries, as an out-cast.

## CARYOPHYLLACEÆ.

- \* *Saponaria officinalis* L. Occasionally, as an escape, or as a relic of former cultivation; Peterhead (1877, J. H. Walker); near Aberdeen, at Alford, and at Strachan (*Guide*).
- Saponaria Vaccaria* L. In sandpit near Old Aberdeen (August, 1878, J. T.); on reclaimed Inches (T. E., July, 1883).  
Escape or casual.
- Silene anglica* L. On reclaimed Inches (T. E., June, 1883).  
Casual.
- Lychnis coronaria* Lam. On bank of river Dee above Ballater (August, 1879).

## PORTULACACEÆ.

*Claytonia perfoliata* Don. Grows as a weed in a garden beside King's College, probably introduced undesignedly; near Ballater (Mr. Brebner).

## MALVACEÆ.

- Probably none of the species of this order are natives with us; but have been introduced for their beauty or supposed medicinal virtues.
- \* *Malva moschata* L. Is common in various localities in Kincardineshire.
- \* *M. sylvestris* is too common throughout the district to require special localities to be noted; but its habitats, so far as I have observed them, are always suspiciously near gardens or houses, from which it had probably strayed.
- \* *M. rotundifolia* L. Is still less apparently native than the others, occurring only beside houses in Johnshaven, &c.

*M. borealis* Wallm. Once found on reclaimed Inches (T. E., August, 1883).

LINACEÆ.

- \* *Linum usitatissimum* L. By roadsides, &c., in various localities. An accidental introduction, or a relic of former cultivation in some cases.

HYPERICACEÆ.

- \* *Hypericum calycinum* L. Near church of Banchory-Ternan, Dr. Stephen (*Guide*).

GERANIACEÆ.

- \* *Geranium phæum* L. At Kincausie and elsewhere, as an escape, or in some places intentionally introduced.
- G. striatum* L. Two plants in Rubislaw Den (July, 1877, J. T.). Accidental.
- G. lucidum* L. In Rubislaw Den (J. T.) and elsewhere, probably introduced to grow on rock-work and walls.
- Oxalis stricta* L. Weed in gardens at Peterhead (July, 1876, Dr. J. H. Walker).
- O. corniculata* L. Weed in garden in High Street, Old Aberdeen. (Sept., 1879, J. T.).

RHAMNACEÆ.

- \* *Rhamnus catharticus* L. On bank of the Dee below the bridge at Banchory-Ternan, probably planted (July, 1876, J. T.). At Alvah (Dr. Todd, *Guide*).

CELASTRACEÆ.

*Euonymus europæus* L. Gight (July, 1860, A. Ogston), probably planted.

LEGUMINOSÆ.

- Medicago sativa* L. Near Dubton Station, on side of railway embankment (Aug., 1879, J. T.), escape from cultivation. Near Banff (T. E.)
- \* *M. denticulata*, Willd. Formerly on the Inch, introduced in ballast (*Guide*).
- M. falcata* L. On reclaimed Inches (Aug. 1883, T. E.), small and larger forms. Accidental or outcast.
- \* *Melilotus officinalis*, Willd. A fine plant beside road to Scotston Moor, in flower and fruit (Aug., 1883, J. T.), outcast. Inch at Aberdeen (*Guide*).



*Trifolium hybridum* L. Is now to be met with in clover fields almost throughout the district. Cultivated.

*T. agrarium* L. Is not rare as an introduced plant in Kincardineshire in fields or on their borders; St. Cyrus, &c.

*Ornithopus perpusillus* L. A doubtful native, Gight (July, 1860, A. Ogston).

*Vicia sativa* L., *V. Faba* L., and *Pisum sativum* L. All occur not uncommonly by roadsides or on the borders of fields, as escapes from cultivation.

*Lathyrus Aphaca* L. One plant on the reclaimed Inches (Nov., 1883, J. T.). Reported by Mr. Roy from Clatt, as naturalised.

*Lupinus perennis* L. Very common along the Dee on shingle beds on the banks, or on islands in the river.

#### ROSACEÆ.

\* *Prunus Cerasus* L. Introduced here and there, probably by birds.

\* *Prunus Avium* L. Along the Dee and Don, introduced.

\* *Spiræa Filipendula* L. (flore pleno), roadside near Cults (Aug. 1877, J. T.); St. Cyrus cliffs (*Guide*).

*Potentilla argentea* L. One plant on reclaimed Inches (Aug., 1883, T.E.)

*Aremonia Agrimonioides* L. Abundant in a small grove of trees near west entrance to Balgonie Lodge, flowers in May, but is sterile (1883, J. T.), Outcast or escape.

*Fragaria elatior* Ehrh. Near Brig o' Balgonie (July, 1876, J. T.). Outcast or escape.

*Pyrus Malus* L. Deeside (June, 1860, A. Ogston). Planted? or accidental?

*P. Aria* Hooker. Culter and elsewhere in shrubberies, probably planted, though possibly also dispersed afterwards by birds.

*Cratægus Oxyacantha* L. Common in hedges, &c.

#### CRASSULACEÆ.

\* *Sedum Telephium* L., var. *Fabaria*. In many places by roadsides and on rubbish-heaps as a garden outcast.

\* *S. album* L. On a wall in Stonehaven (Sept., 1879, J. T.). In Bervie (*Guide*).

*S. reflexum* L. In Rubislaw Den and at Ruthrieston, near station, abundant in both places (J. T.); Castle of Tolquhon (A. Ogston). Outcast or escape.

- \* *Sempervivum tectorum* L. Roofs of houses near Aberdeen, and in Midmar (*Guide*).

GROSSULARIACEÆ.

- \* *Ribes Grossularia* L. Frequent by roadsides, &c., probably planted in some places, dispersed by birds elsewhere.
- \* *R. rubrum* L. Beside the Dee at Banchory-Ternan (June, 1883, J. T.); Midmar (*Guide*).
- \* *R. alpinum* L. Mortlach (*Guide*).

SAXIFRAGACEÆ.

- \* *Saxifraga umbrosa* L. Alford and Dunideer (*Guide*).
- \* *S. Geum* L. Den of Knockspock (*Guide*).

UMBELLIFERÆ.

- \* *Carum Carui* L. Frequent by roadsides and near houses as an escape.
- \* *Æthusa Cynapium* L. A common weed in gardens at Old Aberdeen.  
*Levisticum officinale* Koch. Once found as an escape beside the Ythan below Ellon (July, 1876, J. T.)
- \* *Ægopodium Podagraria* L. Though probably introduced in the Middle Ages, because of the medicinal virtues ascribed to it in large measure, is now most effectually naturalised all around Aberdeen, where it is a most troublesome weed. It is probably abundant elsewhere.
- \* *Peucedanum Ostruthium* Koch. In Rubislaw Den (J. T.); at Gight (A. Ogston, July, 1860). Introduced for its medicinal value? Parishes of Skene and Echt (*Guide*).
- \* *Smyrniolum Olusatrum* L. In various places around Aberdeen (*Guide*); Corbie Den (A. Ogston, 1860); Inverugie Castle and Old Churchyard of Rattray (J. T.). Formerly cultivated as a pot-herb and salad, and now naturalised.
- \* *Myrrhis odorata* L. In numerous places. Formerly used as a pot-herb or as salad, and also as an aromatic stimulant.
- \* *Coriandrum sativum* L. Is recorded (*Guide*) as found on the Inch opposite the Dock gates.
- \* *Apium graveolens* L. Is also recorded (*Guide*) from Craiglug near Aberdeen, on Dr. Murray's authority.

CAPRIFOLIACEÆ.

- \* *Sambucus nigra* L. Common, but hardly to be regarded as



native, since in places where not evidently planted it has probably sprung up from seeds conveyed by birds.

- \* *S. Ebulus* L. Is a very doubtful native, since in the few localities in which it is found it seems to have been introduced, if we may judge by its vicinity to buildings.
- \* *Lonicera Xylosteum* L. Is recorded (*Guide*) as found at Alvah.

#### VALERIANACEÆ.

*Valeriana pyrenaica* L. On the banks of the Deveron, about a mile above Banff (June, 1883, T. E.), probably planted.

#### COMPOSITÆ.

- Onopordon Acanthium* L. Near Culter Station (Sept., 1879, J. T.). Escape.
- Carduus eriophorus* L. Near Loch Kinnord (July, 1877, J. T.). Casual.
- \* *C. Marianus* L. Occasionally on rubbish-heaps near Aberdeen as an outcast.
- Centaurea Scabiosa* L. Near Aberdeen at Rubislaw (1860, A. Ogston). Casual or escape.
- Calendula officinalis* L. (flore pleno). Sand-pit near Cemetery, in King Street Road (August, 1883, J. T.). Outcast.
- \* *Matricaria Parthenium* L. In many places, though hardly fully naturalised. Formerly cultivated as a tonic.
- M. Chamomilla* L. Occasionally as an outcast.
- \* *Tanacetum vulgare* L. Common as an escape or outcast in various places near Aberdeen, at St. Cyrus, &c.; formerly cultivated as a tonic, and also as a condiment.
- \* *Anthemis arvensis* L. In field beyond Rubislaw (J. T.), Ferryhill, near Aberdeen (1860, A. Ogston). Casual? Common in counties south of Forfar. Occasionally in fields near Aberdeen (Professor Macgillivray, *Guide*).
- Anthemis tinctoria* L. On a rubbish-heap on the Links (July, 1875, J. T.)
- Achillea tomentosa* L. Is recorded (*Guide*) from Auchlunkart, in Banffshire.
- Artemisia Abrotanum* L. On the sandy beach about a mile north of Donmouth (Aug., 1876, J. T.), probably carried down the Don, and washed ashore to place where found.
- \* *Senecio saracenicus* L. Beside Burn of Culter, outcast or

escape from neighbouring manse garden (July, 1876, J. T. ; see also *Guide*).

- \* *Doronicum Pardalianches* L. Naturalised in numerous places —*e.g.*, on north bank of Don, near Balgonie, at Echt on road-side, &c. (J. T. ; see also *Guide*).

*Petasites fragrans* Presl. Abundant as a weed in the Manse garden and beside King's College, Old Aberdeen. Formerly cultivated.

- \* *Cichorium Intybus* L. Occasionally in many localities (see *Guide*) ; reclaimed Inches (August, 1883, T. E.)
- \* *Helminthia Echioides* Gaertn. Once on reclaimed Inches (Aug., 1883, T. E.)
- \* *Lactuca muralis* Fres. On a wall near Banchory-Devenick Church, beside the road (Aug., 1883, T. E.). Native?
- \* *Hieracium aurantiacum* L. Is recorded in *Guide*.

CAMPANULACEÆ.

- \* *Campanula Rapunculus* L. Near Aberdeen (1860, A. Ogston).
- \* *C. Trachelium* L.? Peterhead (July, 1876, Dr. J. H. Walker).

JASMINACEÆ.

- \* *Fraxinus excelsior* L., *Ligustrum vulgare* L. Both these species are common in the district, but only where planted, or where the seeds of the introduced plants could have been readily conveyed by wind or otherwise.

APOCYNACEÆ.

- \* *Vinca major* L. In Rubislaw Den, well naturalised (June, 1876, J. T.)
- \* *Vinca minor* L. So very common in some localities, and so widespread that it might almost be regarded as native.

POLEMONIACEÆ.

- \* *Polemonium cœruleum* L. In Rubislaw Quarries (July, 1860, A. Ogston ; see also *Guide*).

CONVOLVULACEÆ.

- \* *Cuscuta Epilinum* Weihe (see *Guide*).

SOLANACEÆ.

- \* *Solanum Dulcamara* L. In numerous localities (see *Guide*) ; additional localities are Peterhead (J. H. Walker) and Banchory-Ternan (J. T.).



- \* *Hyoscyamus niger* L. Here and there beside ruins, or by the roadside—*e.g.*, at Nigg (J. T.), and still at Dunottar Castle.

## SCROPHULARIACEÆ.

- \* *Verbascum Thapsus* L. Occasionally as an outcast or an escape around Aberdeen, at St. Cyrus, &c. (see also *Guide*).
- \* *Scrophularia vernalis* L. On garden wall in Old Aberdeen (July, 1882, J. T.); near Manse of Alford (*Guide*).
- \* *Linaria vulgaris* L. Well naturalised in many localities. On the north bank of Don beside the north road it bears cleistogamous flowers. Escape or outcast.
- \* *L. repens* Ait. Is recorded (*Guide*) from Ballater, Auchindoir, and Alford.
- L. purpurea* L. Well established on wall of Latin Manse in College Bounds, Old Aberdeen, for many years. Escape.
- \* *L. Cymbalaria* Mill. On walls at Ferryhill, Rubislaw Den, and elsewhere around Aberdeen (J. T.).
- \* *Mimulus luteus* L. Thoroughly naturalised along all lower course of the River Don, on the Ythan, on the Bervie, &c.
- Veronica polita* Fries. Occasionally in corn-fields; a weed.
- V. Buxbaumii* Ten. Rather a common corn-field weed in many places.

## LABIATÆ.

- Lamium maculatum* L. Den of Craigston near Turriff (May, 1877, J. K. Ledingham).
- Teucrium Chamædrys* L. A large clump in wall of Old House of Rubislaw, near Aberdeen, where it has been for many years. Formerly cultivated.
- \* *Mentha viridis* L. Recorded (*Guide*) from Castle Fraser, and from Glen Callater.
- \* *Ballota nigra* L. Near Keig, and at Castle Forbes (*Guide*).

## BORAGINACEÆ.

- Pulmonaria officinalis* L. In a park at Duff House near Banff (April, 1883, T. E.). Formerly cultivated as medicinal.
- \* *Lithospermum arvense* L. A doubtful native; confounded with *L. officinale* in *Guide*; on reclaimed Inches (July, 1883, T. E.); near Bridge of Don (J. R.)
- \* *L. officinale* L. A doubtful native; Banchory-Ternan (J. T.).
- \* *Anchusa sempervirens* L. In numerous localities, but always on roadsides and near gardens; thoroughly naturalised—*e.g.*, near Old Aberdeen, Park, &c.

- \* *Borago officinalis* L. On a rubbish-heap on the Links (August, 1878, J. T.); also in *Guide* for Methlic and Cullen.
- Echinosperrum Lappula* Lehm. In sand-pit near old Aberdeen (August, 1878, J. T.); probably a casual introduction.
- Symphytum asperrimum* Bieb. Roadside near Echt (September, 1879, J. T.).
- \* *S. officinale* L. Occasionally near Aberdeen, at St. Cyrus, &c. (J. T.); probably introduced by cultivation.
- \* *Cynoglossum officinale* L. Recorded in *Guide* from several places.

CHENOPODIACEÆ.

- \* *Beta vulgaris* L. Recorded by Dickie as once found on the Inch.
- \* *Chenopodium Bonus-Henricus* L. Not scarce by roadsides and near houses throughout the district. Formerly cultivated.
- \* *Atriplex littoralis* L. Recorded by Dickie as formerly on the Inch.

POLYGONACEÆ.

- \* *Polygonum Bistorta* L. Is a doubtful native as far as my observations go, the localities in which it occurs being such as to leave doubt whether it is not an escape from former cultivation; it easily establishes itself.

URTICACEÆ.

None of the species of this Order seem to be true natives of this part of Scotland. Both *Urtica dioica* and, still more markedly, *Urtica urens* are closely associated with man, nor do we meet with them away at any distance from signs of past, if no longer actual, human occupancy; hence they would seem to have been introduced unintentionally by man.

- \* *Parietaria officinalis* L. On several old buildings (*Guide*), where it had been planted. I have it from Inverugie and from Tolquhon Castle.

*Humulus Lupulus* L. In hedges in various places—*e.g.*, near Balgownie, at Cults, and elsewhere near Aberdeen; probably planted almost wherever it occurs.

*Ulmus montana* Sm. and *U. suberosa* Ehrh. Are not infrequent, but are either planted, or the produce of planted trees.

AMENTIFERÆ.

*Castanea vulgaris* L. Is not rare—*e.g.*, at Cults, Benholm, &c., but only where planted.



*Fagus sylvatica* L. Is very abundant in many places, but has no claims to be considered a native.

*Carpinus Betulus* L. Is pretty common in some places, but can make no claim to be native; at Inverurie, &c.

*Populus alba* L. and *P. nigra* L. Are both to be seen in a good many places, but only where planted, or where the seeds of introduced trees have been dispersed.

*Salix*. Of this genus numerous species have been introduced, and may at times be found apparently wild, in shrubberies, or even in natural thickets on the banks of our rivers. I have nothing special to add to the records in the *Guide*.

## GYMNOSPERMS.

### CONIFERÆ.

*Pinus austriaca* and other species of the genus, along with various species of *Abies* (*alba*, *nigra*, &c.), and a good many other Conifers are to be met with in plantations; but the only introduced species of Conifers that may be met with apparently wild, alike from their situation and from their abundance are:—

*Abies excelsa*.

*A. pectinata*.

*Larix Europaea* L.

## MONOCOTYLEDONS.

### TYPHACEÆ.

\* *Typha latifolia* L. Recorded by Dr. Dickie from Loch of Park; is still abundant there.

### ARACEÆ.

\* *Arum maculatum* L. Thoroughly naturalised in various places near Aberdeen, as recorded by Dr. Dickie, at Seaton and Rubislaw.

### HYDROCHARIDACEÆ.

\* *Elodea canadensis* Mich. (*Anacharis Alsinastrum* Bab.). Thoroughly naturalised in Rubislaw Quarries and burn, at Culter near St. Cyrus in the North Esk, &c. Accidental? No longer on Old Aberdeen Links.

### LILIACEÆ.

\* *Polygonatum multiflorum* All. At Monymusk (1860, A. Ogston), and elsewhere as recorded in *Guide*.

*Asparagus officinalis* L. Peterhead (1860, A. Ogston); an escape.

*Ornithogalum umbellatum* L. Wood above Old Bridge of Don (1860, A. Ogston); an escape.

- \* *Allium oleraceum* L. Is recorded in *Guide* from Arbuthnot, as introduced; but it is abundant on a wooded bank below Stone of Morphie in St. Cyrus, under conditions that certainly seem exceedingly like those of a native plant; hence from my own observations I am disposed to consider it as native there at least.

GRAMINACEÆ.

- \* *Digitaria sanguinalis* Scop. Is recorded by Dickie as once found on the Inch. Introduced in ballast.

- \* *Setaria viridis* Beauv. Has the same record; and Mr. Roy has also notes of its occurrence, as also of the occurrence of *Setaria verticillata* Beauv.

*Phalaris canariensis* L. Is very frequently to be found near the town on rubbish-heaps, in sand-pits, on the Inch, and elsewhere as an accidental introduction, owing to its use as a food for birds. It nowhere holds its own.

- \* *Alopecurus agrestis* L. Dickie records it at Kettock's Mill, and on the Inch.

*Polypogon monspeliensis* Desf. Has been obtained by Mr. Roy from Stonehaven; probably a ballast plant.

- \* *Avena flavescens* L. Is rather doubtfully native; its appearances are more such as may be accounted for by introductions.

*Avena sativa* & *A. strigosa* Schreb. May both be found by roadsides and near houses, as escapes from cultivation, but they are never permanent.

- \* *Glyceria aquatica* Sm. Is recorded at Breda and thence down the Don, in *Guide*; also at Gight (1860, A. Ogston).

- \* *Bromus arvensis* L., *B. secalinus* L., & *B. commutatus* Schrad., all of which occur in grass fields and by roadsides and on river banks, seem to have been introduced into the district among agricultural seeds.

*Bromus rubens* L. Has been sent me by Mr. W. Tait from Inverurie, gathered on the ground where esparto grass is spread when imported.

- \* *Hordeum murinum* L. Has doubtful claims to be considered native, but is included among our native plants in the



*Guide.* I have a specimen gathered at Cults (1860, A. Ogston).

\* *Lolium temulentum* L. Is recorded by Dickie as in fields in different parts of the district, but I have not met with it.

*L. italicum* Braun. Is common in fields around Aberdeen. Introduced for agricultural purposes.

[*Anthoxanthum Puelii*. Has been observed in numerous districts of Britain within the past few years, introduced among grass seeds. It will probably be observed here also if looked for, especially if the seed has been brought from Southern or Central Europe. It much resembles *A. odoratum*, but is smaller, is annual, and differs in some minor points of structure of the spikelet. There is a description of it in the February number of the *Journal of Botany*.]

## THE BOTANICAL WORK OF GEORGE DON OF FORFAR.

BY G. C. DRUCE, F.L.S.

(Continued from page 178.)

*Galium saccharatum* All. "One of Don's reputed discoveries. *Stud. Fl.*

"Said to have been found in corn-fields in the Carse of Gowrie by Mr. G. Don, but it does not appear to have been perfectly naturalized." *Eng. Bot.*

In *Flora Forfar*, *G. saccharatum* and *G. Mollugo* are enumerated as natives of Forfar, but no stations are given.

Arnott suggests it was probably introduced with seed corn. *Br. Fl.*

"Whether this species of *Galium*, i.e., *verrucosum*, confounded by almost all botanists with our *tricornis*, has ever been gathered in Britain before Mr. G. Don observed it in corn-fields near the Carse of Gowrie, we have no sure means of knowing. . . . It has been observed near Malton, Yorkshire, by Mr. R. Miller, and is annual." *Eng. Fl.*, 3, 2173.

"Prov. 10-15. Casual ii. 19, iii. 449." *Comp. Cyb. Br.* 522; *Cyb. Br.* 3.449. Mr. Borrer writes that his specimen from G. Don is like that figured in *Eng. Bot.* as *G. verrucosum*, "and as that figure appears to be a true example of *G. saccharatum* it

would seem that the species had been really found in Britain; though, if so, it was doubtless as a casual introduction only."

Miss Palmer's specimen is from the Carse of Gowrie. Nyman gives for its distribution, Lusitania, Hispania mer., cent., or., Gallia mer.-occ., Helvetia, Germanica (rara et inconstans adv.) etc.

*Galium cinereum* Sm.

"One of Don's reputed discoveries." *Stud. Fl.*

"*G. cinereum* Sm. *G. diffusum*, Don.

Ambiguity, *Eng. Bot.* 4.216; *Eng. Fl.*, 1.208. *Comp. Cyb. Br.* 521.

*Flora Forfar* 93, says—"Near Kinnaird. Mr. G. Don."

"*G. cinereum* Sm. *G. diffusum*, Hook. On banks of the Water of Leith near Slateford, about 3 miles from Edinburgh. It may be considered a very doubtful native, as no one but Don has found it." *Eng. Bot.*

A doubtful native. *Bab. Man.* vii, 170.

A better definition would be a casual, formerly found in Edinburgh and Forfar.

*Galium spurium* L.

*Flora Forfar* at p. 93 says, "In corn-fields near Forfar; rare. Mr. G. Don." A specimen is in Miss Palmer's collection.

In the *Cyb. Brit.*, vol. 2, 20, Mr. Watson writes—"Don appears to have discovered it in Forfar, and a specimen is preserved in Smith's herbarium; but Mr. Gardiner appears not to have found the same species in the county."

In *Eng. Bot.* Dr. Boswell says—"No one besides Don has found it; was probably an accidental straggler."

In the *Fasciculus*, No. 104, is a label to the specimen saying, "*G. spurium* was found near the village of Redditch, in Worcestershire, in corn-fields, and in corn-fields near the village called Lochhead, about 2 miles from Forfar."

Figured in *Eng. Flor.*, vol. 29, p. 1871, and referred to as found by Don in corn-fields about Forfar, but sparingly, as mentioned at t. 1641.

*Comp. Cyb. Br.* 522. Casual. *Bab. Man.* vii., 169, Nyman gives for it—Scot. (1), Ang. Scand. med., mer. Germ., Belg., Gall., etc.

*Galium aristatum* Sm.

"Prov. 15, Forfar; Don.

Sym. 518, evidently one of the intermediate forms connecting *G. elatum* with *G. erectum*." *Comp. Cyb. Brit.* 522. *Eng. Bot.* 4, 217.



“Angus-shire, not common, Mr. G. Don.” *Flor. Forf.* 93.  
 “probably a state of *erectum*.” *Bab. Man.* vii., 170. Given in  
*Stud. Fl.* as a synonyme of *G. erectum* Huds.

*Tussilago alpina*.

“One of Don’s reputed discoveries.” *Stud. Fl.*

“Prov. 15, Forfar, G. Don. *Cyb.* ii. 110, iii. 459; absent from  
 Scandinavia.” *Comp. Cyb. Br.* 533. “Rocks among the Clova  
 mts.” *Pl. of Forf.* 5.

“Said by Mr. Don to have been found in Forfar, but it has  
 been found by no one else.” *Eng. Bot.*

“There is a specimen in Herb. Brodie, from G. Don, ‘On  
 rocks by the side of rivulets on the high mts. of Clova called  
 Garrybarns,’ but we are not on that account prepared to admit the  
 plant as indigenous.” *Arnott’s Br. Fl.*

“Included, like so many other dubious plants, among Don’s  
 discoveries in Forfar, but no other botanist appears to have found  
 it in Britain. Mr. Gardiner suggests that Don intended *Erigeron*  
*alpinus*, but it is difficult to conceive a mistake between plants so  
 very dissimilar.” *Cyb. Br.* ii. 110.

“Mr. G. Don mentions *T. alpina*, an Austrian plant, found on  
 the Clova mts. May his plant not be the *Erigeron alpinus* which  
 he has not enumerated?” *Gardiner’s Flora Forfar*, p. 111.

*Cyb. Br.*, vol ii. 459, says of this species :—

“Mr. Borrer says of this, ‘My specimen from G. Don is the  
 true plant.’ Such being the case, I do not understand why the  
*Homogyne alpina* should be totally excluded from British Floras.  
*ex. gr.* *Bab. Man.*, while plants less likely to occur in Britain,  
 which rest on no safer authority, are admitted, even as genuine  
 natives, *ex. gr.* *Potentilla tridentata*. I do not, however, believe  
 this to be a British species.”

There is a specimen in Miss Palmer’s collection.

Nyman gives its distribution as Pyren. Alpes. Jura. Badia.  
 Wurtemb. Bavar., Morav. Bohem.

Mr. Gardiner’s suggestion of Don’s mistaking *Erigeron* for it  
 will not do, as he knew *Erigeron* well; and alludes, in corres-  
 pondence, to finding it in the Clova district. If any plants could  
 be mistaken for it out of flower *Oxyria*, or *Tussilago Farfara* are  
 the least unlikely. The latter becomes singularly dwarfed in the  
 Clova mts., where I have seen it growing at nearly 3000 feet above  
 the sea, and is not very dissimilar from barren states of *Homogyne*.  
*Centaurea intybacea* L.

“One of Don’s reputed discoveries.” *Stud. Flor.*

“Fields by the Forfar coast in several places.” *Pl. of Forf.* 24.

“Prov. 15, Forfarshire. G. Don sole authority. Error, *Cyb.* ii. 91.” *Comp. Cyb. Br.* 532.

“Said to occur in Forfar by G. Don; no doubt a pale flowered variety of *C. Scabiosa* has been mistaken for this plant as suggested by Mr. H. C. Watson. *Eng Bot.*

“In the fields by the shore in several places in Forfar according to G. Don, who adds an opinion that it must have been confounded with *C. Scabiosa*, which it much resembles.

“It seems likely that Don may have given the above name to the pale flowered variety of *C. Scabiosa*, the resemblance between the two species being such as to render the confusion very probable.” *Cyb. Brit.* ii. 91.

No notice of this plant occurs in *Gard. Flor. Forfar*, but he says of *C. Scabiosa* “three varieties, as respects the colour of the flowers, were found on Will’s Braes, prior to their destruction by the railway—one with the flowers white, a second rose-coloured, and a third with the radial floret rose-coloured, and the discoid purple.”

Nyman gives its distribution as Murc. Arrag. Gall. narbon. ; occ. (Herault rr.), prov. (Marseille).

*Crepis pulchra* L.

“One of Don’s reputed discoveries.” *Stud. Fl.*

“Prov. 15, Forfar. G. Don sole authority. Error, *Cyb.* ii. 49 ; *Flora Forfar*, 99. *Comp. Cyb. Br.* 525.

“Mr. Don said he found this plant among the *debris* of the rocks of the hills of Turin and Pitsandy, Forfar. Dr. Arnott remarks : “The very few specimens from Don which we have seen are more luxuriant than Smith’s acknowledged cultivated one from which the figure in *Eng. Flora* was made.” *Eng. Bot.* (See *Pl. of Forf.* 19, Don says very rare.)

Incog. Don stated he had found this plant, but very rare, on the hills of Turin. It was sought unsuccessfully by Mr. Gardiner in 1845, who says, in *Flora Forf.*, “that a turnip field now occupies the spot.” *Cyb. Brit.*, vol. ii. 49.

Figured in *Eng. Fl.*, 33 vol., 2325 plate, which is drawn from a plant raised from seed sent by Don, who found it wild, in 1796, amongst crumbling rocks on the hill of Turin, Forfar.

“Was probably an error.” *Bab. Man.* vii. 209.

Nyman : Boetic. Castil. Arrag. Catal. Gall. Belg. (??). Germ. occ., etc.

In *Linn. Soc. Trans.*, x. 345, Smith says : “Not at present



known in our gardens, though said to have been cultivated in Chelsea in Rand's time. Mr. Don rightly determined it to be a *Crepis*, and the Linnean specimens decided its species. My worthy friend, Dr. Afzelius, once told me an amusing anecdote to account for the specific name of this *Crepis*. The Queen of Sweden, Louisa Ulrica, celebrated as the great patroness of Linnæus, used frequently in her visits to the Upsala Garden to jest with him for valuing many mean and ill-looking plants, in which she could see nothing to admire. Coming to this little *Crepis*, which is far from ornamental, the Queen exclaimed, "This, I suppose, you call a *pretty* plant." Linnæus replied, "The plant has as yet not been called anything, but your Majesty has given it a name which shall certainly be adopted." He therefore called it *Crepis pulchra*.

There is a specimen in Miss Palmer's collection.

*Hieracium cerinthoides* L.

"One of Don's reputed discoveries." *Stud. Flora.*

"Rocks near the head of Clova?" G. Don. *Flor. Forf.* 102.

"Don did not appear to know the true plant." *Arnott Br. Fl.*

"Said by Smith to have been sent him from the Highlands by Mr. G. Don. The figure is from a cultivated specimen, and no doubt the plant which Don saw wild, and believed to be the same, was *H. Anglicum* var. b." *Eng. Bot.*

"G. Don asserts it to be 'not rare' in the Highlands of Scotland, and localizes it more specifically 'on rocks amongst the Clova mts.'

The garden plant given here by Mr. Borrer is surely not *H. anglicum*." *Cyb. Brit.*, vol. ii. 59.

"Sent from the Highlands of Scotland by its discoverer, Mr. G. Don, who informs us this species is by no means uncommon there upon rocks. *Eng. Flora.*, vol. 34, t. 2378.

*Cyb. Br.*, 3,453, says: "Mr. Borrer's garden plant, mentioned on page 59, vol. 2, was not of British origin; but it is believed by him to be the same species with the specimens from G. Don. Might not the latter be of garden and foreign origin only?"

Miss Palmer's plant is *not* a form of *Anglicum*.

*Hieracium divaricatum*. G. Don.

"Prov. 15, Clova mts." G. Don.

Ambiguity, *Cyb.* ii. 61. *Hieracium lingulatum* Backhouse Mon. 30. *Comp. Cyb. Br.*, p. 526.

Incog. "On rocks among the Clova mts." *Cyb. Br.* ii. 61.

This is referred to *H. lingulatum* in the *Stud. Fl.*

*Hieracium amplexicaule* L.

“Clova mts. Mr. G. Don.” *Flor. Forf.* 102.

“According to Don it occurs on the Clova mts.” *Cyb. Br.*, ii. 61.  
Forfar, G. Don, probably false. *Comp. Cyb. Br.* 527.

*Erigeron uniflorum* L.

“Prov. 15, Perth, G. Don,” in *Eng. Fl.*

Error. A misnomer for *E. alpinus*, in single-headed states.  
*Comp. Cyb. Br.* 533.

“Gathered on Ben Lawers as well as on rocks by the River Almond, near Lynedoch, 7 miles from Perth, by Mr. Don, who justly distinguishes this species from *E. alpinum*.” *Eng. Fl.*, 34.2416.

Referred to *E. alpinus* in the *Stud. Flor.*

An error of Smith's in separating it from *alpinum*, caused by his confounding it with the *uniflorum* of Linnæus. (See Linn. Tran. x. 346.)

*Salix Doniana* Sm. ‘*S. purpurea* var. *sericea* R.’

Prov. ? Scotland. G. Don in *Eng. Fl.*

Baldovan Woods. *Flor. Forf.*

Ambiguity, resembling *S. purpurea*. *Brit. Fl.* 8. *Comp. Cyb. Brit.* 573.

“Was stated by the late G. Don to be a native of Forfarshire, no doubt erroneously. A native of stony place in Mid and South Germany. Described by Andersson as exactly intermediate between *repens* and *purpurea*.” *Stud. Fl.*

I do not see that this is “no doubt erroneously” recorded, or why should not a hybrid willow as likely be found in Baldovan Woods as elsewhere. Whether it was a native is open to doubt.

Nyman gives Scot. Slesv. (rr.) Hercyn. Guestph. Boruss., etc. Omnino media inter *S. purpuream* et *S. repentem* et certe ex iis hybrida ; *S. purpureo-repens* Wimm. et *repens-purpurea* Wimm.

*Salix hastata* L.

“Reported from Sands of Barrie ; never confirmed.” *Stud. Fl.*

“A Swiss alpine, most unlikely to occur even naturalized on the Sands of Barrie, where Drummond met with it.” *Arnott Fl. Brit.*

“Not native, even if found in the recorded locality. *Eng Bot.*, vol. 8, 263. (See *Eng. Fl.* iv., 180.)

“Sands of Barrie, Mr. G. Don.” *Flor. Forf.*, 169.

Nyman gives M. Nevad. Pyren. Alpes. Sudet. Hercyn. Dan. Norv. Suec. etc.



A form of *repens* was probably mistaken for this species, although Don's knowledge of the species was very considerable.

*Juncus tenuis.* Willd.

"One of Don's reputed discoveries." *Stud. Flor.*

"We have specimens from Don's garden, but we doubt much if the roots were ever found in Clova." *Arnott's Br. Fl.*

Prov. 15, Scot.; Dickson. Clova mts., G. Don.

Ambiguity, *Cyb.* iii., 47. Neither authority is reliable, but the figure of *gracilis* in *Eng. Fl.*, vol. 31, No. 2174, may pass well enough for *tenuis*." *Comp. Cyb. Br.* 586.

"Said to have been found in a rivulet in marshy ground among the mountains of Clova." *Boswell Eng. Bot.*

"Found by G. Don in 1795 or 1796 by the side of a rivulet in marshy ground among the mountains of Angus-shire, but very rarely. It appears to be a nondescript, but we received from Mr. Dickson, some years before the above date, a specimen, not so far advanced towards maturity, of what seems to us the same species." *Eng. Fl.* 31, 2174.

"By a rivulet in marshy ground among the mts. of Clova, near their summits. Mr. G. Don and Mr. D. Don (Hb.F.)" *Gardiner's Flora Forfar*, 183.

"Such a record as Don's is worthless in science until confirmed by some more accurate botanist of the present time." *Cyb. Brit.*

"A mistake." *Bot. Man.* 364.

In Don's collection of grasses, etc., is a specimen of this labelled "Clova. I consider it *tenuis*, and see no reason why it should not again be found in some of the lower glens of the Clova districts. Miss Palmer has also a specimen of it.

Nyman gives Gall. occ. Belg. Batav. Germ. (plur. sed sporad.), Bohem.

[In the *Journal of Botany* for March, 1884, vol. xxii., p. 91, Mr. R. F. Towndrow records finding a tuft of *J. tenuis* in the parish of Gradley, Herefordshire, and that his specimens had been confirmed as of this species by M. J. G. Baker of Kew. (Ed. *Scot. Nat.*)]

*Eriophorum capitatum.* Host.

"One of Don's reputed discoveries." *Stud. Fl.*

"We fear Mr. Don had mixed, by mistake, some foreign or cultivated specimens in his possession with the *E. vaginatum* which is very common on Ben Lawers, and which alone we have found there. Most specimens distributed by him belong to *E. vaginatum*." *Arnott's Br. Fl.*

Prov. 15, Perth. G. Don.

“Error, *Cyb.* iii., 82; *Eng. Bot.* x. 174. Misnomer? *Comp. Cyb. Br.*, 587.

“The figure in *E. F.*, 2387, is certainly nothing more than *E. vaginatum*, and the only specimen of Don’s *E. capitatum* which I ever saw, that which is in the herbarium of the Bot. Soc. of London, belonged, without doubt, to the same species.” *Eng. Bot.*

In *Eng. Flora*, vol. 34, 2387, it is thus recorded—“Discovered by Mr. G. Don, August 12, 1810, by the side of a rivulet on Ben Lawers, near the limit of perpetual snow. The plants were rooted in a sand bank, and appeared to have been brought from some still more inaccessible part of the mountain. His specimen agrees exactly with those sent by Professor Schrader, and from Switzerland.”

In *Cyb. Brit.* it is stated: “There is no perpetual snow on Ben Lawers; and, even supposing the words used to be simply a loose mode of expressing a patch of late lying snow, I have seen what would justify the latter reading only in a hollow near the summit where there is no rivulet, and cannot be one from the broken and fissured character of the rock. It must be remembered that G. Don was very inexact in describing localities, and that a bad description will not necessarily imply an intentional falsehood. There is said to be a specimen from Don in the herbarium of Sir W. J. Hooker, which ‘resembles *capitatum*, but the upper part of the stem is triangular.’ *Bab. Man.*, ed. iii, 352. This is unsatisfactory. Is the specimen one of *capitatum* or not? By the triangular stem it is rather *vaginatum*; but yet, by the *Br. Fl.*, it would seem that Don’s specimens were *E. capitatum*, but of foreign origin.”

In Don’s collection of sedges, etc., in the possession of Mr. Knox, is a specimen of *E. capitatum*, labelled “Ben Lawers and Clova mountains, 1810.”

Under *E. polystachion* L., in *Bab. Man.*, vii., 385, we find—“An alpine form has but one nearly sessile spike. *E. capitatum* Don?”

Miss Palmer’s plant I consider true *capitatum*.

Nynam gives its distribution as Ross. arct. Fenn bor., Lapp., Suec. bor. Vermel, Norv., Spitz. Island. Pyren. (r.) Delph. Helvet. Ital. br. (Alpes), etc.

*Carex ustulata* Vahl.

“One of Don’s reputed discoveries.” *Stud. Fl.*



“Prov. 15, Perth and Forfar. G. Don sole authority. Error? *Cyb.* iii., 129. *Eng. Bot.* 137.” *Comp. Cyb. Br.* 588.

Sm. *Eng. Fl.* vol. 34, 2404, says: “Gathered in watery places on micaceous soil on Ben Lawers by Mr. Don, the only person who, to our knowledge, has met with this species in Britain.”

“Stated to have been found ‘on Ben Lawers, very rare’ by George Don, so rare indeed that not one among the many botanists who have since been on that often examined hill, have again found it.” *Cyb. Br.* 3, 130.

*Bab. Man.*, ed. vii., 398, says:—“Specimens are preserved in Don’s collection of sedges labelled ‘Ben Lawers, 1810.’ There is mica adhering to the roots.” (*Vide* note in *Scottish Naturalist*, 1884, p. 190, *Proc. Perth. Soc. Nat. Sci.*)

Miss Palmer has a specimen from the same place.

There is little doubt that Don actually gathered the plant somewhere in the Lawers district. Mr. Sturrock shrewdly suggests that Don was not only a botanist but a florist; and we gather from his correspondence there was a good deal of jealousy between Don and other workers, so that he may have purposely extirpated the plant in the locality where he found it, and this may be also the case with other plants. If so, his botanical reputation has paid dearly for this short-sighted policy.

Nyman gives the range as Scot. (Ben Lawers), Norv, Suec. bor., Lapp., etc.

*Carex hordeiformis* Wahl.

“One of Don’s reputed discoveries.” *Stud. Fl.*

“Drummond, we suspect, found this species among his collections without any memorandum as to where they had been gathered, and drew the conclusion that they were obtained in one of his excursions. *Arnot’s Br. Flora.*

“Said to have been gathered in Den of Panmure by Mr. T. Drummond; but Arnott suggests they were accidentally gathered in the garden at Forfar.” *Eng. Bot.*

Prov. 15; Forfar. Th. Drummond. Error, *Cyb.* iii. 143. *Gard. Flor. Forf.* 217—Small valley about 3 miles west of Panmure; Mr. T. Drummond.

“Perhaps accidentally sown.” *Bab. Man.* vii., 402.

This appears to be one of “Don’s reputed discoveries” which he never claims to have made.

*Carex laxa* Wahl.

Clova mts., Forfar; Don. Error. Hendrick’s *Agricult. Survey of Forfar.* *Comp. Cyb. Br.* 591.

*Phleum Michelii* All.

“One of Don’s reputed discoveries.” *Stud. Fl.; Plants of Forfar*, p. 9.

Prov. 15, Forfar; G. Don, sole authority.

Error, *Cyb.* iii. 157. Very summit of the highest mountains. *Comp. Cyb. Br.* 592.

“No one has verified it. The specimens given by him were cultivated ones.” *Arnott Br. Fl.*

“Discovered by Mr. G. Don on rocky parts of the high mountains of Angus-shire. The specimens agree with authentic specimens, except in being *less* luxuriant, owing probably to its more northern locality or more barren piece of ground.” *Sm. Eng. Flora*, vol. 32, 2265.

“Said to have been found on the highest mountains of Forfar by Don, but by no one else. Mr. H. C. Watson suggests that possibly the long awned form of *Alopecurus alpinus*, to which I have given the name *Watsoni*, may have been mistaken for it.” *Eng. Bot.*

*Cyb. Br.* says:—“Incognita. Don, in *Hendrick’s Forfarshire*, says, ‘Lately I found three other grasses new to the British flora—*Avena planiculmis* (*A. alpina*), *Aira lævigata* (*A. alpina*) and *Phleum Michelii*. These grasses grow on the very summit of the highest mountains.’ Can the *Phleum Michelii* be the *Alopecurus alpestris* (*A. Watsoni*)? True, the figure in *English Botany* does not represent an *Alopecurus* technically, but it bears that first-glance resemblance to my supposed *alpestris*, which may suggest the possibility of Don having seen that one, and somehow substituting the other for it.

In Don’s Collection of grasses, etc., is a specimen of *P. Michelii* (not an *Alopecurus*) labelled—“I discovered this in 1808 on rocks on the Clova mountains, but rare.” In this same collection are *Aira alpina* and *Avena alpina* both labelled “Clova mountains, 1808.”

Nyman gives its distribution, Delph. Juras. Alpes. Ital., etc.

In Miss Palmer’s collection is a specimen labelled “*Phleum Michelii*,” from the Clova mountains, in the Countess of Aylesford’s writing; but the specimen is *Alopecurus alpinus*, an intermediate form between typical *alpinus* and the long-awned form *Watsoni*. Here, again, Lady Aylesford may have mislabelled the plant; but the probability seems strong that Don himself made the error. If so, it lessens the chance of *Phleum Michelii* being a native of Britain.



*Triticum cristatum*. Schreb.

“One of Don’s reputed discoveries.” *Stud. Fl.*

“On steep banks and rocks by the seaside between Arbroath and Montrose. Mr. G. Don, who alone has found it. *Gard. Flora Forfar*.

“Prov. 15, Forfar. G. Don, Lunan Bay, Arbroath.

Ambiguity, *Cyb.* iii. 237. Specimens from Don are in herbaria. *Comp. Cyb.* Br. 597.

“Could not have been indigenous, it being a plant almost peculiar to the east of Europe and Asia.” *Arnott’s Br. Fl.*

“Said by Mr. Don to have been found by him on steep rocks between Arbroath and Montrose. Mr. H. C. Watson states that in a letter from Sir W. Trevelyan, dated August 19, 1839, he remarked that “*T. cristatum* was then abundant by Lunan Bay near Arbroath;” but in 1845 Mr. Gardiner asserted, in his *Flora of Forfar*, that Don never found it.” *Eng. Bot.*

“Discovered by Mr. Don on steep banks and rocks by the seaside between Arbroath and Montrose, flowering very sparingly.” *Eng. Fl.*, 32, 2267.

Specimens of this are in Don’s collection of grasses, etc., labelled between Arbroath and Montrose, and also in Miss Palmer’s. It may have been only a casual introduction.

*Hierochloe borealis*, L.

“Recorded from Glen Cally by Don, but that place has been minutely searched without success. Don’s specimen appears to have been cultivated.” *Arnott’s Br. Fl.*

*Cyb.* Br. iii., 153, says:—

“Incognit., Glen Cally, G. Don. No other botanist, perhaps, has found this grass in the locality named, which is a long, narrow valley descending from the high mountains near the head of Canness into Glen Isla. It does not grow about the head of the glen, which was carefully examined in July, 1843.” *Gard. Flora Forfar*, 199.

“Formerly in Forfarshire.” *Stud. Fl.*

“Glen Kelly or Cally, Forfar; Mr. Don.” *Bab. Man.*, vii., 412.

With respect to the ‘minute search’ referred to by Arnott, it is only fair to say that one of the searchers afterwards stated that although he had made a careful search, from what he had since learned from Mr. Dick about the flowering of the plant, *i.e.*, that it flowers in Caithness early in May, after which it withers, and becomes impossible to find, and considering his search was made *much later* in the year, he withdraws his previous statement.

Gardiner says the upper part of Glen Cally has been searched, but it is more likely to occur in the lower portion of the glen by the stream than among the rocks at the head.

*Triticum biflorum* Brig. *T. caninum* var. *biflorum* Mitten. *T. alpinum* Don mss.

Prov. 15, Ben Lawers, Perth; Don in Borrer's Herb.

Ambiguity, *Cyb.* iii., 237; *Lond. Jour. Bot.*, viii., 533. *Comp. Cyb. Br.*, 597.

Hooker says, "This is only *T. repens*." *Stud. Fl.*

"The present is one of those plants gathered by the late Mr. G. Don, which appears to have been overlooked by other botanists. This label in Mr. Borrer's herbarium runs thus: '*Triticum alpinum* nova spec. it differs from *caninum* by its short arista and upright spikes, and from *repens* by not running at the roots.' No date is mentioned. It is thus clearly evident that he distinguished it as a new species. The only British species with which it can be confounded is *T. caninum*, from which it may be distinguished by its leaves smooth on both sides, its usually two-flowered spikelets, and its want of the long awn; it also appears to be a more slender plant, with narrower leaves." Mr. Mitten in *Journ. Bot.* viii. 533.

The locality indicated is "Rocks on Ben Lawers." Arnott and Babington place Don's plant as a variety of *T. caninum*. A specimen of this is preserved in Don's collection of grasses "from Ben Lawers. Nyman gives as its range as Lapp. occ., Suec. bor., Norv. Alp. *T. violaceum* Horn; *Exs. Fr.* v. 99." *T. alpinum*—Don (Scot.)

The foregoing list of 'reputed discoveries' may be divided into—

*First*—The plants which Don almost certainly found in their recorded localities, but which were only casual plants introduced with seed corn or other means. Of these are *Rapistrum orientale* D.C.; *Neslia paniculata* Desv.; *Hypericum barbatum* Jacq.; *Chærophylum aromaticum* L.; *Galium saccharatum* All.; *Galium cinereum* Sm.; *Galium spurium* L.; *Triticum cristatum* Schreb., and probably *Salix Doniana*.

*Secondly*—Plants which have since been found by others in Britain, including *Lychnis alpina* L.; *Caltha radicans* Forst.; *Alchemilla conjuncta*, Bab. (*argentea*, Don); *Hierochloe borealis*, and *Juncus tenuis*, the two latter not in Don's district.

*Thirdly*—Plants which probably Don really discovered, and which may yet be found when sought at the proper season, viz.: *Sagina alpina*, *Juncus tenuis*, *Carex ustulata*, and *Hierochloe borealis*.



SECOND SUPPLEMENTARY LIST OF FUNGI FOUND WITHIN  
THE PROVINCE OF MORAY.

(Continued from page 227.)

BY REV. JAMES KEITH, LL.D.

UROMYCES Link.

1141. Alchemillæ (Pers.) On Alchemilla Vulgaris.  
*Uredo-spores* (*Uredo Alchemillæ* Pers.) Greeshop. June.  
*Teleuto-spores* (*Uromyces intrusa* Lev.) Grantown. Aug.
1142. Valerianæ (Schum.) On Valeriana officinalis.  
*Æcidio-spores* (*Æc. Valerianaccarum* Duby). At Dulsie. June.  
*Uredo-spores* (*Lecythea Valerianæ* Berk.) Altyre. June.

PUCCINIA Pers.

1143. Malvacearum Mont. On Hollyhocks in Sanquhar Garden, Forres.  
July.
1144. Arenariæ (Schum.) On Stellaria uliginosa. Forres. Aug., Sept.
1145. Fergussoni B. and Br. On Viola palustris. Cothall, near Forres.  
July.
1146. Suaveolens (Pers.) On Cirsium arvense.  
*Uredo-spores* (*U. suaveolens* Pers.) Forres. June.  
*Teleuto-spores* (*P. obtegens* Tul.) Forres. July., Aug.
1147. Umbelliferarum D.C. On Anthriscus sylvestris and other Umbelliferæ.  
*Uredo- and Teleuto-spores.* Forres. Aug.
1148. Anemones Pers. On Anemone nemorosa.  
*Æcidio-spores* (*Æc. leucospermum*, D.C.) Dunphail and Glenfernes. May and June.  
*Teleuto-spores.* Common. June and July.
1149. Galiorum Lk. On Asperula odorata and Galium aparine.  
*Æcidio-spores* (*Æc. Galii* Pers.) and *Uredo-spores* (*Trichobasis Galii* Berk.) Dunphail and Blair Chapel. July.  
*Teleuto-spores.* Sluie. Sept.
1150. Pimpinellæ (Strauss.) On Pimpinella Saxifraga.  
*Uredo- and Teleuto-spores.* Aviemore. Sept.
1151. Saniculæ Grev. On Sanicula Europæa.  
*Æcidio-spores* (*Æc. Saniculæ* Carm.) Grantown. Aug.  
*Teleuto-spores.* Sluie. Sept.
1152. Epilobii D.C. On species of Epilobium.  
*Æcidio-spores.* On *E. montanum*. Dunphail. July.
1153. Flosculosorum (A. & S.) On Compositæ.  
*Æcidio-spores.* On *Crepis paludosa*. (*Æc. Crepidis* Wllr.) Dulsie. June.  
*Uredo-*, along with *Teleuto-spores.* On *Lapsana communis* (*P. Lapsanæ* Fekl.); *Centaurea nigra* (*P. Centaureæ* D.C.); *Crepis virens* and various *Hieracia* (*P. Hieracii* Mort.) June—Sept.
1154. Rubigo-vera (D C.)  
*Uredo-spores* (*Trichobasis rubigo-vera* Lev.) and  
*Teleuto-spores.* On *Holcus*. Sept.
1155. Poarum Niel.  
*Æcidio-spores* (*Æc. Tussilaginis* Pers.) On *Tussilago farfara*.  
Common. June.  
*Teleuto-spores.* On *Poa fluitans*. Grantown. Sept.

## COLEOSPORIUM Lev.

1156. Senecionis (Pers.)  
*Æcidio-spores* (Peridermium Pini Chev. & P. acicolum Link).  
 On Pinus sylvestris and P. Austriaca. Forres and Rothiemurchus. May, June.  
*Uredo and Teleuto-spores.* On Senecio sylvaticus. Scrapahard, Forres. July.

## CÆOMA.

1157. Laricis West. On Larch leaves. Rothiemurchus. June.

## ÆCIDIDIUM Pers.

1158. Compositarum Mart. var. Bellidis D.C. On Bellis perennis at Boat-o'-Birdge. July.

*I am not aware that other forms of the two foregoing species have been discovered.*

## PROTOMYCES Ung.

1159. Macrosporus Ung. On stems and leaves of Goutweed (*Æg. Podagraria* L.) Sanquhar. June.  
 1160. Pachydermus Thum. On leaf-stalk, midrib, and flower-stalk of *Taraxacum officinale*. Forres. May.

## SYNCHYTRIUM De By.

1161. Anemones Woron. On leaves of *Anemone nemorosa*. Rothiemurchus. June.

## USTILAGO Lk.

1162. Salveii B. & Br. On *Holcus* and *Triticum*. Forres. June, July.

## SOROSPORIUM Rud.

1163. Trientalis Woron. On *Trientalis Europæa*. Chapelton Wood. Oct.

## ENTYLOMA De By.

1164. Ungerianum De By. On *Ranunculus repens*. Dunphail, &c. July.  
 1165. Ficiariæ Fischer von Waldh. On *Ranunculus ficaria*. Common. May.  
 1166. Canescens Schröt. (*Protomyces Fergussoni*, B. & Br.) On *Myosotis arvensis*. Waterford. Sept.

## ISARIA Fr.

1167. Intricata Fr. On decayed *Agaric*. Dunphail. Nov.

## SPOROCYBE Fr.

1168. Alternata Berk. On damp pasteboard. Forres. Sept.

## MACROSPORIUM Fr.

1169. Concinnum Berk. On a basket for holding a sponge in my dressing-room. May.

## RHINOTRICHUM Cda.

1170. Repens Preuss. On fallen trunk. Darnaway. Sept.

## PERONOSPORA De By.

1171. Pygmæa Ung. On *Anemone nemorosa*. Dunphail. May.  
 1172. Gangliformis Berk. On *Senecio sylvaticus*. Manachie. May.  
 1173. Viciæ Berk. On *Vicia cracca*. Forres and Grantown. July, Aug.  
 1174. Calotheca De By. On *Asperula odorata*. Dunphail. July.  
 1175. Arenariæ Berk. On *Arenaria trinervia*. Greeshop Wood. June.  
 1176. Alsinearum De By. On *Stellaria media* and *Cerastium vulgatum*. Forres and Grantown. Aug.



1177. *Effusa* Grev. On Spinach in Manse Garden, and on *Chenopodium* at the side of the railway at Forres, June, and at Grantown, Aug.  
 1178. *Ficariæ* Tul. On *Ranunculus ficaria* at Dunphail, and on *R. acris* at Waterford. June.  
 1179. *Affinis* Rossm. On *Fumaria officinalis* on the sloping side of railway opposite Greeshop. July.  
 1180. *Urticæ* (Lib.) De By. On *Urtica urens* beside Sanquhar Garden. June.  
 1181. *Arborescens* Berk. On *Papaver dubium* on sloping side of railway opposite Greeshop. June.  
 1182. *Sordida* Berk. On *Digitalis*. Dunphail. July.  
 1183. *Leptosperma* De By. On Leaves of *Pyrethrum inodorum* on slope of railway embankment behind Greeshop farm. July.

## RAMULARIA Unger.

1184. *Rufibasis* (*Peronospora rufibasis* B. & Br.) On leaves of *Myrica gale*. Grantown. July—Sept.  
 1185. *Obliqua* (Cooke). On Dock leaves. Common. Summer.  
 1186. *Veronicæ* Fekl. On *Veronica montana*. Greeshop Wood. June.  
 1187. *Heraclei* Ond. On *Heracleum*. Common. June—Aug.  
 1188. *Pruinosa* Speg. On *Senecio Jacobæa*. Brodie. July.  
 1189. *Malvæ* Fekl. On *Malva moschata* in Castle Grant garden. Aug.  
 1190. *Calcea* Desm. On *Glechoma hederacea*. Chapel of Blairs, &c. July.

## DACTYLIUM Nees.

1191. *Roseum* Berk. On an osier basket decaying on the ground. Forres. July.

## SPOROTRICHUM Lk.

1192. *Sulfureum* Grev. Along with the preceding species.

## SYZYGITES Ehrb.

1193. *Megalocarpus* Ehrb. On decaying Agarics. Forres. Sept.

## ONYGENA (Pers.), Tul.

1194. *Equina* Pers. On decaying horse-hoofs and sheep-horns. Forres and Rothiemurchus. Aug.—Oct.

## MORCHELLA Dill.

\* *Esculenta* Pers. var. *conica* Fr. Sluie, Rafford, Clunyhill, Sanquhar, and Rothiemurchus. May.

1195. *Semilibera* D.C. Greeshop Wood. May.

## HELVELLA L.

1196. *Infula* Schæff. Sawdust opposite the Dell, Rothiemurchus. Sept.  
 1197. *Atra* König. At the base of Ord Ban, Rothiemurchus. Aug.

## MITRULA Fr.

1198. *Cucullata* Fr. On fir leaves. Clunyhill and Altyre Woods. Abundant. Nov.

## LEOTIA Hill.

1199. *Circinans* P. Fir woods. Under Spruces near the Schoolhouse, and in abundance at corner of Ord Ban, Rothiemurchus. Aug.—Sept.

## GEOGLOSSUM P.

1200. *Difforme* Fr. Rothiemurchus. Aug.

## RHIZINA Fr.

\* *Undulata* Fr. In immense abundance at Rothiemurchus, where a plantation had been burned down eighteen months before. Aug., Sept., 1883.

## PEZIZA L.

1201. *Cupularis* L. Darnaway. Sept.  
 1202. *Xanthomela* Pers. Darnaway. Oct.  
 1203. *Oocardii* (Kalch.) On wet rotten birch wood. Darnaway. Nov.  
 1204. *Furfuracea* Fr. On Alder. Sanquhar and Greeshop. March.  
 1205. *Bulbocrinita* Ph. On prunings. Greeshop. July.—Sept.  
 1206. *Hirtococcinea* Ph. On moss in firwood. Rothiemurchus. Aug.  
 1207. *Rhytismæ* Ph. On spots of old *Rhytisma* on Sycamore leaves.  
 Greeshop. June.  
 1208. *Œdema* Desm. On Bramble leaves on decayed *Phragmidium*  
*bulbosum*, Forres. June.  
 1209. *Lencophæa* Pers. On old stems of *Stachys sylvatica*. Greeshop. June.  
 1210. *Nidulus* Schum. and Kunz. On rotten stems of *Spiræa ulmaria*.  
 Greeshop. May.  
 1211. *Pteridis* A. & S. On decaying leaves of *Pteris aquilina*. Rothie-  
 murchus. June.  
 1212. *Nuda* Ph. On moss near Coilam Bridge, Rothiemurchus. Aug.  
 1213. *Urceoliformis* Karst. On stems of *Vaccinium vitis-idaea*. Grantown.  
 1214. *Subularis* Bull. On *Angelica* seeds. Greeshop. Oct.  
 1215. *Echinophila* Bull. On Chestnut husks. Cawdor, Clunyhill, and  
 Altyre. Sept.—Nov.  
 1216. *Caucus* Reb. On catkins of Alder. Greeshop. Oct.  
 1217. *Pallido-virescens* Ph. On roots of grass or some trailing stems.  
 Greeshop.  
 1218. *Coronata* Bull. On petioles. Greeshop. Oct.  
 1219. *Scutula* Pers. On stems of *Spiræa ulmaria*. Greeshop. Oct.  
 1220. *Electrina* Ph. & Pl. On decaying pine leaves. The perfect form was  
 found by Mr. Plowright at Forres, in September, 1879. I  
 had previously found the less perfect form (*Dacrymyces*  
*succineus* Fr.) at Grantown. It is this which is given  
 under the name of *Fusarium pezizoides*, as No. 837 in my  
 second list (See Grev. VIII., 154).  
 1221. *Lacustris* Fr. On straw of *Phalaris arundinacea*. Greeshop wood.  
 Nov.  
 1222. *Palustris* Rob. On withered grass. Greeshop and Dumphail. June.  
 1223. *Mercurialis* (Fekl.) On dead stems of *Mercurialis perennis*. Cothall  
 and Greeshop. May.  
 1224. *Ventosa* Karst. On Willow stump. Greeshop. July.  
 1225. *Sphæroides* Pers. On dead stems of *Lychnis diurna*. Greeshop. June.  
 1226. *Xanthostigma* Fr. On old wood. Rothiemurchus and Forres.  
 Common. Summer.  
 1227. *Sordida* Fekl. On broom. Manachie. Jan.

## HELOTIUM Fr.

1228. *Epiphyllum* Fr. On damp oak leaves. Darnaway. Sept.  
 1229. *Sulfuratum* (Flo. Dan.) Ph. On fallen pine leaves. Cawdor,  
 W. Phillips: Clunyhill, J. K. Sept.—Nov.  
 1230. *Lutescens* (Hed.) Fr. On a piece of wood covered with moss.  
 Manachie. Jan.  
 1231. *Alniellum* (Nyl.) Karst. On catkins of Alder. Greeshop. Oct.

## PATELLARIA Fr.

1232. *Discolor* Mont. On Alder sticks. Altyre and Greeshop. June—Oct.

## CENANGIUM Fr.

1233. *Subnitidum* Cke. & Ph. On hazel at Chapel of Blairs. May.  
 1234. *Pulveraceum* Fr. On a stick. Darnaway. Oct.

## ASCOBOLUS Tode.

1235. *Viridis* Cur. On the ground in Greeshop wood. Oct.  
 1236. *Subfuscus* Boud. On cat's dung. Forres. April.



1237. *Miosporus* B. & Br. On cow's dung. Aviemore. Aug.

OMBROPHILA Fr.

1238. *Brunnea* Ph. On garden prunings. Greeshop. July.

ASCOMYCES M. & D.

1239. *Deformans* Berk. On Peach leaves in gardens. May, June.

PHACIDIUM Fr.

1240. *Dentatum* Fr. On Chestnut leaves. Clunyhill. Nov.

1241. *Leptideum* Fr. On stems of *Vaccinium vitis-idaea*. Rothiemurehus. Aug.

1242. *Tetrasporum* Ph. & Keith. On Juniper leaves. Manaehie. June. (Gard. Chron., Sept. 4th, 1880.)

1243. *Minutissimum* Awd. On Oak leaves. Dunphail. June.

EPHELIS Fr.

1244. *Radicalis* (Cooke) Ph. & Keith. *Rhytisma radiale* Cke. At the base of dead stems of *Rhinanthus cristagalli*. Forres. Perfect fruit in May and June.

CLAVICEPS Tul.

1245. *Purpurea* Tul. Aseophore. In a frame in garden from *Sclerotia* sown the previous year. May.

HYPOCREA Fr.

1246. *Citrina* Fr. *Forma fungicola* Karst. On pores of *Polyporus betulinus*. Darnaway and Dunphail. Sept., Oct.

HYPOMYCES Tul.

1247. *Violaceus* Tul. On *Æthodium* in an old saw-pit at Cawdor, Sept. 29th, 1879, C. B. Plowright; and on *Æthodium* on heath at Rothiemurehus, Aug., 1884, J. K.

1248. *Chrysospermus* Tul. On decayed *Boletus* in Chapelton wood, Sept., 1879. Plowright and Stevenson; and at Daltulieh, Sept., 1883, J. K.

ELEUTHEROMYCES Fckl.

1249. *Subulatus* Fckl. On decayed *Russula nigricans*. Chapelton Wood. Sept.

NECTRIA Fr.

1250. *Inaurata* B. & Br. On Holly twigs. Sluie. April.

1251. *Mammoidea* Ph. & Pl. On Currant stiek. Greeshop. March.

XYLARIA Fr.

1252. *Pedunculata* Fr. On roe-deer's dung. Rothiemurehus. Aug.

HYPOXYLON Fr.

1253. *Concentricum* (Bolt.) On the stump of an old ash tree at Manse of Alves. July. Rare in this district.

The tree on the stump of which the specimens occurred had been one of a row on which the beeves killed for the use of the Duke of Cumberland's army, while encamped at Alves before the battle of Culloden, are said to have been suspended.

EUTYPA Tul.

1254. *Spinosa* Tul. On a hardwood stiek. Darnaway. May.

DOTHIDEA Fr.

1255. *Trifolii* Fr. On *Trifolium medium*. Grantown. Aug. No fruit.

1256. *Tetraspora* B. & Br. On Whins, Manaehie, Spring; and on Holly twigs, Sanquhar, Dec. Seems to occur most frequently on burnt whins.

## DIATRYPE Fr.

1257. *Verrucæformis* Ehr. var. *Tocciaëana* De Not. On alder. Sanquhar. May.  
 1258. *Pyrrhocystis* B. & Br. On Hazel. Dunphail. May.

## MELANCONIS Tul.

1259. *Modonia* Tul. On dead twigs of *Castanea vesca*. Clunyhill. Jan.

## VALSA Fr.

1260. *Abietis* Fr. On Scotch fir. Mondole. March.  
 1261. *Cratægi* Cur. On Hawthorn. Forres. Nov.  
 1262. *Clypeata* (Fekl.) On dead Bramble stems at Scourie, near Forres. April.

## CUCURBITARIA Gray.

1263. *Lauro-cerasi* Ph. & Pl. On Cherry laurel. Altyre. May. (Grev. vol. X., p. 72.)

## FENESTRELLA Tul.

1264. *Bipapillata* Tul. On Beech twigs. Altyre. March.

## MASSARIA De Not.

1265. *Fœdans* Fr. On Beech. Sanquhar. March.  
 1266. *Eburnea* Tul. On Beech. Darnaway. July.  
 1267. *Tiliæ* Ph. & Pl. On Lime twigs. Drumduan. May. (Grev., vol. X., p. 72.)

## LOPHIOSTOMA De Not.

1268. *Hederæ* Fekl. On Ivy. Sanquhar. April.

## SPHÆRIA Hall.

1269. *Superficialis* Curry. On Fir wood. Rothiemurchus. Aug.  
 1270. *Scabra* Curry. On Broom. Manachie. March.  
 1271. *Prætermissa* Karst. On Raspberry stalks. Dunphail. May.  
 1272. *Pulviscula* Curry. On Wood. Rothiemurchus. Aug.  
 1273. *Sordaria* Fr. On Fir Chips. Scourie. Nov.  
 1274. *Velata* Pers. On Lime twigs. Clunyhill. June.  
 1275. *Ditopa* Fr. Both forms. On Alder twigs. Waterford. June.  
 1276. *Persistens* B. & Br. On Rose stems. Greeshop. June.  
 1277. *Abbreviata* Cke. On Raspberry stems. Sanquhar. July.  
 1278. *Herbarum* Pers. var. *Pisi* Sow. On old Pea straw. Forres. June.  
 1279. *Nigrella* Fr. On Angelica stems. Greeshop. July.  
 1280. *Tubæformis* Tode. On alder leaves. Waterford. May.

## SORDARIA Winter.

1281. *Maxima* Nies. On rabbit's dung. Greeshop. July.  
 1282. *Equorum* (Fekl.) Wint. On horse-dung. Sanquhar. July.

## SPHÆRELLA De Not.

1283. *Maculæformis* Pers. On Oak leaves. Common. June.  
 1284. *Ditricha* (Fr.) On Birch leaves. Common. June.  
 1285. *Anarithma* B. & Br. On *Ammophila*, Waterford. July.  
 1286. *Proximella* Karst. On the axis of old fertile spikes of *Carex ampullacea*. Sanquhar. May.  
 1287. *Rusci* De Not. On leaves of *Ruscus aculeatus*. Invererne and Altyre. July.

## VENTURIA De Not.

1288. *Dickiei* (B. & Br.) De Not. On leaves of *Linnæa borealis* in Castle Grant woods, and at Rothiemurchus. Aug.

## ORBICULA, Cooke.

1289. *Perichænoides* Cke. On old rafters of a barn, Forres. June. (Grev., vol. VIII., p. 10.)

## STIGMATEA Fr.

1290. *Chætomium* Fr. On Bramble leaves. Everywhere. Nov.



## ISOTHEA Fr.

1291. *Saligna* Berk. On Sallow leaves. Cothall. May.

*Omitted in proper place.*

1292. *Russula fellea* Fr. Under Beech trees. Clunyhill, &c. Aug., Oct.

1293. *Nidularia confluens* Fr. & Nord. On a piece of decayed fir wood.  
Forres. Aug., Sept.

1294. *Septoria Hydrocotyles* Desm. On *Hydrocotyle vulgaris*. Rothiemurchus. Aug.

1295. *Peronospora Potentillæ* De By. On *Alchemilla vulgaris*. Rothiemurchus. Aug.

## SCOTTISH GALLS.

BY PROF. J. W. H. TRAIL.

(Continued from page 216.)

ULMUS MONTANA Sm. :—

*a.* Galls of *Tetraneura Ulmi* L. form rifle-bullet-shaped bodies arising from the upper surface of the leaf (“*Sc. Nat.*,” V., p. 216).

*b.* Galls of *Schizoneura Ulmi* L., consisting of fleshy distorted revolute leaves, which shelter, in the pouch formed by them, a large number of the Aphides, amidst a quantity of secretion (“*Sc. Nat.*,” V., p. 216).

*c.* Mite-galls in the leaves, the work of *Phytoptus*. They are very inconspicuous when young, but are readily detected after a time by causing the leaf around them to die and to become brown in spots about 4 or 5 mm. across, very closely resembling the spots so frequently produced on leaves by fungi; indeed it was while examining the spots in search of fungi that I detected their true cause. The young gall is lenticular in form, projecting very slightly from both surfaces of the leaf, slightly more so below, where the orifice is situated. The gall is usually from .5 to 2.5 mm. across, and is about twice as thick as the leaf around it; but its surface hardly differs from that of the leaf in colour, though it is at times yellowish-green. However, in course of time the colour changes through yellow to brown as the tissue dies. On microscopic examination the palissade cells are seen to be hardly altered, but the cells of the tissue below them become much enlarged, and leave large interspaces among them; and in the interspaces the mites live. Before the fall of the leaves the mites may be found crawling over them, having abandoned the galls through the opening below. Frequently a leaf bears many galls; and on some trees hardly a leaf can be seen free from them. I

have found them abundantly in Aberdeenshire, Forfarshire, and Perthshire, and have no doubt that they will be found almost wherever looked for.

#### ULMUS CAMPESTRIS L. :—

Galls of *Phytoptus*, doubtless the same species as makes the galls just described on *U. montana*, are common in the same localities as the latter, and are exactly similar in all respects. They have been described from this tree from Gotha, Wurzburg, and the Tyrol by Dr. Thomas, and from Weidling in Austria by Dr. Fr. Loew.

#### JUGLANS REGIA L. :—

*Erineum Juglandinum Pers.* was sent me in the month of June by Dr. Buchanan White from Perthshire, where he had gathered it. It is made by a species of *Phytoptus*, like the other *Erinea*. Greville described it under the name *E. subulatum* in his *Monograph* of the genus (*p.* 75, *t.* II., *f.* 4), and under the name *E. Juglandis* D.C. in his "*Flora Edin.*" (*p.* 450), and in his "*Scot. Crypt. Flora*" (*V.*, *t.* 263, *f.* 2), recording its occurrence near Edinburgh. The gall is situated on the lower surface of the leaves, and consists of a patch of yellowish-gray hairs, very closely packed together; the outlines of the patch are bounded by nerves of the leaf, and it is thus often quadrangular in form, and may be as much as 20 mm. in its long diameter. The hairs are slender, simple, and pale, seldom showing any marked irregularity in form. The patches generally lie in depressions of the lower surface, to which correspond irregular convexities, of a paler or more yellowish-green colour than the rest, on the upper surface. The mites live among the hairs.

#### QUERCUS ROBUR L. :—

*iv.* Galls of *Aphilothrix solitaria Fonsc.*, already recorded by Mr. Cameron from near Glasgow ("*Fauna and Flora of the West of Scotland*," *p.* 16), and by myself as sent me from Perth ("*Sc. Nat.*," *IV.*, *p.* 17), were found by me in 1882 at Ballater on Deeside. I here describe the fresh galls. They are ovate budgalls, usually sessile, with a few small scales around the base, narrowed abruptly near the tip, where they end in a sharp prominent point. Their surface is nearly smooth, and is green or greenish-brown. In size they vary from 6 to 9 by 4 to 5 mm. On section the wall is thin; but in it one can distinguish a hypoderm of thin-walled cells, and an inner layer of polygonal cells with thick pitted walls.



The central cavity is rather large, and is lined with thin-walled cells that contain protoplasm and starch as food for the larva apparently. The insects emerged in August.

x. Galls of *Aphilothrix albopunctata* Schla., already described in this Magazine.

y. Galls of *Aphilothrix collaris* Hart. were found by me in June, 1882, at Parkhill, north from Aberdeen, and also at Banchory Ternan on Deeside. They belong to the group of bud-galls, and are very inconspicuous, as they remain hidden among the scales. The gall is spindle-shaped or ovate, 4 by 2 mm., and ends in a conical point. Its surface is brown, and its wall is thin and dry. All those found were empty. This gall is said by Adler to be the work of the spring brood of *Andricus curvator* Hart., which is very common in Britain, and has already been described ("Sc. Nat.," I., 193, c).

z. Galls of *Aphilothrix autumnalis* Hart. have been already recorded by Mr. Cameron from near Glasgow. I found one or two specimens beside the Dee near Aberdeen in October, 1882. The gall is ovate, 3.5 by 2.5 mm., and ends in a minute wart. The surface is brown and smooth, with faintly marked longitudinal ridges. The outer layers of the wall in the fresh state are slightly fleshy, and adhere closely to the hard inner shell. The gall is very inconspicuous among the scales. In the end of autumn it falls to the ground. Adler believes it to be the work of the "alternate generation" of the insect that makes the "*Silk Cotton gall of the Oak*"—viz., of *Andricus ramuli* L., already described in these notes ("Sc. Nat.," II., p. 128, o).

#### FAGUS SYLVATICA L. :—

Descriptions of galls on this tree will be found in earlier volumes of this Magazine (I., p. 235, and VI., p. 256-57), the makers being gall-midges. This autumn, in September, I found in Shambellie woods near Dumfries two forms of mite-galls, neither of which had been previously found by me in Scotland, though one of them (*Erineum fagineum*) was recorded in Greville's "*Scot. Crypt. Flora*" (t. 250, f. 1) from the Southern counties, and is said by him to be of frequent occurrence.

c. *Erineum fagineum* Pers. (*E. lacteum* Fries) consists of patches of short velvety hairs crowded together here and there on the lower surface of the leaf, at first pale dirty white or gray, afterwards passing into some shade of brown, or less frequently of red or purple. The spots are seldom large, and are usually slightly sunk

in hollows of the leaf, occupying the central spaces between the nerves. There is seldom any mark of their presence, except an occasional slight discolouration on the upper surface of the leaf. Several patches may exist on a leaf, but they show no tendency to fuse together, and are usually a little distance apart. The hairs are short, pyriform or obovate, and shortly stalked, with thin membranous cell wall, marked with longitudinal folds. This gall has been recorded from numerous localities on the Continent of Europe.

*d. Legnon circumscriptum Bremi*; the galls of this mite consist of the involute and slightly thickened margins of the leaves, sometimes extending almost entirely around the leaf, but usually only in parts of from 5 to 50 mm. in length. The affected portions form tubes not exceeding 1 mm. in diameter, and generally on cross section show about  $1\frac{1}{2}$  turns. The interior of the tube contains some hairs, the usual marginal hairs of the leaf, among which live the mites, as usual belonging to the genus *Phytoptus*. The tissue of the gall is slightly more fleshy than that of the healthy leaf, but the colour is little changed, though becoming brown and dry rather earlier than the rest of the leaf. These galls were abundant on the same trees, and often on the same leaves as the *Erineum*; probably they are not rare in Scotland in certain localities, though so inconspicuous as to be readily overlooked.

#### AGROSTIS ALBA L. :--

*a.* Galls of *Tylenchus*? on the leaves ("Sc. Nat.," VI., 17).

*b.* Pseudogalls of *Brachycolus Stellariæ Hardy* on the young leaf-shoots, quite similar to, but less conspicuous than those on

#### HOLCUS MOLLIS L.

In both these grasses in autumn one very frequently finds shoots remaining short, stunted, and clubbed, the leaves being crowded and showing a tendency to become fleshy at the base. Between the bases of the leaves are numbers of wingless long-bodied Aphides, of the species mentioned above (see Buckton's "*British Aphides*," Vol. II., 147-8, pl. LXXXV., f. 1-3). The galls on *Holcus* are extremely common in many places; on *Agrostis* they are less frequent. In spring one meets with similar pseudogalls, formed by the same insects, on *Stellaria Holostea* and on *Cerastium*, as already noted under these plants.

#### FESTUCA OVINA L.

In August, 1882, and again in July, 1883, I found in various



localities in Braemar, and on the Links near Aberdeen, stem-galls on this grass. They are not readily observed, as the plants affected show hardly a trace of injury in the parts exposed to view. I have never found more than one gall on a stem; and it is situated always near the base of one of the lower internodes of the flowering culm. The whole circumference is affected, but growth is more rapid on one side, so that the culm becomes bent and the gall bursts through the lower part of the leaf-sheath. Its surface is smooth or nearly so, its colour dull brownish yellow. In size the galls do not seem to exceed 8 by 3 mm. They taper at each end into the culm, but more gradually upwards. On section the wall is found to be thin but compact, and the central space is rather large. Each gall contains one (?) hymenopterous larva, about 4 mm. long and 1 mm. thick, of a honey-yellow colour.

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### THE STUDENT'S FLORA OF THE BRITISH ISLANDS.\*

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ALL British botanists know, we suppose, and appreciate the Student's Flora in its first and second editions. No apology is therefore necessary if we notice at some length this, the third edition, in view of the considerable alterations and improvements that have been made. The former editions, though full, as our readers are doubtless aware, of much interesting information in addition to the descriptions of the plants, yet bore marks here and there of a rather too hasty compilation—not perhaps to be wondered at considering the mass of facts recorded and the busy life of the author. In this edition not only have most of the errors (such as they were) been corrected, but much new information has been added. For example, “under the description of the flowers of various Genera, characters concerned in the process of fertilization” have been introduced. Of these the author remarks: “Our knowledge of these subjects is incomplete and rudimentary. Any student may add to it; but great caution is required, for I suspect that individual species are subject to considerable variation in these respects.” These words are well worth keeping in mind. Students of field botany are too apt to be content with making out the name of a plant—if even they go the length of trying to identify the species for themselves—and to utterly ignore the many interesting phenomena that congregate round each species.

We shall now briefly glance at the work in its relation to some Scottish plants.

*Thalictrum majus* Sm. (not Jacq.) is given as a sub-species of *T. minus* L. Whether it be a sub-species or (as we are inclined to think) a variety only, the distinctive characters given are not satisfactory. *T. minus* is said to be “often glaucous or glandular; stem 6-18 in., usually naked at the base.” *T. majus* differs by “stem 2-4 ft., more leafy below, leaflets usually much larger.” Other authors give additional characters, but in our experience these are subject to so much variation that they cannot be depended on, and the description in the Student's Flora embraces really all the difference between the two forms. It is to be noted that Nyman (*Conspectus Floræ Europææ*) refers the British plant to *T. Jacquinianum* Koch, possibly a good species.

In the Batrachian group of *Ranunculus* eight species are admitted. Of these *R. circinatus* is said to be the most distinct, and “very uniform in size, habit,

\* By Sir J. D. Hooker. Third Edition. London: Macmillan & Co. 1884.

and character." As a rule, this is no doubt true, but authentically named Perthshire specimens show a considerable amount of variation.

Under *Caltha radicans*, the statement that it is said to have been found by Th. Fries in *E. Finland* should have been in *E. Finmark*. The attention of botanists to the species or forms of *Nuphar* that occur in Britain is much required. In the Flora *N. intermedium* Ledeb. is given as a variety of *N. luteum* from Northumberland and E. Perth; while *N. pumilum* ranks as a species, and has a wider distribution. An examination of living specimens of the plant that usually passes under the name of *N. pumilum* has recently shown us that there is something eminently unsatisfactory in the descriptions in all the text-books. Our plant combines the characters of *N. intermedium* and *N. pumilum*, but which name (if either) it should bear we are not yet prepared to say. Herbarium specimens of this genus are often in a bad condition for examination, and notes should be taken of the characters of living examples. According to Caspary, *N. intermedium* is a hybrid between *N. luteum* and *N. pumilum*.

*Nasturtium palustre* is said to range from the Clyde southwards. It is, however, native, and not very rare in Mid and East Perth. *Barbarea vulgaris* var. *arcuata* is reported only from Ireland. It occurs, however, in Perthshire, and is there as much (or as little) a true native as *B. vulgaris* proper.

Under *Viola sylvatica*, *V. Reichenbachiana* is raised to the rank of a sub-species, and the same rank is accorded to *Stellaria umbrosa* under *S. media*. The unsatisfactory plant that in Britain went by the name of *Cerastium latifolium* is reduced to varieties of *C. alpinum*, that species now including *C. alpinum* proper, with var. *Smithii* (*C. latifolium* Sm. not L.) and var. *Edmonstonei* Wats. (*nigrescens* Syme). Syme's var. *compactum* is not mentioned.

*Stellaria glauca* With. and *Silene inflata* Sm. take the names of *St. palustris* Ehrh. and *Sil. Cucubalus* Wibel respectively, and will serve to illustrate the many necessary changes (in accordance with the law of priority) that have been made in the nomenclature. But it may be remarked that the earlier name *Ranunculus Sardous* Cr. for *R. hirsutus* Curt. is rejected as "being too inappropriate," while the seemingly as inappropriate name of *Arenaria hirta* Wormsk. is adopted instead of *A. rubella* Hook. It seems to us that when a name is the earliest and belongs to the species without any dubiety, it must be adopted whether it seems inappropriate or not.\* *Arenaria norvegica* is made a sub-species of *A. ciliata*, and is said to occur in Orkney, as well as Shetland. If we are not mistaken, the Orkney habitat requires verification. *Sagina saxatilis* and *S. nivalis*, it may be noticed, are clumped together under *S. Linnæi* Presl., *S. nivalis* being given as a sub-species, and *S. saxatilis* taking the name of *S. Linnæi*.

The two forms of *Montia* are still retained as varieties. They certainly seem worthy of the rank of sub-species, though perhaps not that of species, to which they are raised in some Continental floras.

As an example of alterations in the arrangement, it may here be noticed that the order *Paronychieæ*, which in the second edition followed *Portulacææ*, has been removed to beyond the order *Labiataæ*, and the name changed to *Illecebraceæ*.

Under *Spiræa Ulmaria*, it may be mentioned that British botanists (or at least British Floras) do not seem to recognise that there is more than one form. The common form has the leaves white and downy below, but another form occurs with the leaves glabrous or nearly so below. The latter is either glaucous below (var. *glauca* Fr.) or green (var. *viridis* Fr.), or the two combined are perhaps *S. denudata* Hayn. The stem leaves should be examined. This form is rare in Perthshire. *Spiræa salicifolia* L. might well be dropped out of our Floras, as it apparently never occurs but where planted.

In *Potentilla*, *P. norvegica* is a species that is naturalised in several places in England, and is reported to be "apparently rapidly spreading." A look out

\* Since this article was written, I have seen an article in the "Journal of Botany" for September, in which the Editor (Mr. Britten) takes the same view about the necessity of adopting the oldest names. This paper may be consulted with great profit by botanists who take an interest in the correct nomenclature of British plants.—F. B. W.



should be kept for it in Scotland. *Apropòs* of naturalised plants, it is surely time that *Lupinus perennis* should find a place in our Floras, as it deserves it quite as well as the above-mentioned *Potentilla norvegica* and some others. The Lupin is thoroughly established in Perthshire, Kincardineshire, Aberdeenshire, and Inverness-shire, and perhaps in other counties. *Alchemilla conjuncta* Bab. is considered to be merely "a sport" of *A. alpina*, but it seems to merit at least varietal rank.

*Saxifraga cæspitosa*, which in the second edition was kept distinct from *S. hypnoides*, is now ranked as a variety of the latter as the result of repeated study of the various forms, the passage from one to the other being "undefinable." *S. cernua*, by the way, is said to rarely produce flowers in Britain, but, of late years at least, we think it has annually been found in flower on Ben Lawers, where, notwithstanding the raids of botanists, it seems to be gaining rather than losing ground.

One of the distinctions between *Myriophyllum alterniflorum* and *M. spicatum* is said to be that the former inhabits lakes in hilly and upland districts. From central Scotland northwards *M. spicatum* is very much more local and rare than *M. alterniflorum*, which, so far as our experience goes, is common both in rivers and lakes, *M. spicatum* being confined to lakes and ponds.

*Epilobium anagallidifolium* is very properly no longer recognised as even a variety, though mentioned as a form of *E. alpinum*. Doubts as to the specific distinctness of *Circea alpina* from *C. lutetiana* are no longer expressed. Considering their close relationship and the intermediate forms (scarcely hybrids as sometimes suggested) that occur, surely *C. alpina* ought not to be considered to be more than a sub-species?

*Astrantia major* is admitted only as a naturalised species at Ludlow and Malvern; we have seen it in the same condition in several places on the banks of the Tay. *Pimpinella major* is given (without doubt expressed as to its nativity) as occurring from Perth southwards. In Perthshire we think it is certainly an introduced plant.

Regarding *Galium boreale*, it is certainly much commoner and more luxuriant on the banks of streams than on "moist rocks in mountain districts," and when on mountain rocks it is usually on the driest.

Under *Valeriana officinalis* the usual two forms are mentioned, but the var. *V. sambucifolia* is said to be "very local," whereas in Topographical Botany it is reported to be the commoner. From Mid-Scotland northwards it is the only form that has occurred to us. It is not certain that it is not specifically distinct from the other, or *V. officinalis* proper.

*Scabiosa Columbaria* is given as occurring from Perth southwards. It is native in Forfarshire, but we do not know that it is to be found in Perthshire. The arrangement of the Compositæ, it may be mentioned, has been considerably altered, and some plants formerly considered as varieties are now treated as sub-species. One of these is *Gnaphalium norvegicum*. This is said to ascend to 1,600 feet, but we have seen it at upwards of 3,000. Many of our Scottish plants ascend to higher altitudes than those mentioned in the work before us, but in many cases the observations recently made on the subject have not yet been published.

In the thistles it is to be noted that *Cnicus* is restored to generic rank, while *Mulgedium* is considered as not distinct from *Lactuca*. By a slip of the pen, the petioles of *Arctium Lappa* (*A. majus*) are said to be hollow instead of solid.

*Arctostaphylos alpina* is given as occurring from Perth and Forfar shires northwards, but it seems to be a very doubtful inhabitant of these counties. *Monotropa Hypopitys* now takes the name of *Hypopithys multiflora*. Doubt is cast upon *Lysimachia Nummularia* being a native of Britain at all, as it is said not to seed. Under *Erythræa Centaurium* five sub-species, instead of three as formerly, are admitted. A var. *præcox* (*G. uliginosa* Willd.) of *Gentiana Amarella* is mentioned, but how it is to be distinguished from *G. campestris* by the characters given we are unable to perceive. Nyman admits it as a sub-species, and gives Scotland as one of the countries in which it occurs.

Under the var. *trigranulatus* of *Kumex crispus*, we are rather inclined to think that the locality "Annan" is a misprint for "Arran."

*Populus alba* is stated to be cultivated as far north as Forfar, but "does not flower in Scotland?" Scottish botanists should make observations on this point, and prove or disprove it.

In the *Orchidaceæ* several changes in the arrangement and nomenclature have been made. For example, *Gymnadenia* and *Neotinea* (or rather *Tinea*) become sections of *Habenaria*, which also includes *Leucorchis* (*H. albida*), *Cæloglossum* (*H. viridis*), and *Platanthera* (*H. bifolia* and *H. chlorantha*).

In *Juncus*, *J. tenuis* (from Hereford) is added; while under *J. supinus* some changes have been made, the var. *Kochii* Bab. having been omitted without any explanation. What seems to be it we have found in several localities in Scotland.

*Luzula* also has undergone some changes in the nomenclature; for example, *L. maxima* instead of *L. sylvatica*; *L. vernalis* instead of *L. pilosa*; while Swartz is given as the author of *L. arcuata* instead of Hooker. We notice also that *L. erecta* replaces *L. multiflora*, but the plant is still left as a var. of *L. campestris*, contrary to the opinion of many other writers.

*Alisma natans* is removed to the genus *Elisma*, and *Triglochin* and *Scheuchzeria* to the order *Naiadaceæ*. The genus *Potamogeton* has been revised by Mr. Arthur Bennett, and several additions and changes made in it. Thus *P. polygonifolius*, *P. plantagineus*, and *P. lonchites* have been raised to the rank of species, while *P. Kirkii* is considered to be probably a form of *P. polygonifolius*. *P. Zizii* is described as a sub-species (of *P. lucens*), and *P. decipiens* is raised to the rank of sub-species (of *lucens*). *P. Griffithii*, A. Bennett, is a new species allied to *P. prælongus*, and the true *P. salicifolius* Wolfg. is admitted as a British species. *P. compressus*, being a doubtful name, is suppressed in favour of *P. zosterifolius*, both which and *P. acutifolius* Link. are considered to be full species. Under *P. pusillus* three sub-species are admitted—*P. pusillus* proper, *P. Friesii* Rupr., and *P. Sturrockii* A. Benn. The latter is said to occur in Forfar and Perth, but we think that it has been found in Perthshire only. Finally, *P. filiformis* Nolte is accorded full specific rank. In *Naias* the recently discovered (in Britain) *N. marina* is described, but *N. graminea* Delile is not even mentioned.

In the arrangement of *Cyperaceæ* some important alterations have been made. *Heleocharis* (formerly *Eleocharis*) is restricted to three species, and *H. uniglumis* is considered to be a sub-species. *Scirpus* includes, in addition to the species formerly contained in it, those which in the last edition were placed in *Eleocharis* (in part), *Isolepis*, and *Blysmus*.

In *Carex* it may be noted that the author and Mr. Baker "do not doubt" that *C. fulva* Good. is the plant figured by Goodenough, and that the name *fulva* must be retained in preference to *Hornschuchiana*, which is adopted by some other authors. *C. Grahami* is considered to be a sub-species, instead of as formerly a variety, of *vesicaria*.

Amongst the grasses also many alterations will be found. Thus *Alopecurus fulvus* and *bulbosus* are reduced to sub-species of *geniculatus*; several sub-genera have been accorded full generic rank; and to *Festuca* two species have been added—*F. rigida* and *F. loliacea*, which were formerly in *Glyceria*. The name *Agropyrum* replaces the familiar *Triticum*.

Amongst the ferns we find *Woodsia ilvensis* reduced to the rank of a sub-species. *Equisetum pratense* is said to grow in marshes (as is also *E. hyemale*). This statement requires correction, as though *E. pratense* usually grows near streams, it is always, so far as we have seen, in well-drained and, on the whole, rather dry places. With *E. hyemale* our experience is not so extensive, but we have not seen it in marshes. *Lycopodium alpinum* is reduced to the rank of a sub-species of *L. complanatum*, which is admitted as a British species, and which should be looked for in Scotland.

Before concluding this necessarily too brief a notice of a work so full of interest to the botanist, we must allude to the use of the word "Isla" instead of "Islay" as the name of the island on the West of Scotland where so many plants seem to find their northern boundary. Doubtless the author



has some good reason for his preference for "Isla," but, besides being unfamiliar to Scottish eyes, there is some little risk of confusion with the river Isla on the eastern side of Scotland.

F. BUCHANAN WHITE.

*Æcidium Jacobææ* Grey.—By a series of experimental cultures made during 1883-4, I find that this *Æcidium* is not, as has been hitherto supposed, a condition either of *Puccinia glomerata* nor of *P. compositarum*, but that it is a true heteroecismal uredine. The teleutospores and uredospores occur upon *Carex arenaria*, and are perfectly distinct from those of *Puccinia caricis*. The teleutospores in question occur in much larger sori, which project considerably above the surface of the affected leaves. The *Puccinia* in many points answers to the description of *P. dioicæ* Magnus, but at present their identity is not established.

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Capture of Insects in the Hebrides and in St. Kilda. By C. W. DALE, Esq.

[Extracted from the Entomologist's Monthly Magazine, Vol. XX.]

LAST June I spent a few days in the Island of North Uist, one of the Hebrides, and met with the following species:—

**Lepidoptera:** *Sericoris littoralis*, *Bactra lanceolana*, *Grapholitha campoliana*, *Argyrolepis Baumanniana*, *Dicrorampha simpliciana*, *Eupœcilia angustana*, *Simaëthis Fabriciana*, *Plutella cruciferarum*, *Gelechia tenobrosella*, *Tinea rusticella*, *Miana fasciuncula*.

**Neuroptera and Orthoptera:** *Asynarchus cœnosus*, *Limnophilus extricatus*, *L. affinis*, *Lestes sponsa*, *Forficula auricularia*.

**Hymenoptera:** *Bombus Smithianus*, *B. fragrans*, *B. terrestris*, and *B. pratorum*, *Odynerus trimarginatus*.

**Diptera:** *Eristalis sepulchralis*, *Thereva plebeia*, *Dolichopus atratus*, *D. nubilus*, *D. punctum*, *Melanostoma mellina*, *Platycheirus manicatus*.

**Coleoptera:** *Helobia brevicollis*, *Calathus fuscus*, *C. mollis*, *C. melanocephalus*, *Amara familiaris*, *Creophilus maxillosus*, var. *ciliaris*, *Philonthus splendens*, *Meligethes œneus*, *Elater tessellatus*, *Hylastes piniperda*.

At St. Kilda I found—*Crambus culmellus*, *Bactra lanceolana*, *Glyphipteryx thrasonella*, *Tinodes aureola*, *Polycentropus irroratus*, *Limnophilus auricula*, *Dolichopus atratus*, *D. nubilus*, *Helobia brevicollis*, and *Abax striola*. (P. 213, February.)

"Additions to the Entomology of the Isle of Harris" includes the following species taken on July 29th, 1882,—*Satyrus Janira*, the males of which have darker undersides than usual, while a female was taken with the fulvous band continued across the hind-wings; *Lycœna Alexis*, *Noctua xanthographa*, *Boarmia repandata*, *Melanippe fluctuata* dark, *Hypsipetes elutata* small and dark, as are also most of the following, *Larentia cœsiata*, *L. pectinitaria*, *Emmelesia albulata*, *E. blandiata*, *Camptogramma bilineata*, *Melanthia ocellata*, *Anaitis plagiata*, *Scopula fuscalis*, *Eudorea atomalis*, *Plutella annulatella*, *Hematopota pluvialis*, *Tetanocera umbrarum*, *Halictus villosulus*, *Creophilus maxillosus* var. *ciliaris*, *Sisyra fuscata*, *Psychomyia phœopa*, *Cyrnus trimaculatus*, *Hydroptila sparsa*, *Beroea pullata*, *Wormaldia occipitalis*, *Leptocerus bifasicatus*, *L. extricatus*, and *L. luridus*. (P. 256, April.)

**Captures in the Isle of Skye.** After leaving Harris I spent three days at Dunvegan, Sligachan Inn, and Portree, and took—*Pieris Rapæ*, *Argynnis Aglaia*, *Chortobius Pamphilus*, *Cidaria russata*, *Metrocampa margaritata*, *Eupithecia lariciata*, *Boarmia repandata* large and fine, *Larentia cœsiata*, *Abraxis grossulariata*, *Tortrix viburnana*, *Mixodia Schulziana*, *Aphelia pratana*, *Sericoris lacunana*, *Pardia tripunctana*, *Eupœcilia angustana*, *Crambus ericellus*, *C. culmellus*, *Lepidocera bisontella*, *Pleurota bicostella*, *Pterophorus tephradactylus*, *Phryganea obsoleta*, *Heemerobius humuli*, and *Vespa arborea*. (P. 257, April.)



# INSECTA SCOTICA.

## THE TRICHOPTERA OF SCOTLAND.

By JAMES J. KING AND KENNETH J. MORTON.

### ANABOLIA Steph.

**NERVOSA** (Leach), Curt. Very common. Running waters and occasionally ponds.

DISTRIBUTION—EAST. o Forth Tay o Moray o o o  
WEST. o Clyde o o o

An autumnal species appearing in September and October.

### ASYNARCHUS M'Lach.

**CÆNOSUS** Curt. Common. Moor-pools.

DISTRIBUTION—EAST. o Forth Tay o o o o o  
WEST. o Clyde o o Hebrides.

Found on high-lying moors, and usually abundant.

### STENOPHYLAX Kol.

**INFUMATUS** M'Lach. Locally common. Streams.

DISTRIBUTION—EAST. o o Tay o o o o o  
WEST. o Clyde Argyle o o

**ROTUNDIPENNIS** Braver. Not common. Streams.

DISTRIBUTION—EAST. o o o o o o o o  
WEST. o Clyde o o o

**STELLATUS** Curt. Common. Streams.

DISTRIBUTION—EAST. o o Tay Dee Moray Suther-  
land o o  
WEST. o Clyde o o o

**LATIPENNIS** Curt. Not common. Streams.

DISTRIBUTION—EAST. o o o Dee o o o Zetland.  
WEST. o Clyde o o o

**CONCENTRICUS** Zett. Rare. Streams.

DISTRIBUTION—EAST. o o o o o o o Zetland.  
WEST. o Clyde o o o

**VIBEX** Curt. Rare. Streams.

DISTRIBUTION—EAST. o o o Dee o o o o  
WEST. o Clyde o o o

### MESOPHYLAX M'Lach.

**IMPUNCTATUS** M'Lach.

DISTRIBUTION—EAST. o o o o o o o o  
WEST. Solway o o o o

One example taken in Dumfries-shire by Mr. Service.



## MICROPTERNA Stein.

SEQUAX M'Lach. Frequent. Streams.

DISTRIBUTION—EAST. o Forth Tay o Moray Suther-  
land o o

WEST. Solway Clyde o o o

ATERALIS Steph. Common. Streams.

DISTRIBUTION—EAST. o o Tay o o o o o

WEST. o Clyde Argyle o o

## HALESUS Steph.

RADIATUS Curt. Very common. Streams.

DISTRIBUTION—EAST. o Forth Tay o Moray Suther-  
land o o

WEST. o Clyde o o o

All the species of Halesus are autumnal.

DIGITATUS Schrank. Frequent. Streams.

DISTRIBUTION—EAST. o o o o o o o o o

WEST. o Clyde o o

AURICOLLIS Pict. Common. Streams.

DISTRIBUTION—EAST. o Forth Tay Dee Moray o o o

WEST. o Clyde o o o

## DRUSUS Steph.

ANNULATUS Steph. Common. Streams.

DISTRIBUTION—EAST. o Forth Tay Dee Moray o o o

WEST. o Clyde o o o

## ECCLISOPTERYX Kol.

GUTTULATA Pict. Common. Streams.

DISTRIBUTION—EAST. o o Tay Dee o Sutherland o o

WEST. o Clyde Argyle o o

## CHÆTOPTERYX Steph.

VILLOSA F. Common. Streams.

DISTRIBUTION—EAST. o Forth o Dee o o o o o

WEST. o Clyde o o o

## APATANIA Kol.

WALLENGRENI M'Lach.

DISTRIBUTION—EAST. o o Tay o o o o o o

WEST. o Clyde o o o

## SERICOSTOMATIDÆ.

## SERICOSTOMA Latr.

PERSONATUM Spence. Common. Streams.

DISTRIBUTION—EAST. Tweed o Tay Dee Moray Suther-  
land o o

WEST. o Clyde o o o

## GOËRA Leach.

PILOSA F. Common. Slowly-running streams.

DISTRIBUTION—East. o o Tay o o o o o  
 WEST. o Clyde o o o

SILO Curt.

PALLIPES F. Very common. Streams.

DISTRIBUTION—EAST. o Forth Tay Dee Moray Suther-  
 land o o  
 WEST. Solway Clyde Argyle o o

BRACHYCENTRUS Curt.

SUBNUBILUS Curt. Common. Rivers.

DISTRIBUTION—EAST. o o Tay o o o o o  
 WEST. o Clyde Argyle o o

CRUNÆCIA M'Lach.

IRRORATA Curt. Not uncommon. Rock springs.

DISTRIBUTION—EAST. o Forth Tay o Moray Suther-  
 land o o  
 WEST. o Clyde o o o

LEPIDOSTOMA Ramb.

HIRTUM F. Common. Streams.

DISTRIBUTION—EAST. Tweed o Tay Dee Moray Suther-  
 land o o  
 WEST. o Clyde o o o

LASIOCEPHALA Costa.

BASALIS Kol. Not common. Streams.

DISTRIBUTION—EAST. o o Tay o Moray o o o  
 WEST. o o o o o

ÆQUIPALPIA.

LEPTOCERIDÆ.

BERÆA Steph.

PULLATA Curt. Common. Shallow streams filled with water  
 plants.

DISTRIBUTION—EAST. o o Tay Dee o Sutherland o  
 WEST. o Clyde o o o

MAURUS Curt. Common. Springs.

DISTRIBUTION—EAST. o Forth Tay Dee Moray Suther-  
 land o o  
 WEST. o Clyde o o o

BERÆODES Eaton.

MINUTA L. Locally common. Small streams.

DISTRIBUTION—EAST. o o o o o o o o o  
 WEST. o Clyde o o o

MOLANNA Curt.

ANGUSTATA Curt.

DISTRIBUTION—EAST. o Forth o o o o o o o  
 WEST. o o o o o



**PALPATA** M'Lach.

DISTRIBUTION—EAST. o Forth Tay o Moray Sutherland o o  
 WEST. o o o o Hebrides.

**ODONTOCERUM** Leach.

**ALBICORNE** Scop. Common. Streams.

DISTRIBUTION—EAST. o Forth Tay Dee Moray Sutherland o o  
 WEST. Solway Clyde o o o

**LEPTOCERUS** Leach.

**NIGRO-NERVOSUS** Retz. Frequent. Rivers.

DISTRIBUTION—EAST. o o o o o Sutherland o o  
 WEST. o o Argyle o o

**FULVUS** Ramb. Not common. Ponds, lakes, and rivers.

DISTRIBUTION—EAST. o o Dee Moray Sutherland o o  
 WEST. o Clyde o o o

**SENILIS** Burm. Not common. Rivers.

DISTRIBUTION—EAST. o o o o o o o o  
 WEST. o Clyde o o o

**ALBO-GUTTATUS** Hag. Frequent. Rivers.

DISTRIBUTION—EAST. o o o o Moray Sutherland o  
 WEST. o o o o o

**ANNULICORNIS** Steph. Frequent. Rivers.

DISTRIBUTION—EAST. o Forth Tay o o o o o  
 WEST. o Clyde o o o

**ATERRIMUS** Steph. Very common. Ponds and lakes.

DISTRIBUTION—EAST. o Forth Tay Dee Moray Sutherland o o  
 WEST. o Clyde Argyle o o

**CINEREUS** Curt. Very common. Ponds, lakes, and rivers.

DISTRIBUTION—EAST. o Forth Tay Dee Moray Sutherland o Zetland.  
 WEST. o Clyde Argyle o o

**ALBIFRONS** L. Common. Rivers.

DISTRIBUTION—EAST. o o Tay Dee Moray o o o  
 WEST. o Clyde o o o

**COMMUTATUS** (Rostock), M'Lach. Common. Rivers.

DISTRIBUTION—EAST. o o Tay o Moray Sutherland o o  
 WEST. Solway Clyde Argyle o o

**BILINEATUS** L. Common. Streams.

DISTRIBUTION—EAST. o Forth o o Moray Sutherland o o  
 WEST. o Clyde Argyle o o

**DISSIMILIS** Steph. Common. Rivers.

DISTRIBUTION—EAST. o o Tay o Moray Sutherland o o  
 WEST. o Clyde o o o













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