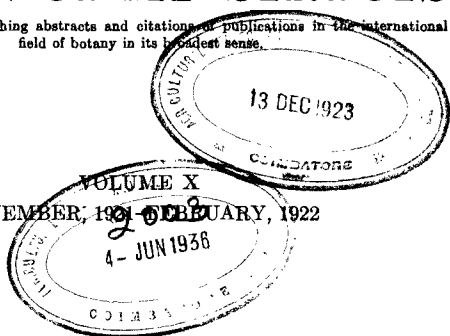


# BOTANICAL ABSTRACTS

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- Entry 351. *For Clayley read Cayley*  
 Entry 672. *For Jeffrey read Jefferey*  
 Entry 676. *For Jeffrey read Jefferey*  
 Authors' Index. *For Clayley read Cayley*  
 Author's Index. *For Jeffrey, H. J. read Jefferey, H. J.*

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The list here printed is an enumeration of the serial publications abstracted for all sections of **BOTANICAL ABSTRACTS**. (By a serial publication is here understood any publication which appears successively under the same title even though at long or irregular intervals.) The list is complete to January 1, 1922.

It is proposed to print the list once a year, and it is intended to serve the following specific purposes:

1. To inform the reader as to the precise extent to which **BOTANICAL ABSTRACTS** is covering serial literature which is likely to contain material falling within the scope of **BOTANICAL ABSTRACTS**. With it, the reader will be under no misapprehension concerning the completeness or incompleteness of the Journal.

2. To enable readers to bring to the attention of the Journal additional serials which should be abstracted. The serials being grouped by countries or geographical areas permits of easy detection of omissions.

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In this period of readjustment many publications are either being discontinued or issued under new titles. Changes of this kind applying to serials in the list should also be communicated to the Bibliography Committee.

In the case of each serial, the portion of the title printed in bold face letters is the officially adopted abbreviation used in citing the publication.

All communications should be addressed to **BOTANICAL ABSTRACTS**, National Research Council, 1701 Massachusetts Avenue, Washington, D. C.

### AFRICA

#### ALGERIA

Bulletin Agricole de l'Algérie et de la Tunisie  
Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord  
Revue Horticole de l'Algérie

#### BELGIAN CONGO

Annales du Musée du Congo Belge  
Bulletin Agricole de Congo Belge  
Congo

#### BRITISH EAST AFRICA PROTECTORATE

British East Africa Department of Agriculture Annual Report

#### EGYPT

Almanach de la Société Seltanienne  
Annuaire de l'Université Egyptienne  
Bulletin of the Alexandria (Egypt) Horticultural Society  
Bulletin de l'Institut d'Égypte  
Bulletin de l'Union des Agriculteurs d'Égypte  
Caire Scientific Journal  
Department of Agriculture, Egypt, Horticultural Section  
Leaflet  
Mémoires présentées à l'Institut d'Égypte

#### NYASALAND PROTECTORATE

Nyasaland Protectorate, Annual Report of the Department of Agriculture

#### RHODESIA

Rhodesia Agricultural Journal

#### TUNIS

Revue Tunisienne

#### UGANDA PROTECTORATE

Annual Report of the Department of Agriculture Uganda Protectorate

#### UNION OF SOUTH AFRICA

Annals of the Bolus Herbarium  
Annals of the Natal Museum  
Annual Progress Report, Forest Department, Union of South Africa  
Annals of the South African Museum  
Annals of the Transvaal Museum  
Botanical Survey of South Africa Memoirs  
Bothalia  
Flowering Plants of South Africa  
Journal of the Botanical Society of South Africa  
Journal of the Department of Agriculture, Union of South Africa  
Official Year Book of the Union of South Africa

Records of the Albany Museum (Grahamstown, South Africa)  
 Report of the South African Museum  
 South African Fruit Grower and Smallholder  
 South African Gardening and Country Life  
 South African Journal of Industries  
 South African Journal of Natural History  
 South African Journal of Science  
 South African Sugar Journal  
 Transactions of the Royal Society of South Africa  
 Union of South Africa, Department of Agriculture Science Bulletin

## ZANZIBAR PROTECTORATE

Zanzibar Protectorate Annual Report of the Department of Agriculture

## ASIA

## CHINA

Annual Report of the Botanical and Forestry Department of Hongkong  
 Hsu-Shang-Sha-Chang-Lien-Ho-Hui-Ki-Kan (China Cotton Journal)  
 Journal of the North China Branch of the Royal Asiatic Society  
 Ko-Hsueh [Science—a Publication of the Chinese Science Society]

## CYPRUS

Cyprus Agricultural Journal

## FEDERATED MALAY STATES

Agricultural Bulletin of the Federated Malay States  
 Department of Agriculture, Federated Malay States Bulletin  
 Journal of the Federated Malay States Museum

## INDIA AND CEYLON

Administrative Report, Afforestation Division United Provinces  
 Agricultural Journal of India  
 Agricultural Research Institute Pusa Bulletin  
 Annual Report of the Agricultural Station of East Bengal and Assam  
 Annual Report and Proceedings of the Science Convention of the Indian Association for the Cultivation of Science  
 Annual Report of the Board of Scientific Advice for India  
 Annals of the Royal Botanic Garden, Calcutta  
 Annals of the Royal Botanic Garden of Peradeniya  
 Bulletin of the Carmichael Medical College, Belgachia  
 Bulletin, Department of Land Records and Agriculture, United Provinces of Agra and Oudh  
 Bulletin of the Madras Fisheries Bureau  
 Bulletin of the Madras Museum  
 Ceylon Administrative Reports Part IV.—Education, Science, and Art, Marine Biology  
 Department of Agriculture, Bombay, Bulletin  
 Department of Agriculture, Bombay, Leaflet  
 Department of Agriculture, Ceylon, Bulletin  
 Forest Leaflets [India]  
 Forest Pamphlet [India]  
 Indian Agriculturist  
 Indian Forester  
 Indian Forest Memoirs  
 Indian Forest Records

Indigo Publications of the Agricultural Research Institute, Pusa.

Journal of the Asiatic Society of Bengal  
 Journal of the Bombay Natural History Society  
 Journal of the Department of Science Calcutta University  
 Journal of Indian Botany  
 Journal of the Madras Agricultural Students Union  
 Memoirs of the Asiatic Society of Bengal  
 Memoirs of the Department of Agriculture of India Bacteriological Series

Memoirs of the Department of Agriculture of India Botanical Series

Memoirs of the Department of Agriculture of India Chemical Series

Mysore Agricultural Calendar

Mysore Department of Agriculture Bulletin Chemical Series

Mysore Department of Agriculture Bulletin General Series  
 Mysore Department of Agriculture Bulletin Mycological Series

Paleontologia Indica

Poona Agricultural College Magazine

Proceedings of the Agri-Horticultural Society of Madras

Proceedings of the Board of Agriculture in India

Proceedings of the Indian Association for the Cultivation of Science

Proceedings of the Planters Association of Ceylon

Quarterly Journal of the Indian Tea Association, Scientific Department

Records of the Botanical Survey, India

Records of the Geological Survey, India

Report of the Colombo Museum

Report of the Department of Agriculture of Madras

Report of the India Agricultural Station, Burma

Report of the Karimnagar Agricultural Experiment Station

Report on the Operations of the Department of Agriculture of Burma

Review of the Agricultural Operations in India

Scientific Reports of the Agricultural Research Institute of Pusa

Spolia Zeylanica

Transactions of the Bose Research Institute of Calcutta

Tropical Agriculturist

## INDO-CHINA

Bulletin Agricole de l'Institut Scientifique de Saigon  
 Bulletin Economique de l'Indochine

## JAPANESE EMPIRE

Annals of the Phytopathological Society of Japan  
 Berichte der Ohara Institute fur Landwirtschaftliche Forschungen

Botanical Magazine of Tokyo

Issues of the Essential Forest Trees of Hokkaido

Journal of the College of Agriculture of Hokkaido Imperial University

Journal of the College of Agriculture, Imperial University of Tokyo

Journal of the College of Science, Imperial University of Tokyo

Memoirs of the College of Science, Kyoto Imperial University

## STRAITS SETTLEMENTS

Gardens' Bulletin Straits Settlements

Journal of the Straits Branch of the Royal Asiatic Society



## AUSTRALIA, NEW ZEALAND AND TASMANIA

Agricultural Gazette of New South Wales  
 Annual Progress Report, Queensland Forest Service  
 Annual Progress Report, Woods and Forests Department,  
 South Australia  
 Annual Progress Report, Woods and Forests Department,  
 Western Australia  
 Australian Forestry Journal  
 Australian Garden and Field  
 Australian Museum Memoirs  
 Australian Museum Records  
 Australian Naturalist  
 Australian Sugar Journal  
 Journal of the Department of Agriculture, South Australia  
 Journal of the Department of Agriculture of Victoria  
 Journal of the Natural History and Science Society of  
 Western Australia  
 Journal and Proceedings of the Royal Society of New  
 South Wales  
 Memoirs of the Queensland Museum  
 New Zealand Journal of Agriculture  
 Northern Territory [Australia] Bulletin  
 Papers and Proceedings of the Royal Society of Tasmania  
 Proceedings of the Linnean Society of New South Wales  
 Proceedings of the Royal Society of Queensland  
 Proceedings of the Royal Society of Victoria  
 Report of the Minister of Agriculture, South Australia  
 Report of the Director, New South Wales Botanical  
 Gardens  
 Science and Industry  
 Semi Annual Progress Report, Woods and Forest Depart-  
 ment, Western Australia  
 Transactions and Proceedings of the New Zealand  
 Institute  
 Transactions and Proceedings of the Royal Society of  
 South Australia  
 Western Australia Woods and Forest Department Bulletin

## EAST INDIES

### BRITISH EAST INDIES

Sarawak Museum Journal

### DUTCH EAST INDIES

Annales du Jardin Botanique de Buitenzorg  
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 Notizblatt des Botanischen Gartens und Museums zu  
 Berlin  
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# BOTANICAL ABSTRACTS

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No. 1

## AGRONOMY

C. V. PIPER, Editor

MARY R. BURR, Assistant Editor

(See also in this issue Entries 75, 80, 93, 100, 148, 195, 198, 230, 240, 248, 286, 303, 315, 316, 380, 381, 382)

1. ANONYMOUS. Dollar wheat. *Agric. Gaz.* New South Wales 32: 434. 1921.—The variety originated in Victoria. Although of promise, it yields less than standard varieties.—*L. R. Waldron.*

2. BLOCK, AUGUST. Praktische Erfahrungen über den Anbau von Schmetterlingsblütlern. [Practical experience in the culture of legumes.] *Mitteil. Deutsch. Landw. Ges.* 36: 278-281. 1921.—The author gives an account of methods of culture for beans, peas, and especially clovers. The need for lime on clover is emphasized, and it is pointed out that a light top dressing of nitrogen in the spring makes it possible to cut the 1st crop much earlier than usual. The great benefits to hord and grain crops following clovers are mentioned, and some estimates are given of increases due to the clover sod.—*A. J. Pieters.*

3. CALVINO, MARIO. El zacate blanco de Honduras. (*Isophorus unisetus* Sch.) [The white hay of Honduras.] *Rev. Agric. Com. y Trab.* [Cuba] 3: 364-366. 3 fig. 1920.—This gramineous plant (*Isophorus unisetus* Sch.) was tried as a forage crop on several kinds of soil in Cuba. For best results the seed was planted in a seed bed and transplanted. Watering was necessary in the light dry soils where the first trials were made. In the first 3 cuttings of the 1st year crops up to 99,703 kgm. per hectare were secured. A chemical analysis is given which indicates that as a forage it is richer than *Panicum berbinode* or *P. maximum*.—*F. M. Blodgett.*

4. CRUZER, G. H. Pure seed distribution and the method employed in Alberta. *Sci. Agric.* [Canada] 1: 82-84. 1921.—The author discusses the Alberta Crop Improvement Association, dealing with objects, membership, cooperative experiments, and seed growing centers.—*B. T. Dickson.*

5. FITZ, L. A. Kanrod: the new Kansas wheat. *Operative Miller* 25: 284-285. 1920.—Varietal comparisons with Karkof and Turkey, 2 standard hard red winter wheats, conducted at the Kansas Agricultural Experiment Station during the 8 years, 1912-1919 inclusive, show that Kanrod outyielded the other varieties by 2.9 and 3.8 bushels respectively. The average

bushel weight and percentage of flour yield also were higher. The protein content of both wheat and flour was higher and the loaf expansion greater.—*Carleton R. Ball.*

6. FRANCK, W. J. Het onderzoek van Cietenzaad aan het Rykproefstation voor Zaaicontrol. [Examination of beet seed in the government agricultural experiment stations for seed-control.] *Cultura* 33: 155-168. 1 pl. 1921.—The author discusses for beet seed sampling of seed, germination of seed, examination of water contents, purity of the variety, and occurrences of disease.—*J. C. Th. Uphof.*

7. GERLACH. Die Ernährung der landwirtschaftlichen Kulturpflanzen im reichen des Phosphorsäuremangels. [Fertilizing agricultural plants in view of phosphoric acid shortage.] *Arbeit. Deutsch. Landw. Ges.* 300. 79-91. 1919.—The author reviews some of the work on fertilizer experiments to bring out the influence of phosphoric acid. He points out that the quantities of phosphoric acid that had commonly been applied were greatly in excess of those removed by crops, and concludes that the greatest part of the mineral soils in the German Empire contained before the war such considerable quantities of active phosphoric acid combinations that, under a regular stable-manure agriculture, the application of phosphoric acid may be reduced or omitted without material decrease in yields.—*A. J. Pieters.*

8. HANSEN. Die Fütterung unter besonderer Berücksichtigung des Eiweissmangels. [Feeding with especial reference to the lack of albuminoids.] *Arbeit. Deutsch. Landw. Ges.* 300. 68-78. 1919.—A general review is presented of sources of proteins for feeding purposes. The author suggests a more extensive culture of legumes and oil-producing seeds. The American and the Swiss systems of making silage are compared; the results of 1 experiment are reported to show that there is a much greater loss of proteids in the American silo than in the Swiss fermentation chamber.—*A. J. Pieters.*

9. HANSEN, R. Symbiotic nitrogen-fixation by leguminous plants with special reference to the bacteria concerned. *Sci. Agric. (Canada)* 1: 59-62. 1921.—The present paper, read before the Western Canadian Society of Agronomy, deals with the work of the author in conjunction with the late T. J. BURRILL in Illinois. It was shown that the root nodules of other than leguminous plants are not caused by the bacteria which are found in the nodules of Leguminosae. Leguminous plants may be grouped according to whether or not they can be cross-inoculated by certain bacteria. This grouping may depend on similarity of cell sap in root tissues, or on the existence of specific enzymes secreted by the bacteria.—*B. T. Dickson.*

10. LEBMANN, E. Die Grundlagen der Fütterungslehre einst und jetzt. [The fundamentals of feeding theories, past and present.] *Arbeit. Deutsch. Landw. Ges.* 300. 48-67. 1919.—The author reviews past and current theories governing the study of the value of feedstuffs.—*A. J. Pieters.*

11. LITTLE, L. G. Field experiments with cereals. Glen Innes experiment farm. *Agric. Gas. New South Wales* 32: 403-406. 1921.—In trials of early and mid-season wheats sown for grain, Clarendon and Early Haynes Bluestem yielded decidedly highest and these varieties resisted rust. Early Haynes Bluestem gave the highest hay yield.—In trials of late-sown wheats, Cleveland yielded 32 bushels followed by Red Fife, 22; Kanred, 20; Huron, 18; Marquis, 17; Haynes Bluestem, 16; Kharkov, 9; and Red Rock, 2. Kanred showed practically no rust while Haynes rusted badly.—In oat-variety trials *Smyrna* stood highest in yield of grain and second in hay yield. Fulghum, Kherson, and Sixty Day gave rather low yields.—*L. R. Waldron.*

12. MAIDEN, J. H. Four newly recorded weeds. *Agric. Gas. New South Wales* 32: 396. 1921.—Brief notes are given on *Calandrinia coulescens Menziesii* (HBK) Gray, *Sisymbrium altissimum* L., *Orthocarpus purpurascens* Benth., and *O. erianthus* Benth.—*L. R. Waldron.*

13. MERKEL. Sortenversuchsbericht. Saatucht-Abteilung. [Report on variety tests. Seed breeding section.] *Mittell. Deutsch. Landw. Ges.* 36: 306-313. 1921.—The author



## AGRONOMY

briefly reviews the work of the section for previous years and reports on the results of variety tests of barley, rye, wheat, oats, and beans for the year 1919-20.—A. J. Pieters.

14. MILLER, M. F., AND R. E. HUDELSON. Thirty years of field experiments with crop rotation, manure and fertilizers. Missouri Agric. Exp. Sta. Bull. 182. 43 p. 1921.—Results of Missouri rotation experiments for 30 years, beginning with 1888, are reported, and all yield data are detailed in an appendix. The rotations included: (1) Corn, oats, wheat, clover, timothy, timothy; (2) corn, oats, wheat, clover; (3) corn, wheat, clover; and (4) wheat, clover. In addition, each of the crops was grown continuously on the same land. All cropping systems were used both with a manure application of 6 tons annually and with no fertilizer treatment. Also, commercial fertilizers were used on many of the plots.—In general, crop rotations gave better yields than were secured from crops grown continuously without rotations, and the 4-year rotation,—corn, oats, wheat, clover,—gave best results. Crop rotation without manure was practically as effective in maintaining the yields of corn and wheat as was heavy manuring without rotation. Manure was more effective than heavy chemical fertilizers in maintaining the yield of corn and grass in rotations, but the reverse was true in the case of wheat and oats. Soil analyses at the end of 25 years indicated that the most important factor in the soil exhaustion was the loss of nitrogen and organic matter. The supply of nitrogen in the continuous culture plots without fertilizer or manure was reduced most rapidly by corn and least rapidly by timothy. The supply of soil nitrogen was much more effectively maintained by heavy applications of barnyard manure than by heavy applications of chemical fertilizers. Continuous cropping to grass reduced the supply of soil nitrogen less than crop rotation.—L. J. Stadler.

15. POPP, M. Silenspressfutter aus Duwockgras. [Sweet silage from Duwockgrass.] Mittell. Deutsch. Landw. Ges. 36: 301-302. 1921.—Duwockgrass, *Equisetum palustre*, is poisonous if fed as new hay but can be ensiled and the ensilage used with safety and profit. The author believes that the poisonous alkaloid, equisetin, which is known to be very unstable at higher temperatures, is destroyed by the heat due to fermentation.—A. J. Pieters.

16. ROOT, A. I. Still another new sweet clover. Gleanings in Bee Culture 49: 302. 1921.—Notes are given on varieties of sweet clover (*Melilotus alba*).—J. H. Lovell.

17. ROOT, A. I. The new annual sweet clover. Gleanings in Bee Culture 49: 374. 1921.—It has been proposed to call the new annual sweet clover "Hubam clover."—J. H. Lovell.

18. RUDKIN, S. Harvest report. Nyngham experiment farm. Agric. Gas. New South Wales 32: 391-392. 1921.—Yields are given of wheat and oats from large fields of the experimental farm.—L. R. Waldron.

19. SAUNDERS, C. E. The effects of premature harvesting on the wheat kernel. Sci. Agric. [Canada] 1: 74-77. 1921.—The author gives an account of part of his work on the early cutting of wheat in 1917. One hundred heads of previously marked Marquis wheat were gathered every 2nd or 3rd day from July 21 to Aug. 15 in 4 groups according to length of straw retained. The average weight of 1,000 kernels from heads with 3-inch straw was practically the same as from that of full length straw with roots, owing to the very rapid drying of the straw. Taking into consideration the daily growth in weight of 1,000 kernels and the mean daily temperatures, it is shown that the period of greatest daily gain occurred from July 25 to Aug. 2, with a normal maximum on July 29. It would appear, therefore, that in ordinary Ontario summers there would be little loss to the wheat crop if cut about a week before the ordinary date and allowed to ripen in the stock.—B. T. Dickson.

20. SHEPHERD, A. N. Farmers' experiment plots. Grain trials, 1920. On and adjacent to Murrumbidgee irrigation areas. Agric. Gas. New South Wales 32: 393-395. 1921.—Trials with wheat were conducted cooperatively with 4 farmers, no irrigation being practiced; the varieties used were not the same for the 4 farms. In fertilizer trials, superphosphates generally caused marked increases in yield.—L. R. Waldron.

21. WACKER. Ölrüchte und Gespinstpflanzen. [Oil and fiber plants.] Arbeit. Deutsch. Landw. Ges. 300. 102-116. 1919.—The author calls attention to the decrease between 1878 and 1913 in the areas devoted to the culture of various oil-producing plants and hemp, and discusses the kinds and varieties that could and should be grown in Germany, together with cultural directions.—A. J. Pieters.

22. WHITTET, J. N. Lucerne seed crop competition at Coolah. Agric. Gaz. New South Wales 32: 419. 1921.—Results are given of a competition for a prize offered for the best ½ acres of lucerne crop carrying seed in the Coolah Valley. The best crops of seed were produced in the localities where water can be obtained at a depth of from 18 to 25 feet.—L. R. Waldron.

## BIBLIOGRAPHY, BIOGRAPHY AND HISTORY

NEIL E. STEVENS, *Editor*

(See also in this issue Entries 45, 126, 235)

23. ANONYMOUS. [Hermann Vöchting.] Leopoldina 54: 60. 1918.—His botanical contributions are briefly reviewed. From 1887 until his death in November, 1917, Dr. Vöchting was professor of botany at Tübingen. His studies on internal growth-factors and polarity, on genetics, on the movements of flowers and fruits, on the influence of light on flower development, on phyllotaxy and on floral anomalies, are indicative of his special fields of investigation.—A. W. Evans.

24. ANONYMOUS. Robert Allen Rolfe. Nature 107: 276-277. 1921.—Rolfe was born at Ruddington, May 12, 1855, and died April 13, 1921. He was an assistant in the herbarium at Kew for over 40 years. He was known as an authority on Orchidaceae, and in 1893 founded the Orchid Review, which he edited and to which he contributed largely.—O. A. Stevens.

25. ARTHUR, J. C. Specialization and fundamentals in botany. Amer. Jour. Bot. 8: 275-285. 1921.—The author asks for mutual good will, confidence and generosity among botanical workers. He decries overspecialization, particularly when it leads to neglect of intimate acquaintance with plants as living objects having distinctive names and varied relationships. He holds that plant names should be used for identification only, and not as qualifying terms, and bespeaks consideration for any attempts to secure exact names, uniformly applied. He advocates the preservation and advancement of the democratic quality in botanical work, with full cooperation between institutions and between individuals, but pleads for individual freedom as against too great encroachment by the machinery of organization. "The consistent, effective onward march of botany calls for careful balance between the attention given to specialization and that given to fundamentals."—E. W. Sinnott.

26. CUMMING, M. The Junius of Nova Scotia. Sci. Agric. [Canada] 1: 55-58. 1921.—An account is presented of a series of letters written by JOHN YOUNG (1773-1837), the first Secretary of Agriculture for Nova Scotia, under the pen-name of "Agricola," which brought about a complete change in the agricultural affairs of the province, replacing depression by prosperity.—E. T. Dickson.

27. MCCALLUM, A. W. Abstracts of Canadian plant pathological literature. Sci. Agric. [Canada] 1: 78-80. 1921.—Abstracts of, and references to, plant disease literature appearing in Canadian publications during 1919 and 1920 are presented.—E. T. Dickson.

28. TURNER, A. G. Pomological progress in New Brunswick. Sci. Agric. [Canada] 1: 175-177. 1921.—An account is given of the work of FRANCIS P. SHARP (born 1825) and his son, FRANKLIN SHARP (died 1882) in the production of new varieties and development of the apple industry of New Brunswick.—E. T. Dickson.

29. ZAVITZ, C. A. History and development of the Ontario Agricultural College. Sci. Agric. [Canada] 1: 101-105. *Illus.* 1921.

## BOTANICAL EDUCATION

C. STUART GAGER, *Editor*ALFRED GUNDERSEN, *Assistant Editor*

30. ANONYMOUS. **Imperial forestry education.** *Nature* 107: 315-316. 1921.—The report of the Interdepartmental Committee on Imperial Forestry Education recommends a 3-year course at a university, followed by 1 or more years at the central institution. It is recommended that the latter be located at Oxford and affiliated with the University.—O. A. Stevens.

31. ANONYMOUS. **Science for all. Outline of the course.** *School Sci. Rev.* 2: 203-212. 1920.—A course of study by subjects on living and non-living things is presented under *Courses on Living Things*.—Ellen Eddy Shaw.

32. ANONYMOUS. [Rev. of: FRITCH, F. E., AND E. J. SALISBURY. **An introduction to the structure and reproduction of plants.** vii + 458 p., 8 pl. G. Bell and Sons: London, 1920.] *Nature* 107: 200. 1921.—“As a reference book for first-year university students, it is the most useful we have seen.”—O. A. Stevens.

33. ANONYMOUS. **Study of plants in the field.** [Rev. of: HORWOOD, A. R. *The outdoor botanist.* 284 p., 20 pl. T. Fisher Unwin: London, 1920.] *Nature* 107: 293-294. 1921.—The chapter on ecology contains foreign material which is fragmentary and incoherent. Frequent misleading and contradictory statements are made. Many of the illustrations are good.—O. A. Stevens.

34. ANONYMOUS. [Rev. of: MARTIN, J. N. *Botany with agricultural applications.* 2nd ed., xii + 605 p. John Wiley and Sons: New York; Chapman and Hall: London, 1920.] *Nature* 107: 168. 1921.

35. HOPPING, ALEITA. **Organization of biology and related sciences in city high schools.** *School Sci. and Math.* 21: 463-472. 1921.

36. JOHNSON, ARTHUR M. **The use of the textbook in beginning classes in botany.** *School Sci. and Math.* 21: 573-577. 1921.

## CYTOLOGY

GILBERT M. SMITH, *Editor*GEO. S. BRYAN, *Assistant Editor*

(See in this issue Entries 81, 101, 107, 123, 124, 135, 306)

## ECOLOGY

HENRY C. COWLES, *Editor*G. D. FULLER, *Assistant Editor*

(See in this issue Entries 60, 128, 178, 179, 249, 323, 326, 374, 377)

## FORESTRY

RAPHAEL ZON, *Editor*

(See also in this issue Entries 30, 150, 215, 329)

37. ANONYMOUS. British Empire timbers. Australian Forest. Jour. 3: 86-87. 1920; 4: 18-19, 56-58, 86-87, 146-148. 1921.—The article gives a very brief statement of forest conditions in Bermuda, British Guiana, Cyprus, Gold Coast Colony, South Africa, Southern Rhodesia, British India, British East Africa, Nyasaland and Uganda, the Bahamas, the Malay Peninsula, and brief notes on the leading commercial species and forest products of each dominion.—*C. F. Korstian*.
38. ANONYMOUS. Diseases of trees. Australian Forest. Jour. 4: 53-54. 1921.—The note directs attention to the need for investigating forest-tree diseases.—*C. F. Korstian*.
39. ANONYMOUS. Education of forest apprentices. Australian Forest. Jour. 4: 52. 1921.—A note is presented on the training of lower-grade forest officers of the Western Australia Forest Department.—*C. F. Korstian*.
40. ANONYMOUS. Fire-resisting properties of eucalypt timbers. Australian Forest. Jour. 4: 55-56. 1921.—The note stresses the fire-resistant qualities of eucalypt structural timbers.—*C. F. Korstian*.
41. ANONYMOUS. Poisoning green timber. Australian Forest. Jour. 4: 108-109. 1921.—Girdling and the killing of trees with arsenic are discussed.—*C. F. Korstian*.
42. ANONYMOUS. Ueber Brennkraft und Heizwert der verschiedenen Hölzer. [The heating value of various woods.] Wiener. Allg. Forst- u. Jagdzeitg. 38: 215. 1920.—Heating value depends upon specific gravity and resin content. A listing of woods from "Der Holzkmarkt" is given, including 11 species ranging from maple with a value of 1011 to willow with 508 (relative values for equal volumes, based on hornbeam = 1000). A list by PRESSLER is given, including 16 species ranging from 104 for maple to 53 for willow (based on red beech = 100). A list by TUCHSCHMIED (8 species air dry) runs from 2427 heat units per cubic decimeter for hornbeam to 1698 for fir, and per kilogram from 3571 for pine to 3070 for ash. A list of 12 species by Tuchschmied having equal moisture contents runs from 103 for hornbeam to 68 for linden (based on beech = 100). The species included in one or more lists are *Carpinus betulus*, *Fagus sylvatica*, *Acer* spp., *Quercus* spp., *Fraxinus excelsior*, *Betula alba*, *Pinus sylvestris*, *P. austriaca*, *Picea excelsa*, *Alnus* spp., *Populus* sp., *P. tremula*, *Salix* spp., *Ulmus campestris*, *Abies pectinata*, *Larix europaea*, and *Tilia* sp.—*F. S. Baker*.
43. ANONYMOUS. Forestry in the United States. [Rev. of: (1) ISE, J. The United States forest policy. 395 p. Yale Univ. Press: New Haven; Humphrey Milford: London, 1920. (2) RECKNAGEL, A. B., AND J. BENTLEY, JR. Forest management. xiii + 309 p., 5 pl. John Wiley and Sons: New York; Chapman and Hall: London, 1919. (3) BROWN, N. C. Forest products; their manufacture and use. xiz + 471 p. John Wiley and Sons: New York; Chapman and Hall: London, 1919.] Nature 107: 326-327. 1921.—The 1st and 3rd are regarded as good; the 2nd is not elementary enough for private owners and managers.—*O. A. Stevens*.
44. ARCHER, ERLING. Om tømmerets form i Glommens og Drammens vassdrag. [Form of timber in Glommen and Drammen watersheds, Norway.] Bilag Tidskr. Skogbruk 28<sup>1/2</sup>: 57-122. 1920.—Results are presented of an investigation of the form of the timber of Scotch pine and Norway spruce in the 2 principal lumbering regions in Norway, by the Norwegian Forest Experiment Station. The dimensions of logs for different parts of the tree, the method of obtaining the measurements, the construction of the graphs and tables, and the volume tables for logs of different lengths and top diameter in cubic contents are given.—

45. ARCHER, ERLING. Skogforsøgsvaesenets oprettelse og første virksomhet. [Establishment of the forest experiment station (Norway) and its first endeavors.] Bilag Tidsskr. Skogbruk 28<sup>v</sup>/10 1-28. 1920.

46. BRUCE, DONALD. The campaign for private forestry. Sierra Club Bull. 1921: 171-174. 1921.

47. CLARK, J. Forest entomology in Western Australia. Australian Forest. Jour. 4: 142-144. 1921.—The trend of practical forest entomology in Western Australia and the need for further work on the life histories and habits of insects injurious to forest trees are briefly discussed.—C. F. Korstian.

48. DAWKINS, C. G. E. Notes on an attack of *Pyrausta machoeralis* on teak in Zigon and Tharrawaddy in 1920. Indian Forest. 47: 209-213. 1921.—Forest plantations of teak were completely defoliated, the damage being especially noticeable in stands from 10 to 20 feet in height. Leaves appeared again on the lower portions of the stem but the tops were killed. The only possible way of saving the trees is to coppice the stand. Preliminary observations appear to show no decrease in girth growth. It appears that the insects have run their course and are disappearing.—E. N. Munne.

49. FOWLER, R. A. Australian hardwoods for paper-making. Australian Forest. Jour. 4: 144-146. 1921.—A note is presented on paper-making from Australian hardwoods pulped by the soda and mechanical processes.—C. F. Korstian.

50. GILL, WALTER. Annual progress report upon state forest administration in South Australia for the year ended June 30th, 1920. Ann. Progress Rept. Woods and Forests Dept. South Australia 18 p., 18 fig., 4 maps. Adelaide, 1920.—This is the routine administrative report for the fiscal year. The work of the department is briefly summarized under the following captions: "Area of forest reserves and plantations, areas enclosed for planting operations, general account of the year's planting and other forest operations, exhibits at the peace conference, interstate forest conference, and officers of the department." There are appended detailed statements of trees planted during the year and the number that survived, receipts and expenditures for the year, comparative revenues, expenditures, and legislative provision for the past 44 years, and lands purchased from the loan under act 1028/10 for purposes of afforestation.—C. F. Korstian.

51. GÖRSCHKE, O., F. KRÖBIE, C. BISTRUP, og C. W. AHLEFELDT-LAURVIG. Dansk skovforenings forsøgsakure af svensk og dansk rødgran. [Tests of sheds of Danish and Swedish red spruce made by the Danish forest association.] Dansk Skovforenings Tidsskr. 5: 182-191. 1920.—Red spruce, *Picea excelsa*, appears to be a trade name. In order to settle a dispute as to the relative durability of these 2 grades for construction purposes test sheds were erected, one from each species. The results show that Danish spruce is in no respect inferior to the Swedish.—J. A. Larsen.

52. GRÆVE, J. W. A. The management of the Punjab irrigated plantations as self-contained forest estates on commercial lines. Indian Forest. 47: 103-109. 1921.—There are 62,000 acres of irrigable land in Punjab, of which 9605 have been planted. From this planted area, a return of over 18 rupees per acre has been received annually. To put the balance of these lands under proper forestry would require a considerable increase in the forestry staff. The necessary service to handle this work is given in detail.—E. N. Munne.

53. HILEY, W. E. The financial rotation for larch. Quart. Jour. Forest. 15: 123-127. 2 fig. 1921.—If the cost of the land does not exceed £20 per acre, the financial rotation does not exceed 40 years for 2nd quality woods or 30 years for 1st quality. Second quality woods should not be cut under 30 years unless unusually high prices are obtained, but 1st quality woods may be cut at 25 years if the cost of land does not exceed £10. Planting 1st quality larch soil bought at £25 per acre is a better financial investment than planting 4th quality larch soil obtained for £1 per acre.—C. R. Tillotson.

54. HOWARD, M. S. A forestry enabling law. *Jour. Forest.* 19: 500-505. 1921.—The methods advocated for reforestation call for the expenditure of large sums of money by the governmental agencies or by individuals or corporations. Most of the latter class do not consider it possible to undertake such measures now. The reforestation could be made secure by giving a bond and taking a mortgage on the property to be released at the time of timber harvesting.—*E. N. Munns.*
55. JONES, OWEN. Forestry in relation to engineering and architecture. *Australasian Forest. Jour.* 4: 132-134. 1921.—This paper discusses forestry principles and the importance to engineering and architecture of adequate timber supplies.—*C. F. Korstian.*
56. KAY, JAMES. The more important trees of British Columbia. *Quart. Jour. Forest.* 15: 134-142. 1921.—A dendrological description is given of *Pseudotsuga taxifolia*, *Tsuga heterophylla*, and *Thuja plicata*.—*C. R. Tillotson.*
57. KELLOGG, R. S. Notes upon the paper industry and the pulpwood supply. *Jour. Forest.* 19: 495-499. 1921.—The consumption of paper has risen in this country to nearly 8 million tons per year, or 147 pounds per capita. The decreased supplies and increased uses and demand have made it possible for the forester to prove the truth of his assertions to the manufacturers. It should be possible to pay as high as 15 dollars per acre for the land and restock it, and, with an annual protection charge, give a return of 6 per cent on the investment. Yields of 20 cords per acre in 40 years are predicted with a return of more than 10 dollars per cord.—*E. N. Munns.*
58. KROGNES, C. Om temperaturmaalingerne i skogsdistrikterne i Nord-Norge sommeren 1919. [The temperature observations in the forests in northern Norway summer 1919.] *Bilag Tidsskr. Skogbruk* 28<sup>1/2</sup>: 39-56. 1920.—Fifteen stations have been installed for the purpose of studying more closely the relation between air temperature and seed production along the northern timber-line in Norway. It has been found by borings and silvical study that successful natural reproduction periods are about 100 years apart, not because the seed is produced so seldom but because favorable temperature conditions for blossoming and seed ripening require 3 seasons of relatively high air temperature. DR. HAGEM of the Bergen experiment station has found by testing pine seed from different parts of Norway, including that from the northern timber-line, that the latter is practically worthless, and that a mean air temperature of at least 10.5°C. must prevail during the period of ripening. During some seed years the average temperature often falls below this in the northern section.—*J. A. Larsen.*
59. LEWELYN, WILLIAM CRAVEN. Forest soils of Wales. *Quart. Jour. Forest.* 15: 129-133. 1921.—Statistics of yield of forest trees growing on soils of diverse geological origin indicate that no sharp demarcation exists between the yield of coniferous species, provided the aspect, altitude, and a few other factors are favorable.—*C. R. Tillotson.*
60. MUNNS, E. N. Evaporation and forest fires. *Monthly Weather Rev.* 49: 149-152. *Fig. 1-4.* 1921.—Hitherto, apparently, little attempt has been made by foresters and meteorologists to correlate the factors of climate and forest fires. The purpose of the present paper is to show that the occurrence and spread of large forest fires are coincident with a greatly increased rate of evaporation or a decrease in vapor pressure. Since evaporation is a climatic complex dependent on the 3 major factors of temperature, humidity, and wind, the influence of any one of these may be offset by a pronounced change in either or both of the other two. The close relation between periods of high evaporation and forest fires is strikingly brought out in figures 1 and 2, which also show that the rate of evaporation does not follow constantly either temperature, humidity, or wind. In some cases it follows wind alone, in others temperature, while in still others it follows changes in relative humidity only. In southern California the wind direction is highly important. For example, an east wind blowing directly off the great deserts brings excessively dry, hot air, resulting in extraordinary dryness in a short time. In examining the vapor pressure data for the period 1911-1920, it was found

that in those years and months in which the average vapor pressure remained high a very small number of fires occurred, while in those years and months with a relatively low average vapor pressure there were uniformly periods of extreme hazard, during which many bad fires occurred.—*E. N. Munnis*.

61. OLMSTED, FREDERICK E. National control of forest devastation. *Jour. Forest.* 19: 468-478. 1921.—The text of the new Capper Bill is given in full with an analysis of the sections and how the bill would act to control the devastation now caused by the lumber industry.—*E. N. Munnis*.

62. ROIG, J. T. Legislación forestal y reservas forestales. Necesidad de una legislación forestal. [Forestry legislation and forest reserves.] *Rev. Agric. Com. y Trab.* [Cuba]3: 366-369. 1920.

63. SALT, HAROLD. A tanning survey of the west. *Australian Forest Jour.* 4: 117-118. 1921.—A note is presented on the sources of supply and the possibilities of a tanning survey in studying the tannin contents of all parts of a tree.—*C. F. Korstian*.

64. SALT, HAROLD. Forestry and the manufacture of tanning extracts. *Australian Forest Jour.* 4: 118-119. 1921.—The note concerns the relation of forestry to stability in the manufacture of tanning extracts.—*C. F. Korstian*.

65. SMYTHIES, E. A., AND S. H. HOWARD. Taper curves and constants for sal. *Indian Forest.* 47: 161-164. 2 fig. 1921.—The taper factor for sal has been found to be a constant for all diameter classes and that for trees from 3 feet 6 inches to 6 feet 6 inches in girth the ratio

$$\frac{\text{Breast high diameter over bark}}{\text{Diameter at } x \text{ without bark}} = \text{a constant}$$

where  $x$  is any chosen height on the stem above breast height. From these points a curve may be constructed giving the taper constant which holds very close to the actual. This method may be used to determine the diameter at half height for use in volume calculations.—*E. N. Munnis*.

66. SNELL, WALTER H. The relation of the moisture content of wood to its decay. *Paper Trade Jour.* 72<sup>12</sup>: 44-46. 2 fig. 1921.—The author contributes to the discussion of the feasibility of spraying log piles for the prevention of fire, emphasizing the effect of this spraying upon decay. MUENCH's data are cited as well as experiments of the writer upon 5 fungi. It is shown that the moisture-decay curve varies inversely with the specific gravity of the wood. Sixty per cent of water (150 per cent calculated upon oven dry weight) prevented decay in loblolly pine sap and 67 per cent (200 per cent on oven dry weight) in Sitka spruce. Inasmuch as it has previously been shown that logs sprayed a short time contained 52-60 per cent of water, and as the pulp logs are of about the same density as the loblolly pine sap, it is concluded that spraying for fire protection carries with it no danger of favoring serious loss through decay.—*W. H. Snell*.

67. STAF, H. Eikenakhout. [Oak coppice.] *Tijdschr. Nederland. Heidemaatschap-* pij 33: 215-218. 1921.—High prices for bark and the demand for fuel led to extensive planting of oak, especially on the heaths of the Veluwe. Bark prices are given for the period 1874-1920. Plantations on lowlands are liable to injury by late spring frosts, and mildew frequently causes some loss. Oak can be followed by pine forests.—*J. C. Th. Uphof*.

68. STAF, H. Het dunnen van dennenbosschen. [Thinning of pine forests.] *Tijdschr. Nederland. Heidemaatschappij* 33: 158-160. 1921.

69. STOATS, T. N. Silvicultural notes: *Pinus insignis*. *Australian Forest Jour.* 3: 275-277, 325-327. 1920; 4: 6-11, 37-39, 106-107. 1921.—A silvicultural discussion is presented summarising the information available on soil and climatic requirements, the establishment

and composition of the crop, the selection and development of the forest nursery site, seed sowing, care of seedlings, transplanting, season of planting, spacing, planting operations, planting methods, rotation, and cleanings of this important exotic species.—*C. F. Korstian.*

70. SWAIN, E. H. E. Annual report of the Director of Forests for the year ended 30th June, 1920. Ann. Progress Rept. Queensland Forest Service. 65 p. Brisbane, 1920.—This is the usual routine report for the year. The work of the Service is summarized under the following captions: "Prospect, retrospect, financial, forest organization, logging operations, silvical investigation and experiment, forest products research, forest protection, forest survey and engineering, forest reservation, the timber market, administration, interstate and imperial conferences, personnel." Appendices include a report for the 6 months ended June 30, 1919, the Hobart Conference, the Imperial Forestry Conference, forestry in Queensland, and revenue. The duty of exploitation and of actually delivering the products of the state forests directly from the stump to the market has been added to the Forest Service.—*C. F. Korstian.*

71. WEAVER, ROSCOE B. The burning of dead and down trees as a practical protection measure. Jour. Forest. 19: 506-511. 1921.—As a protective measure, snags and down trees in western yellow pine stands in the Modoc Forest were burned during the latter part of the season. After chopping a hole in the sapwood near the base, a fire is started which burns the tree down in a short time. With recently killed trees, 2-inch auger holes are bored in the trunk at such an angle as to intersect and in one of these a fire is started which in most cases successfully drops the tree. About 2,000 acres were covered and 4,600 trees fired, averaging 115 trees per man per day at a cost of 6 cents per tree and 14 cents per acre. Such results are of great practical value as such burning can be done about areas of high fire hazard, along protection or isolation strips, along roads, and about recreation areas at a cost which makes such clearing feasible.—*E. N. Munns.*

## GENETICS

GEORGE H. SHULL, *Editor*

J. P. KELLY, *Assistant Editor*

(See also in this issue Entries 23, 162, 177, 182)

72. ANASTASIA, G. EMILIO. Le forme elementari della composizione del vegetali. L'origine della specie. (Filogenesi delle Nicotianae della Primulaceae e delle Violae. I. Le Nicotianae. [Elementary forms of the composition of plants. Origin of species. (Phylogenesis of the Nicotianae, Primulaceae, and Violae. I. The Nicotianae.]) Boll. Technico 1920: 45 p., 7 pl. 1920.—The author believes that *N. tabacum* is a composite species comprising numerous elementary forms, intermediate between species of the sections *Rustica* and *Petunioides* of G. DON. These sections are characterized not only by flower shapes as originally described but by the shapes of the stigmas. A plant of a variety of *N. rustica* L. was crossed with pollen from a garden variety of *Petunia*. Three seeds from this cross germinated; one produced a plant which in appearance duplicated *N. tabacum*. The author is not disturbed by the possibility of error which might be suspected from the fact that the plant was completely fertile. He believes its occurrence throws much light on the origin of *N. tabacum*.—*E. M. East.*

73. BABCOCK, E. B. Bud selection and the frequency of mutations. Monthly Bull. Dept. Agric. California 10: 137-140. 1921.—The efficacy of bud selection as a means of improving the type is dependent upon the occurrence of bud mutations; its practicability, upon their frequency. In order to change existing varieties through bud selection, bud variations, or plants grown from bud variants of a relatively permanent nature, must first be discovered. Thus far data available are not sufficient to justify any conclusion regarding the practicability of increasing the yield of deciduous trees through bud selection.—*E. L. Overholser.*



74. BLAKESLEE, A. F. The Globe mutant in the jimson weed (*Datura Stramonium*). *Genetics* 6: 241-264. 1921.—The Globe mutant is distinguished as a seedling by its broad entire first leaves. In the first leaves of 98 Globes, length divided by breadth averaged 1.5; while in 98 normal sibs of these Globes it averaged 2.1. Globe plants have more closely overlapping and broader leaves, which are less toothed; the capsules are depressed globose, and have stouter spines. Globe seedlings are less vigorous than normals. Globes selfed gave 4403 Globes to 16,075 normals, a percentage of 21.5. Globes pollinated by normals gave 917 Globes to 2351 normals, or 28.1 per cent of Globes. Normals crossed by Globe pollen gave 57 Globes to 3362 normals, or only 1.7 per cent of Globes. Normal sibs of Globes selfed produced only 4 Globes to 2072 normals, or 0.2 per cent. In other normal lines 24 apparently original Globe mutations were found, together with 33,108 normal plants, which is a percentage of 0.06. However, one line extensively grown gave a disproportionately large number of these Globes. The other 11 mutants of *Datura* selfed gave 0.2 per cent of Globes, and when crossed by normal pollen, 0.3 per cent; while normals crossed by pollen of these mutants gave 0.1 per cent.—Nineteen normal plants gave an average of 2.7 per cent of bad pollen, while 7 Globes at the same time averaged 7.0 per cent, over 1000 grains being counted from each plant. Other extensive pollen counts gave similar results.—Selection for 10 generations failed to increase the number of Globes in the progeny.—The Globes show 12 and 13 chromosomes in the pollen mother-cells after the reduction division. It is presumed that the pollen grains with 13 chromosomes rarely function, and either that some of the 13-chromosome egg cells do not function, or that the 23-chromosome zygotes are less viable than the 24-chromosome zygotes in the early stages.—*John Belling*.

75. BLARINGHEM, L. Sur le pollen du lin et la dégénérescence des variétés cultivées pour la fibre. [On the pollen of flax and the degeneration of varieties cultivated for fiber.] *Compt. Rend. Acad. Sci. Paris* 172: 1603-1604. 1921.—The degeneration of flax is considered to be due to genetic rather than climatic influences. Hybrids between different cultivated annual flaxes and the wild biennial *L. angustifolium* are fertile but give pollen some of which is partially aborted. The large pollen grains are variable in size and shape. All the annual flaxes cultivated for grain are early-maturing, homogeneous in type, and give perfect, uniform pollen. Most of the fiber flaxes are heterogeneous in type, and their pollen is irregular or a small proportion is even aborted; these facts make it possible to suppose that these flaxes have had a remote hybrid ancestry. One strain of fiber flax of Russian origin was found to be uniform, early, well-fixed in type, and to have perfect and very regular pollen. The selection of fiber flaxes based on a study of the pollen of isolated strains continued through several successive generations is recommended as a procedure for avoiding degeneration of the common varieties.—*D. F. Jones*.

76. BRIDGES, C. B. Proof of non-disjunction for the fourth chromosome of *Drosophila melanogaster*. *Science* 53: 308. 1921.—The author states that he secured genetic evidence of non-disjunction of the 4th chromosome in *Drosophila melanogaster* during the summer of 1920 and obtained cytological verification later the same year. He then shows that the genetic evidence recently given by LITTLE (*Science* 53: 167. 1921) is susceptible of interpretation as due either to the presence of a new, less extreme eyeless allelomorph, or to a dominant 4th-chromosome minus modifying factor, as well as to non-disjunction.—*H. H. Plough*.

77. BRIDGES, CALVIN B. White ocelli—an example of a "slight" mutant character with normal viability. *Biol. Bull.* 38: 231-236. 1920.—A description and genetic data of a mutation in *D. melanogaster* in which the ocelli or simple eyes are white instead of the normal brown color are given. The gene producing this effect is located in the 3rd chromosome between hairless and rough. The mutation is very slightly different from the normal, though definite and easily distinguished. It causes no diminished viability and actually persisted in mixed mass cultures for fully 175 generations without selection. Such a mutant might survive in nature, and if slightly advantageous might supplant the original type.—*H. H. Plough*.

78. BRIGGS, H. H. Hereditary congenital ptosis with report of 64 cases conforming to the Mendelian rule of dominance. *Trans. Amer. Ophthalmol. Soc.* 16:255-276. 1918.—The study is based on 128 persons in 6 generations, descendants of a single affected female and constituting a family of southern mountaineers. Of the entire number 64 were affected with ptosis and 64 were normal; all the former had an affected parent except 2, and in these cases the evidence concerning the parent is not conclusive. The author discusses the Mendelian law of inheritance and considers that his "cases conform to the Mendelian law of dominance." The paper is illustrated with portraits and a pedigree chart; a review of the literature on the subject and a bibliography of 45 numbers are added.—Howard J. Banker.

79. BRIGGS, H. H. Hereditary congenital ptosis with report of 64 cases conforming to the Mendelian rule of dominance. *Amer. Jour. Ophthalmol.* III, 2: 408-417. 1919.—The paper published in *Trans. Amer. Ophthalmol. Soc.* 16:255-276. 1918 (see preceding entry) is here printed in "slightly abridged" form without portraits.—Howard J. Banker.

80. CARON, VON. Die Erfolge der Verwandtschafts- und Inzucht bei den Eldinger Weizenzüchtungen. [The results of consanguine breeding and of inbreeding in the Eldingen wheat breeding.] *Deutsch. Landw. Presse* 1920: 390-391. 1920.—The author describes briefly his methods in developing strains of wheat with high gluten content, immunity to rust, and other desirable characters. He began with a wide cross and followed this with selection among self-fertilized lines and later with crosses among these lines.—Sewall Wright.

81. CAROTHERS, E. ELEANOR. Genetical behavior of heteromorphic homologous chromosomes of *Circotettix* (Orthoptera). *Jour. Morphol.* 35: 457-483. 5 pl. 1921.—Both males and females of *Circotettix* were collected from the wild; only nymphs of the female were used. Eighteen matings were made. In 6 of these one or the other parent died, and in the remaining 12 only 8 produced offspring. After the eggs had been laid both parents were killed, and the gonads were fixed and sectioned. Twenty-eight male offspring were studied cytologically.—In *C. verruculatus* the spermatogonial complex consists of 21 chromosomes, 9 large atelomitic, 6 telomitic, and the other 6 may be either telomitic or atelomitic, but constant for an individual. The complex for the female is similar except that there is an additional accessory which gives constantly 10 large atelomitic chromosomes. In the spermatocyte 4 chromosomes and the accessory are atelomitic, 3 are constantly telomitic, and 3 may vary from specimen to specimen. The 28 males which were studied were the offspring of 5 crosses in which the chromosomal complexes of the parents are known. No offspring varied in its chromosomal constitution beyond the limits to be expected from a combination of the gametes of its parents. These homologues have been actually identified in both parents and offspring.—Mary T. Harman.

82. CORRENS, C. Versuche bei Pflanzen das Geschlechtsverhältnis zu verschieben. [Attempts to modify the sex ratio in plants.] *Hereditas* 2: 1-24. 5 fig. 1921.—The present theory of the mechanism of sex determination is explained in detail and the evidence briefly summarized. Examples of modified sex ratios in several species are pointed out. The paper deals particularly with the author's experiments in the genus *Melandrium*. This is a dioecious plant which has been found by various investigators to produce approximately 44 per cent male and 56 per cent female plants. By applying pollen in different amounts it was possible to modify the ratio even more. When an overabundance of pollen was used the number of females in the progeny increased 12 per cent over that in the progeny from plants on which but a small amount of pollen had been applied. The proportion of males to females was also changed by cutting off the style soon after pollination and before all the pollen tubes had reached the ovules. In 1 case the progeny of a plant so treated produced 69 per cent female and 31 per cent male plants. Both of these experiments indicate that the female-producing pollen grains have a more vigorous pollen tube or in some other way effect a more rapid fertilization of the ovules. By careful drying it was possible to keep alive the pollen of *Melandrium* for 120 days. When old pollen was applied the resulting progeny showed a decrease in the percentage of female plants; this decrease became more pronounced with increasing age of the

pollen. When very old pollen was used no female plants were produced. However, the plants were so few,—due to the large number of undeveloped seeds,—that the results are not entirely significant. The author concludes that in nature the factors tending to influence the sex ratio in one direction are, as a rule, equal to those acting in the opposite direction so that the net result is approximately a 1:1 ratio. This ratio may in some cases be modified by artificial means.—*P. C. Mangelsdorf.*

83. CZAJA, A. TH. [German Rev. of: CHAMBERLAIN, CHARLES J. Grouping and mutation in *Botrychium*. Bot. Gaz. 70: 387-398. 11 fig. 1920 (see Bot. Absts. 7, Entry 1735).] Zeitschr. Bot. 13: 472-473. 1921.

84. DORSKY, M. J. Some characteristics of open-pollinated seedlings of the Malinda apple. Proc. Amer. Soc. Hort. Sci. 16: 36-42. 1919 [1920].—A large number of seedlings from open-pollinated fruit of the Malinda apple were planted and studied for the following characters: Resistance to cold, age of bearing, and characters of the fruit. Standing in close proximity to the Malinda apple were such varieties as Oldenburg, Wealthy, Scott Winter, Hibernial, Pattens Greening, Northwestern Greening, and a number of other varieties. The Malinda seed was selected especially for the hardiness of the tree and the long-keeping quality of its fruit.—During selection a large number of seedlings were discarded as inferior or unworthy. Of the 3879 original seedlings 49.1 per cent were removed because of their wild-type or stunted growth, 20.8 per cent were discarded because of inferior fruit, and 30.1 per cent were selected for further study. Two-thirds of these selected trees were retained because of their superior fruit and the remaining 1 because they had not come into bearing; girdling processes failed to hasten the period of fruit-bearing. The author points out that while all of the seedlings originated from the same known tree a great variation in the age at which they come into bearing is found among them. The question is raised as to whether the early-bearing habit of seedlings will be transmitted to orchard trees when propagated from them by vegetative means.—Among the pronounced variations found in the seedlings were extreme cases in sweetness and acidity of fruit, keeping quality, and resistance to cold.—From the material studied the author concludes that the named varieties of apples are only rare or extreme variations within the species, and that unless certain varieties vary in the proportion of inferior types in the progeny, these open-pollinated seedlings give a fair index as to the expectations in the  $F_1$  of inter-varietal combinations.—*L. R. Detjen.*

85. DYKES, W. R. Irises of the future. Gard. Chron. 69: 258. 1921.—Notes are given on a considerable number of *Iris* species, with comments on their behavior when crossed, or suggestions as to the probable results of crossing. "*Iris pseudacorus* seems to reproduce itself with whatever pollen the flowers are fertilized, and nothing seems able to fertilize *I. foetidissima* except its own pollen."—*J. Marion Shull.*

86. EYSTER, W. H. The linkage relations between the factors for tunicate ear and starchy sugary endosperm in maize. Genetics 6: 209-240. 1921.—A study of the linkage relations of the tunicate or podded-ear character with 30 other mutant factors of maize is reported. The only linkage found was with the sugary endosperm of the seeds, confirming the observations of JONES and GALLAGHER; but where these authors found 8 per cent of crossing over between the tunicate and sugary factors the author finds 27 per cent in the megasporocytes and 35 per cent in the microsporocytes. In the test with the ramose character of the inflorescence the results confirm the observations of COLLINS and the author concludes with him that homozygous tunicate plants are sterile.—*J. H. Kempton.*

87. FRATEUR, J. L. La nature héréditaire du pelage sauvage du lapin. [The heredity of the wild coat pattern of the rabbit.] 11 p. Imprimerie G. Bothy: Bruxelles, 1920.—The author gives a minute description of the coat color of the wild rabbit and its minor variations. He believes that this pattern is complex genetically as well as somatically. He finds certain elements of it apparently dissociated from others, in the black-and-tan pattern. His crosses indicate that black-and-tan differs from black by a dominant unit factor and he assumes that

the wild pattern involves a 2nd dominant factor. He is therefore surprised to find that he obtains merely monohybrid ratios in crosses of wild with either black, or black-and-tan; this he explains by selective fertilization. As to minor variations of the wild pattern, the author finds that a dark under color on the belly is dominant over pure white and gives monohybrid ratios in back-crosses and  $F_2$ .—*Sewall Wright*.

88. FREDWIRTH, C. Zu "Wicke mit linsenförmigem Samen." [To "Vetches with lens-shaped seeds."] *Zeitschr. Pflanzzücht.* 3: 89. 1921.—Quotations are given from an original article by F. A. WIEGMANN, "Über die Bastarderzeugung im Pflanzenreiche," Vieweg, 1828.—Wiegmann planted vetch and lentils together and saved seeds from each separately. Seeds from the vetch parent produced plants which were similar to the mother plant but bore flat, compressed seeds of paler color; hence, resembling the lentil seeds. These plants appeared to breed true for their hybrid characters.—*C. M. Woodworth*.

89. FUNKQUIST, H. The inheritance of the muzzle color in the cattle breed of Stjærnsund. *Hereditas* 1: 343-363. 1920.—Inbreeding has been followed in this breed for 30 years and the animals are therefore closely related. The muzzles are light- and dark-colored; the former are termed flesh-colored and the latter black, lead, or slate-colored. Those that are spotted or slightly pigmented are termed mixed.—The study is largely made from the descendants of 11 bulls. Tables for each of these bulls are given, showing the muzzle color of each descendant and that of the dam of each descendant. Of the 11 sires used, 6 were pigmented, 3 mixed, and 2 flesh-colored. The matings of these 6 pigmented sires gave the following results: When mated with pigmented dams, 225 pigmented, 48 mixed, and 11 flesh-colored; when mated with mixed dams, 45 pigmented, 44 mixed, and 18 flesh-colored; when mated with flesh-colored dams, 79 pigmented, 64 mixed, and 46 flesh-colored.—The mating of the 3 mixed sires gave the following results: When mated with pigmented dams, 51 pigmented, 13 mixed, and 6 flesh-colored; when mated with mixed dams, 16 pigmented, 18 mixed, and 16 flesh-colored; when mated with flesh-colored dams, 9 pigmented, 9 mixed, and 16 flesh-colored.—The matings of the 2 flesh-colored bulls gave the following results: When mated with pigmented dams, 18 pigmented, 16 mixed, and 11 flesh-colored; when mated with mixed dams, 3 pigmented, 4 mixed, and 7 flesh-colored; when mated with flesh-colored dams, 5 pigmented, 10 mixed, and 10 flesh-colored.—It is believed that the following 2 hypotheses explain the inheritance of muzzle color: 1. There is an inhibiting factor preventing the intensity factors from acting. The flesh-colored muzzle is due to the presence of this inhibiting factor or to the absence of the intensity factors. 2. There is a yellow pigment factor epistatic to the intensity factors producing dark pigment. The flesh-colored muzzle is due to the presence of this yellow pigment factor or to the absence of the intensity factors.—*R. E. Graves*.

90. GOWEN, J. W. The variation of milk secretion with age in Jersey cattle. *Maine Agric. Exp. Sta. Bull.* 236. 49-60. 1920.—From a study of 1741 8-months milk records, it was found that yield of milk changed definitely with age and that this change was logarithmic and not linear. If growth of the mammary gland is a logarithmic function of age a causal relation may exist between this and yield of milk, due to an increase in the number of cells rather than to an increase in the ability of cells to secrete milk.—*E. Roberts*.

91. GUINIER, PH. Variations de sexualité dioicité et dimorphisme sexuel chez le *Pinus montana* Mill. et le *P. sylvestris* L. [Variations in sexuality, dioeciousness, and sexual dimorphism in *Pinus montana* and *P. sylvestris* L.] *Compt. Rend. Soc. Biol.* 84: 94-96. 1921.—*Pinus montana* Mill. and *P. sylvestris* L., normally monoecious, were found to show a tendency toward dioeciousness associated with the development of the trees. The production of fertile pistillate branches is dependent upon vigorous vegetative growth, without which only fertile staminate branches are produced. Young trees tend to function as females while older trees become male-functioning only, as do also trees which have been grown under unfavorable conditions.—*D. F. Jones*.

52. HÄCKER, VALENTIN. *Allgemeine Vererbungslehre.* [General genetics.] 18 × 24 cm., ix + 444 p., 149 fig. Friedr. Vieweg & Sohn: Braunschweig, 1921.—The book consists of 37 chapters arranged in 7 sections. The contents of these 7 sections, together with the author's views of chief theoretical interest, are briefly as follows: Section I. Early known facts of heredity in man and domestic animals and the development of ideas of heredity are reviewed. The author gives (1) the early classification of facts of heredity by means of so-called "laws"; (2) statistical laws, as those of ancestral contributions, regression (GALTON); (3) development of statistical methods; and (4) origin and methods of genealogy.—Section II is devoted to (1) morphological basis of heredity; (2) structure, chemistry, and physiology of protoplasm; (3) cell theory and structure of nucleus. The division of organisms into cells is held to be significant in the development of form and in physiological processes. Several theories of the mechanics of cell division are discussed without special support of any one. Somatic and germ cells are recognized early in embryonic development. Maturation and structure of mature germ cells, attraction of egg and sperm, and the process of fertilization are described. Complete or partial separation of egg chromosomes and sperm chromosomes (gonomery) in early spindles or nuclei of the embryo is described in several cases. The history of germ cells in plants is briefly related. Size differences among chromosomes may be due in some cases, at least, to unequal growth of the chromosomes. The number of chromosomes is given for many species, and the variation in number within single species and among species of larger groups is described. Diminution in the size of chromosomes in evolution appears to occur simultaneously with a decrease in number. Maturation divisions in animals are homologized with those in plants. Maturation is regarded phylogenetically as rudimentary spore formation.—Section III. Older morphological theories of heredity (DARWIN's pangenesis, GALTON's stirps, etc.) are discussed. Continuity of germ-plasm is regarded by the author as forming the foundation of the theory of heredity. The mechanistic theories of NAGELI, ROUX, WEISMANN, and others are described. The contrast between nucleus and cytoplasm as agents in heredity has been over-emphasized for in general the action of the 2 is harmonious. Though it is conceivable that somatic induction may impress changes upon germ cells following somatic modification, it is scarcely possible that the chain of events would be reversed and produce the same somatic modification in the offspring. The medical practice of calling diseases hereditary when they are merely congenital, owing to germinal or intra-uterine infection, is criticized. Satisfactory evidence of the inheritance of injuries, functional changes, and psychic acquisitions has never been produced; but practical breeders and some others believe in such inheritance. An explanation of supposed inheritance of acquired characters by parallel induction, especially indirect parallel induction (through sense organs and the nervous system), is given with implied approval. Parallel activation, calling into action certain one of a limited number of capacities in the parent and offspring, may be the explanation of some cases. Parallel reduction, loss of certain characteristics through general chemical change in both parent and offspring, is suggested to explain some cases. Similar modifications of parent and offspring may also easily arise owing to general weakening through poisons (germinal injury, blastophthoria). New hereditary factors have been produced (TOWER's beetles) by direct environmental action on germ cells. Besides offering the usual explanation for xenia and certain bizarre phenomena, the author suggests that in some cases these phenomena may be the result of hormone (?) action of the male elements. Graft hybrids are described. Weismann's system of idants, ids, determinants, and biophores is discussed in relation to maturation, amphimixis, and embryonic development, with brief comment in view of more recently discovered phenomena. Weismann's theory is regarded as neo-preformationist, in contrast to those of O. HERRWIG and others which are neo-epigenetic.—Section IV. The development of pre-Mendelian ideas of heredity, terminology, classification of hybrids, and sterility are discussed. MENDEL's law is separated into 3 parts: Law of uniformity in  $F_1$ , law of segregation, and law of independent assortment; the widespread application of these laws is demonstrated by numerous examples. Presence and absence hypothesis is accepted in explanations. Multiple allelomorphs, such as factors for gray, black, and chocolate in mice, are defined as 2 or more factors which represent different grades of the same character. Cases of polymery are discussed. Inheritance of ear size.

linked inheritance, and intersexuality are explained. Sex determination takes place either before, at, or after fertilization. Exceptions to Mendel's laws are found in reversible dominance, fluctuation of unit characters, and irregular ratios; these have been explained by auxiliary hypotheses, such as inhibiting factors, linkage, repulsion, reduplication, differential mortality, incompatibility, etc. The Mendelian theory is in harmony with the corpuscular theory of Weismann, mutation theory, genotype theory, and evolution and selection theory. The author thinks it probable that continuous variation of germ-plasm occurs under the effect of environment and selection; in unicellular organisms it always results in visibly continuous variations, while in multicellular ones the results may appear as discontinuous variations.—Section V. Many characters are shown to depend on physiological features of embryonic development; complexly determined characters are more likely to exhibit impure segregation than simple ones; difference is attributed to ferments; characters complex in development are more likely to be of selective value. Extreme cases of complex causation may be highly species-specialized; intermediate cases are species-forming characters. Characters found in many species are usually simple in development and inheritance. Simple characters in man persist in hybrid races, complex ones tend to disappear. The inheritance of numerous human traits is described.—Section VI. Individuality of chromosomes is no longer to be regarded as a working hypothesis, but as a well-grounded theory. The author doubts the correctness of the theory of parasygnapsis and splitting of chromosomes as accounting for formation of tetrads, holding that these phenomena may be partly due to accident, and partly to artifact; but he recognizes that Mendelian heredity is better explained by that theory than by telosynapsis. The STURTON-BOWEN chromosome theory of heredity is outlined. The chromosome theory of sex is considered almost universally accepted. Some form of quantitative theory fits the facts better than the hypothesis that there are specific genes for sex as for other characters; but both theories are objectionable. The author believes that X chromosomes are mere indices, not causes; the relation of metabolism to sex supports the index-hypothesis. Proof of MORGAN's theories of linear arrangement and crossing over await discoveries in forms in addition to *Drosophila*. Purity of gametes is proved, but that segregation is effected by reduction division is still in doubt; there is much evidence of somatic segregation. The author suggests the nucleoplasm theory to account for unequal cell divisions, including segregation of genes. Materials passing from the nucleus to the cytoplasm, or produced in the cytoplasm under the influences of the nucleus, may be equally divided at cell division, or may be sorted out (segregated); these substances may in turn influence the nature of the nucleus. Quantitative relations are supposed to determine dominance.—Final Section. Though a knowledge of Mendelian phenomena has led to few striking improvements in domesticated animals, it has made intelligible many puzzling phenomena, such as instability of certain species, atavism, individual potency, effects of inbreeding, heterosis, limits of artificial selection, and correlation, and has been useful in anthropology.—A. Franklin Shull.

93. HARLAN, H. V., AND S. ANTHONY. Development of barley kernels in normal and clipped spikes and the limitations of awnless and hooded varieties. Jour. Agric. Res. 19: 431-472. 1920.—Removal of awns at flowering time results in (1) a lessened deposit of dry matter in the kernel, especially of starch; and (2) an increased deposit of ash in the rachis of the spike. The awn functions as a depository for ash and its removal causes the surplus ash to accumulate in the rachis. This ash accumulation causes brittleness of the spike and consequent tendency to shatter. Hooded and awnless sorts have rachises more brittle than awned sorts, also yield less grain. The production of high-yielding strains of these types may be possible by using parents having a low percentage of ash in the rachises.—The substitution of smooth for scabrous awned sorts is suggested as likely to meet the objections of growers and feeders of barley. The production of such sorts equal in yield to the latter is a future task of the plant breeder.—F. P. Bussell.

94. HARRISON, J. W. HESLOP. The variation of *Primula farinosa* L. in County Durham. Vasculum 7: 21-25. 1921.—Variations are described in *P. farinosa* found in the mountains and along the Durham coast. Many of the variations are similar to those attributed to hybridization. The isolation of desirable types is attributed to the isolation of factors without latent ... Karl ...

95. HAVILAND, MAUD D. Preliminary note on antennal variation in an Aphid (*Myzus ribis* Linn.). Proc. Cambridge Phil. Soc. 20: 35-44. 1920.—The author reports that within a single clone of *Myzus ribis* ratios of certain antennal lengths to head breadth decreased with feeding on red-blistered leaves and increased with feeding on green unblistered leaves. Transference of red-fed individuals to green food indicated persistence of the effects of red food for 2 or 3 generations.—J. P. Kelly.

96. HEIN, S. A. ARENDSSEN. Studies on variation in the meal-worm, *Tenebrio molitor*. I. Biological and genetical notes on *Tenebrio molitor*. Jour. Genetics 10: 227-264. 18 fig. 1920.—*Tenebrio molitor* is a common beetle belonging to the series Heteromera, in which the 1st and 2nd pairs of legs have 5 joints to the toes but the 3rd pair only 4. As there are over 15,000 species of Heteromera, this character may be considered to have remained fixed for millions of years. Nevertheless, on examining 35,247 individuals of *T. molitor*, no less than 60 were found with 5 joints in the posterior toes. Breeding from these gave only negative results, the character apparently being not inherited; but on the other hand, when beetles, with fewer joints in the toes than normal, were bred together, the character was found to be inherited. Variations in the color of the eyes were found; the normal eye is intense black. Cream-white eyes show sex-limited descent; red eyes are apparently not sex-limited. The larvae show variations in color and structure, which were studied. Numerous details are given concerning the life-history and characters of the species.—T. D. A. Cockerell.

97. JACKSON, HARTLEY H. T. A hybrid deer of the F<sub>2</sub> generation. Jour. Mammalogy 2: 140-143. 1 pl., 1 fig. 1921.—On the eastern slopes of the Cascade Mountains in the State of Washington there is a limited area in which the ranges of the mule deer, *Odocoileus hemionus hemionus*, and the Columbian black-tailed deer, *O. columbianus columbianus*, overlap. In the wild state these 2 species have been known to hybridize, but the F<sub>2</sub> individual reported was bred in captivity. The F<sub>1</sub> sire of this specimen (now No. 223,685 U. S. National Museum, Biological Survey Collection) was sired by a full-blooded mule deer out of a black-tailed doe. The F<sub>1</sub> dam was sired by a full-blooded black-tail buck out of a mule doe. Each of these individuals was born and raised in captivity. Nevertheless, there were no data available on the traits of the parental generation or the F<sub>1</sub> parents, so a comparison with the 2 pure species in general was all that was possible. The author draws 2 conclusions: (1) The F<sub>1</sub> hybrids are fertile among themselves despite widespread recognition of the parents as distinct species; (2) certain unit characters are transmitted to the offspring in addition to characters that are apparently intermediate in nature. The F<sub>2</sub> individual was essentially a mule deer in shape and size of horn, in shape of the post-orbital region of the skull, in the size of the metatarsal glands, and in the general body size. It showed the black-tailed character of *O. columbianus columbianus*, however.—Edward N. Wentworth.

98. JEFFREY, E. C. The geographical distribution of hybrids. Science 53: 556. 1921.—The author objects to criticisms directed against BRAINERD and PETERSEN (see Bot. Abstr. 8, Entry 233) for classifying as hybrida blackberry (*Rubus*) forms which occur outside the range of the supposed parents. Instances are cited from KRENNER in support of the contention "that absence of one or both parent species of a supposed hybrid in a given region is no valid argument against the hybrid origin of such an intermediate form."—E. E. Clausen.

99. JONES, L. R., J. C. WALKER, AND W. B. TISDALE. Fusarium resistant cabbage. Wisconsin Agric. Exp. Sta. Res. Bull. 48. 34 p., 10 fig. 1920.—Cabbage yellows, widespread in the eastern U. S. A., is caused by the fungus *Fusarium conglutinans* Wollenw. The fungus penetrates the root hairs, pushing through the cortical tissues until it reaches the vascular system. This leads to the death of the vascular tissues followed by a slow yellowing of the aerial parts. Soil remains infected almost indefinitely. The destructiveness of the disease depends on seasonal conditions as aggressive host invasion occurs only at relatively high temperatures, 17°C. and above.—As a result of careful selection experiments the conclusion was reached that resistance is due to heritable differences (multiple factors) and that by selection of resistant heads from "sick" soil a *Fusarium*-resistant strain may be secured. Disease

resistance does not seem to be incompatible with any other of the commonly recognized cabbage characters.—The method which has proved most desirable is the selection of resistant plants; the growing of resistant heads in isolation, and the obtaining of self-fertilized seed; and mass selection from those cultures which show the greatest degree of resistance. Strains produced by this method have been distributed, and have proved resistant in other states.—*H. K. Hayes.*

100. JORDAN, DAVID STARR. The inbred descendants of Charlemagne: a glance at the scientific side of genealogy. *Sci. Monthly* 13: 481-492. 1921.—A chart of American genealogy from the 12th century to the present and showing the lines of descent of hundreds of well known families, by Miss Sarah Louise Kimball, of Palo Alto, California, furnishes the basis for the author's discussion. This chart is only a fragment of the genealogy of a single person. By calculating the descendants and comparing with the population, it becomes evident that the intervening individuals are reckoned over and over again. The tangled lineage of the English people gives a clue to the origin and persistence of racial traits. The law of primogeniture led to noble and peasant of the same blood. The ancestral record of George Washington, Abraham Lincoln, George V, Grover Cleveland, Theodore Roosevelt, Robert Edward Lee, and others, is given, showing that for over 200 years the line is identical.—*L. Pace.*

101. KLATT, BERTHOLD. Beiträge zur Sexualphysiologie des Schwammspinners. [Contributions to the sexual physiology of the gypsy moth.] *Biol. Zentrabl.* 40: 539-558. 1920.—Results of a study of oviposition are reported. The female genitalia and the process of copulation are described in detail; oviposition takes place in the dark only. Normal mated females lay eggs in a solid mass covered with wool and cemented together. Unmated females, after prolonged delay, produce a few scattered eggs and die with egg-filled abdomens. Normal females mated with completely castrated males or normal males when ejaculation has been prevented produce a few scattered eggs,—rudimentary oviposition. Matings of normal females with males castrated as caterpillars, and therefore still possessing accessory glands, produce rudimentary oviposition although such males produce a small spermatophore lacking sperm. Successive matings of a normal female with a number of incompletely castrated males produce rudimentary oviposition. Completely castrated females and others in which the connection between the ovary and oviduct is broken show normal desire for copulation and normal activities of oviposition—"oviposition without eggs." Castrated females mated with castrated males show the activities of rudimentary oviposition. The author concludes that the presence of eggs is not essential to the normal activities of females. Darkness plus tactile stimulus of the penis are sufficient to produce rudimentary oviposition. Darkness plus tactile stimulus and the presence of sperm in motion are necessary for normal oviposition.—*P. W. Whiting.*

102. KRÜGER, PAUL. Studien an Cirripeden. [Studies on Cirripedes.] *Zeitschr. Indukt. Abtamm- u. Vererb.* 24: 105-158. 15 fig. 1920.—Sex conditions in barnacles are compared with those in plants; for example, relations in the genus *Ibla* are compared with CORNUS' studies of *Bryonia*. The occurrence of hermaphroditism, dioecism, trioecism, androdioecism, gynodioecism, and parthenogenesis in various groups of barnacles is discussed from the point of view of Mendelian heredity, cytology, and phylogeny. A brief review of sex conditions is given for other groups, especially mollusks. The problem of sex-determination may be attacked by crossing hermaphroditic and dioecious species for example, by studying sex-linkage, or by cytological investigation of gametogenesis. A special study of the androdioecious species, *Scalpellum scalpellum*, was made at Kristineberg, Sweden; the study included the morphology and distribution of developmental stages and cytological conditions, especially in relation to chromosomes. Three forms of gametogenesis,—ovogenesis and spermatogenesis of the hermaphrodite, and spermatogenesis of the male,—show no significant differences. The diploid number of chromosomes is always 32, with reduction to 16 in the 1st and 2nd gametocytes. The chromosomes of metaphase are compact and almost similar, in form and size; no heterochromosomes occur so that the results are inconclusive as regards the sex problem.—*P. W. Whiting.*



103. LENZ, F. Kann eine quantitative Fluktuation von Erbfaktoren von wesentlicher Bedeutung für Artbildung sein? [Can a quantitative fluctuation of genes be of significance for species formation?] Zeitschr. Indukt. Abstamm.- u. Vererb. 25: 169-175. 1921.—This paper consists of a critical discussion of GOLDSCHMIDT's theory that evolution proceeds mainly through the accumulation of fluctuations in the genes, rather than through mutation and the recombination of genes. The theory goes further, explaining that genes are purely chemical in nature, each one being an enzyme, whose quantitative fluctuations are expressed in the soma. The obvious difficulties for such a chemical theory are indicated: In order to explain any stability or continuity in a sea of fluctuations, it becomes necessary to assume some limiting structure which then becomes the controlling basis of the continuity as well as of the fluctuations. This is shown to be the case when GOLDSCHMIDT assumes the chromosomes to be colloidal skeletons which absorb the inheritance-enzymes at cell division, and form the mechanism for their equal division between the daughter cells. Aside from this difficulty, GOLDSCHMIDT's theory offers no explanation for the development of new genes (enzymes). Further difficulties are mentioned, such as the failure to distinguish between inherited variations and those that are only somatic; and objections are made to various specific statements of GOLDSCHMIDT.—E. C. MacDowell.

104. LITTLE, C. C., AND M. GIBBONS. Evidence for sex-linked lethal factors in man. Proc. Soc. Exp. Biol. Med. 18: 111-115. 1921.—After illustrating the inheritance of the lethal factor in yellow mice and sex-linked inheritance in the tortoise-shell cat, the authors show the manner of inheritance of haemophilia and color blindness in the human race. They then demonstrate that any sex-linked lethal factors in man would follow the same line of inheritance, and examine the data of BULLOCK and FIELDS on haemophilia as well as the data of the Eugenics Record Office. If sex-linked lethal factors are linked to the allelomorph for normal in the case of haemophilia and color blindness each, there should be an excess of abnormal types among the males as compared with the normal types, and there should also be a decreased proportion of females in families having no excess of affected males. The following table shows the results:

	SEX RATIO		RATIO MALES TO 100 FEMALES	DIFFERENCE
	Males	Females		
All males haemophilic.....	413	337	122.55 ± 2.73	35.26 ± 3.39
Part males haemophilic.....	1070	678	157.81 ± 2.02	10.4 × P. E.
All males color blind.....	114	100	114.00 ± 4.4	30.62 ± 6.52
Part males color blind.....	184	119	154.62 ± 4.83	4.6 × P. E.

The excess of haemophilics is so great as compared to the number expected that the odds exceed 1 to a billion that chance is the cause. Similarly, the odds that the excess in the case of color blindness is due to chance are 26 to 1. In the case of deficiency in the females, the odds are 1 to 2 billion in the case of haemophilia and 1 to over 500 in the case of color blindness.—Edward N. Wentworth.

105. LÖNNBERG, EINAR. Hybrid gulls. Arkiv Zool. 12: 1-22. 3 pl., 8 fig. 1919.—A number of hybrids from (1) *Larus leucopterus* ♀ × *L. fuscus* ♂ and (2) *L. glaucus* ♀ × *L. marinus* ♂ are described in detail; many of these birds were bred in confinement. The pinkish feet of (♀) *leucopterus* were dominant over yellow feet of (♂) *fuscus*; black pigment in the primaries of *fuscus* is dominant over absence of the corresponding pigment of *leucopterus*. The white on the primaries was variable in the hybrids. The parent species are believed to represent extreme stages of development in opposite directions; the hybrid is intermediate, and is interpreted as more primitive or generalized,—in other words, it is considered "a reversion to an ancestral form."—The hybrid between *L. marinus* and *L. glaucus* is taken to be

the same as the form which has been described and named *L. nelsoni* Henshaw.—Both sets of hybrids in the juvenile stage more closely resemble the darker parent.—*L. J. Cole*.

106. McROSTIE, G. P. The immunization of plants. *Sci. Agric. [Canada]* 1: 123-134. 1921.—The present paper, read before the Quebec Society for the Protection of Plants, discusses the general ideas of selection and hybridization to secure disease-resistant plants.—*B. T. Dickson*.

107. MALONE, J. Y. Spermatogenesis of the dog. *Trans. Amer. Microsc. Soc.* 37: 97-110. 2 pl. 1918.—The spermatogonia show 21 chromosomes. The leptotene thread apparently undergoes parasynapsis. The X chromosome stands apart as a compact dark-staining mass. Ten bivalent and an X chromosome appear in the metaphase of the primary spermatocyte. The X chromosome passes undivided to one pole. The secondary spermatocytes show 10 and 11 chromosomes, respectively. In spermiogenesis the centrosome gives rise to the endknob, the axial filament, and the posterior centrosome; the sphere substance to the acrosome; and the spermatosphere to the sheath of the middle piece. Measurements of mature spermatozoa show a bimodal curve.—*M. F. Guyer*.

108. MORGAN, T. H., A. H. STURTEVANT, AND C. B. BRIDGES. The evidence for the linear order of the genes. *Proc. Nation. Acad. Sci. [U. S.]* 6: 162-164. 1920.—This paper is the final answer to the criticisms of CASTLE of the theory of the linear order of the genes in the chromosome, and to his suggested 3-dimensional chromosome model. The authors emphasize the proof already cited that the linear order is shown by building up the whole chromosome by combining "distances" so short that no double-crossover classes appear. "The purpose of the chromosome maps is two-fold: 1st, to give the sequence of the loci, and 2nd, to indicate by the relative spacing of the loci the crossover values most likely to coincide with the results of future experiments." In order to discover the 1st point it is necessary to use data in which all loci however widely separated are followed in a single experiment, while the latter point can be determined best by the use of all available data including intermediate points. It has already been shown why the two do not necessarily correspond, yet Castle states that the authors reject "nearly 99 per cent" of their data in the case of the yellow, bifid section of the map, and reverse the method in constructing their model. It is also stated that there is nothing impossible in crossing over in excess of 50 per cent. The authors believe that all of Castle's objections have been met, and that his 3-dimensional scheme does not fit the data.—*H. H. Plough*.

109. MULLER, H. J. Are the factors of heredity arranged in a line? *Amer. Nat.* 54: 97-121. 4 figs. 1920.—The author shows that CASTLE's objections to the linear arrangement of genes in chromosomes, and his substitute non-linear 3-dimensional models are invalid, since they involve, among others, the following gratuitous or erroneous assumptions: (1) Shapes and sizes of organic molecules; (2) that double or triple crossover does not occur; (3) that data from unrelated experiments are comparable; (4) that both small and large frequencies of separation can be represented by straight lines in some single consistent model; (5) that proportionate representation of separation frequencies is compatible with polarized breaks in linkage; (6) that map-distances greater than 50 units must connote separation frequencies greater than 50 per cent; and (7) that coincidence can be left unconsidered. It is shown that, mathematically considered, genes are arranged in a bipolar fashion, each linked directly to only 2 others, those lying to the right and to the left in a line all parts of which are straight,—a relation that, physically considered, requires a material connection of gene to gene in chain formation.—*Calvin B. Bridges*.

110. НАСТАНЕК. [German rev. of: MERTZ, C. W. Chromosome studies in the Diptera. I. A preliminary survey of five different types of chromosome groups in the genus *Drosophila*. *Jour. Exp. Zool.* 17: 45-56. 28 figs. 1914. IDEM. II. The paired association of chromosomes in the Diptera and its significance. *Jour. Exp. Zool.* 21: 213-262. 8 pl. 1916. IDEM. III. Additional types of chromosome groups in the Drosophilidae. *Amer. J.*

111. NOACK, KONRAD LUDWIG. [German rev. of: COBBENS, C. Vererbungswarstuch mit bunthilfrigen Sippen. III. *Veronica gentianoides albocincta*. IV. Die albamarmorata- und albolpulverea-Sippen. V. *Mercurialis annua versicolor* und *xantha*. [Genetical studies with variegated races. III. *Veronica gentianoides albocincta*. IV. The albamarmorata and albolpulverea races. V. *Mercurialis annua versicolor* and *xantha*.] Sitzungsber. Preuss. Akad. Wiss. Berlin 1920: 212-240. 1920 (see Bot. Absts. 8, Entry 1068).] Zeitschr. Bot. 13: 465-467. 1921.

112. OHSHIMA, HIROSHI. Reversal of asymmetry in the plutei of *Echinus miliaris*. Proc. Roy. Soc. London B. 92: 168-178. 2 fig. 1921.—The author discusses experiences in rearing larvae of echinoids, among which, in a small proportion of cases, the hydrocoele cavity developed upon the right side instead of the left, as normally is the case. In such individuals the larval symmetry throughout became reversed, though the fully developed echinoid showed no evident departures from the normal condition. In some cases larvae were found having hydrocoeles upon both sides. The paper is largely devoted to a discussion of hypotheses to explain these conditions, the one advocated being that the exceptional right-handed condition is due to the early suppression of the left hydrocoele through accident (external causes). The double condition results from a temporary or partial suppression of the left hydrocoele. A 2nd generation was not obtained, but the author's discussion implies that the character is believed to be non-hereditary.—*F. B. Sumner*.

113. PEARL, R., J. W. GOWEN, AND J. R. MINER. Studies in milk secretion. VII. Transmitting qualities of Jersey sires for milk yield, butter fat percentage, and butter fat. Maine Agric. Exp. Sta. Bull. 281. 89-164, 165-204. 1919.—The aims of this investigation as set forth by the authors are: (1) To determine the transmitting qualities of Jersey Register of Merit Sires for milk production and (2) butterfat percentage. (3) To determine the net change in yearly production of butterfat between the daughter's production and mother's production for Jersey Registry Sires. (4) To determine the transmitting qualities of the sire's sire as judged by the production of the daughters of his son in comparison with that of their dams. (5) To analyze the pedigree of the superior and inferior sires of the Jersey breed. As material the records for the year test of Jersey cows contained in volumes 1-5 of the Register of Merit were used.—All bulls having 2 or more daughters with year records from dams with year records were included. All milk records were calculated to a standard age of 8 years and all fat percentages to the age of 2 years, making all records comparable. The dams are divided into 4 classes in order to make allowance for the difference in their ability as producers.—Three tables are given in which the 224 bulls studied are ranked according to the average amount of increase of milk, per cent of fat and amount of butterfat of daughters over dams. The summary shows that 105 bulls raised the milk production, 101 raised the fat percentage, and 99 increased the amount of butterfat of daughters over dams.—Pedigree studies of the leading bulls are included, and a comparison is also made with the lists of leading native and imported sires selected by a well known breeder.—Lists of bulls are given which increased and decreased the milk and butterfat percentage of their daughters. This is followed by a thorough study of the ancestry of these superior and inferior transmitting sires to determine their inbreeding and relationship, and the amount of Island and American stock in the male and female sides of the pedigree. There are 28 superior and 47 inferior sires in the group studied and the inferior sires are slightly more inbred than the superior group.—It was also found that all animals which appeared in the pedigrees of the superior sires on the male side more than 4 times or on the female side more than 3, also had appearances in the pedigrees of the sires inferior in their transmitting qualities.—A literature list and complete tables of raw data are presented in a special supplement to this bulletin.—*M. H. Fekeman*.

114. PEARL, RAYMOND. A further note on war and population. Science 53: 120-121. 1 fig. 1921.—Vital statistics are presented showing that the vital index, 100 X deaths divided by births, for Vienna, England and Wales, and the U. S. A. reached a high point in 1918, dropping sharply at this point. The transitory effect of war on the death-birth ratio is emphasized.—*F. B. Sumner*.

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115. PEARL, RAYMOND. The biology of death. V. The inheritance of duration of life man. *Sci. Monthly* 13: 46-66. 5 fig. 1921.—This, the fifth of a series of papers on the general topic, treats of the factor of heredity. The writer reviews and discusses the work of ALEXANDER GRAHAM BELL on longevity in the HYDE family and the correlation studies of PEARSON and BEETON; also the investigations of PLOETZ of Munich and of E. C. SNOW as bearing on the question of a selective death rate in man. The latter is supplemented by conclusions drawn from unpublished statistical work of F. S. CRUM and ARNOLD FISHER based on a large body of Dutch material. The final conclusions are that "the death rate of the earliest period of life is selective," and that "inheritance is one of the strongest elements, if not indeed the dominating factor, in determining the duration of life of human beings."—Howard J. Banker.
116. PEARSON, CHAS. E. Protection for plant novelties. *Gard. Chron.* 67: 8. 1920.—The author deprecates the present position of the raiser of new fruits, etc.; no method of protection is suggested. The paper is elicited by a previous article by BLISS.—J. M. SHULL.
117. PLUMB, C. S. Types and breeds of farm animals. viii + 820 p., 1 pl., 368 fig. Ginn & Co.: Boston & London, 1920.—This book is in four parts: Part I is devoted to the various breeds of horses, the ass, and the mule; part II, to cattle; part III, to sheep and goats; and part IV, to swine.—The following breeds of horses are discussed in part I: The Arab, Thoroughbred, American Saddle Horse, American Trotter and Pacer, Hackney, French Coach, German Coach, Cleveland Bay, Percheron, French Draft, Belgian, Shire, Suffolk, Ponies, Shetland.—The breeds of cattle discussed in part II are: Shorthorn, Polled Shorthorn, Hereford, Aberdeen Angus, Galloway, West Highland, Jersey, Holstein-Friesian, Guernsey, Ayrshire, Dutch Belted, French Canadian, Kerry, Dexter, Red Polled, Brown Swiss, and the Devon.—The breeds of sheep discussed in part III are: Merino, American Merino, Delaine Merino, Rambouillet, Southdown, Shropshire, Oxford Down, Hampshire Down, Dorset Horn, Cheviot, Suffolk, Tunis, Leicester, Cotswold, Lincoln, Romney Marsh, Black-faced Highland, Corriedale, Karakul, Angora Goat, and the Milch Goat.—The breeds of swine discussed in part IV are: Merksire, Duroc-Jersey, Poland-China, Chester White, Hampshire, Mule-Foot, Large Black, Cheshire, Small Yorkshire, Essex, Large Yorkshire, and the Tamworth.—Chapters are devoted to descriptions of the light harness, the heavy harness, and the draft horse type; to the beef, the dairy, and the dual-purpose type cattle; to the fine-wool and the mutton type sheep; and to the lard type and the bacon type of pig.—Some idea of the scope of the discussion of each breed may be gained from the following outline of the chapter on the Percheron horse: The Native home of the Percheron horse, the origin of the Percheron breed, the improvement of the early Percheron, the early type of Percheron, Percheron deterioration, the type of Percheron about 1877, the improvement of the Percheron in France, the introduction of the Percheron to the United States, the characteristics of the Percheron horse, the color of the Percheron, the weight and height of the Percheron, the temperament of the Percheron; the maturing quality of the Percheron, cross-bred or grade Percherons, the prolificacy of the Percheron, famous Percheron sires, the leading Percheron shows, Percheron futurity shows, the prices paid for Percherons, Percheron geldings, the distribution of the Percheron horse, the distribution of Percherons in the United States, organizations for promoting Percheron horses, American Percheron horse associations.—R. R. Graves.
118. POMONA. The pollination of fruit blossoms. *Gard. Chron.* 69: 150-151. 1921.—It is stated that forms of *Malus* are in great measure sterile, and several examples are cited of barren trees becoming fruitful when the blossoms were artificially pollinated with pollen from other varieties, or when supplied with pollen from trees of other varieties planted in close proximity. The author warns against planting large blocks of single varieties and advocates mixed planting.—C. S. Crandall.
119. REID, G. ARCHDALL. Biological terminology. *Nature* 107: 265-266. 1921.—The author replies to CUNNINGHAM (*Nature* 106: 828. 1921).—G. A. Stearna.

120. HINDLE, O. Differential survival of male and female dove embryos in increased decreased pressures of oxygen. A test of the metabolic theory of sex. Proc. Soc. Exp. Med. 18: 88-91. 1920.—The attempt is made to measure the relative metabolic rates of embryos of different sex. Because of difficulties in doing this directly, the experiments devised to test the differential survival of the sexes when the eggs during incubation subjected to increased and decreased oxygen pressures and to low temperature for various periods. It is argued that if male embryos have a higher metabolic rate than females should succumb more readily to diminished oxygen pressure and *vice versa*, and the low percentage should by the same reasoning be more harmful to the males. Data are given which are interpreted as supporting this conclusion.—L. J. Cole.

121. ROWAN, W., E. WOLFF, THE LATE P. L. SULMAN, K. PEARSON, E. ISAACS, E. ELDERTON, AND M. TILDESLEY. On the nest and eggs of the common tern (*S. fluviatilis*) A cooperative study. Biometrika 12: 308-354. 6 pl. 1919.—The authors report the continuation in 1914 of the study of a tern colony made in 1913. The following characters were recorded: (1) Length, (2) breadth, (3) longitudinal girth, (4) transverse girth, (5) tone or ground color, and (6) mottling, of eggs; and (7) type of nest, whether a simple depression in the ground or constructed of nesting materials. From a statistical treatment of these data more or definite conclusions are reached. Some of these are as follows: As in 1913, broader eggs have less mottling, attributed to possible pressure on the surface of the egg as it passes through the oviduct, thereby influencing the amount of pigment deposited. The eggs of 1914 are significantly larger and less variable, possibly correlated with a better food supply. Correlations believed significant were obtained between relatively longer eggs (those of greater ovality) and more elaborated nests. While correlation of nest type with ground color (brown or green) of egg was not significant, eggs with finer blotches seemed to be associated more frequently with the more elaborate nests; moreover "denser browns and lighter greens are somewhat more usual when the nest is a mere hole in the shingle, and lighter brown darker green eggs are associated with more elaborately constructed nests."—The proportion of green to brown eggs in a clutch increases with the size of the clutch. Various explanations are suggested and tested statistically. Several other correlations are considered and a more detailed discussion of the physiological and evolutionary bearings of the results.—L. J. Cole.

122. SALIBURY, E. J. [Rev. of: REINHEIMER, H. Symbiosis. A socio-physiological study of evolution. xiv + 295 p. Headley Brothers: London, 1920.] Sci. Prog. [London] 13: 571. 1921.

123. SCHRADER, FRANK. The chromosomes of *Pseudococcus nipae*. Biol. Bull. 259-270. 2 pl. 1921.—The diploid number of chromosomes in both the male and the female of *Pseudococcus nipae* is 10. In the female, 5 tetrads are formed; these are normal in appearance. In the growth period 5 of the chromosomes condense in advance of the remainder and can always be distinguished from the other chromosomes. There is no indication of tetrad formation. In the 1st division all chromosomes divide and each daughter cell receives 10. In the 2nd division there is no chromosomal division but merely a separation of chromosomes into 2 groups, those which were condensed first going to one pole and the other going to the other, thus giving rise to 2 kinds of spermatids each containing 5 chromosomes. Spermatosa formation seems to follow normally.—Mary T. Harman.

124. SKILBEK, J. [German rev. of: MOHR, OTTO L. Mikroskopische Untersuchungen zu Experimenten über den Einfluss der Radiumstrahlen und der Kälte Wirkung auf die Keimreife und das Heterochromosom bei *Decticus verrucivorus* ( $\sigma^7$ ).] (Microscopic studies relating to experiments on the influence of radium rays and effect of cold on maturity and the heterochromosome of *Decticus verrucivorus* ( $\sigma^7$ .) Arch. Mikrosk. Anat. 300-368. 6 pl. 1919.] Arch. Zellforsch. 15: 312. 1920.

125. SHAMMEL, A. D. Cooperative improvement of citrus varieties. California Citrograph 6: 141, 156, 199, 220-222. 7 fig. 1921.—A general discussion of "bud variation" and

selection" is presented. Citrus orchards studied generally showed 40-90 per cent of trees of inferior "strains," averaging about 25 per cent; re budding such trees from superior trees has greatly increased the yield in many cases.—Howard B. Frost.

126. SHAMEL, A. D. The Satsuma orange in southern Alabama. California Citrograph 6: 328-331. 6 fig. 1921.—This popular article includes an outline of rules of the Alabama State Board of Horticulture regulating citrus propagation. After Nov. 1, 1921, the Board will furnish information to propagators about orchards suitable as sources of bud wood, and every lot of trees sold must carry a certificate tracing the trees to the parent orchard. From Nov. 1, 1924, similar provisions relating to the individual parent trees are to be enforced.—Howard B. Frost.

127. SHAMEL, A. D. Top-worked citrus trees. California Citrograph 6: 109, 134. 5 fig. 1921.—The use of buds from performance-record trees in all top-working is urged.—Howard B. Frost.

128. STOUT, A. B. Conference notes for November and December. Jour. New York Bot. Gard. 22: 15-19. 1921.—The author reported on flower types in grapes with reference to fruit development. Excellent study material is available at the New York Agricultural Experiment Station at Geneva, where thousands of European and American grape seedlings are raised. Breeding and selection of parentage are necessary to produce desirable flowers, particularly for production of seedless varieties. The latter are strongly male and weakly female. Crosses between seedless and near-seedless plants, used as the pollen parent, with strongly female plants result in strongly female and seed-producing progeny. Crosses between 1st-generation hybrids of standard seed varieties with Hubbard seedless resulted in strongly female plants producing seeded fruit, the strong femaleness of seeded fruit being dominant over weak femaleness of seedless fruit. Some seedless fruits may be expected by segregation in later generations. A few viable seeds may be produced by crossing seedless varieties, as pollen parent, and near-seedless varieties, as female parent, although most of these are generally strongly male. Thus, families may be obtained, strongly male and weakly female, producing some seedless fruit.—F. W. PENNELL reported on the trend of evolution in American species of *Veronica* and near allies of the Scrophulariaceae, and T. HARVEY JOHNSTON on his mission to the U. S. A. for the Prickly Pear Travelling Commission.—At the December conference H. A. GLEASON reported on "*Siphocampylus* and *Centropogon* in South America," and P. A. RYOSWA on the genus *Diphysa*.—FRANCEVA R. MEYER.

129. STOUT, A. B. Types of flowers and intersexes in grapes with reference to fruit development. New York Agric. Exp. Sta. Bull. 82. 16 p., 7 pl. 1921.—A detailed report is presented of the different types of flowers among varieties of grapes together with an investigation into the probable cause of the production of seedless varieties. The usual classification of grape flowers into staminate, perfect hermaphrodite, and imperfect hermaphrodite for all general purposes is retained but the author points out that besides these flower types there are a number of variations. Especial attention is called to a flower type having a well developed pistil but rapidly degenerating stamens. The filaments instead of being straight and long are crinkled and the pollen is generally impotent. A description of several other types of flowers is included, with 7 plates and 39 figures.—The author points out that grape flowers for convenience may be grouped according to the degree of maleness or femaleness which they exhibit. Staminate flowers are male in character even though rudiments of the pistil may be observed. Imperfect hermaphrodites are weak in maleness because of the degeneration of the stamens and pollen grains. Perfect hermaphrodites are equally strong in both maleness and femaleness and these flowers are found associated with the best commercial varieties.—Fruitful perfect hermaphrodites with weakly developed pistils are weak in femaleness in inverse ratio to the number of viable seeds that are produced. It is among these flowers that the type is sought which is responsible for the production of seedless and near seedless grapes.—A clear distinction is drawn between vines that produce seedless fruits developing from flowers

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that produce seedless fruit without any such stimulus; the latter are truly parthenocarpic in character. A few cases are cited of vines bearing 2 or more types of flowers during the same season; and, again, vines known to have changed their flower types from year to year in regard to the degree of femaleness and relative fruitfulness. Such cases indicate that fruitfulness of the vine can be stimulated by cultivation and better care.—Intersexualism is described as resulting from variations in the morphological development of stamens and pistils and in their ability to function sexually. It is always the result of a one-sided loss of sex or sexual power. It is contrasted with the sterility of hybridity, which manifests itself always in the deterioration of the functions of both sets of flower organs.—General suggestions are given for the production of seedless types of grapes by pollinating the near-seedless types which produce occasional seeds with pollen from the truly seedless types.—*L. R. Detjen.*

130. STURTEVANT, A. H. Genetic studies on *Drosophila simulans*. II. Sex-linked group of genes. *Genetics* 6: 43-64. 6 fig. 1921.—Since hybrids between *D. simulans* and *D. melanogaster* are sterile, the genetic make-up of pure *D. simulans* has been studied. Seven sex-linked mutants are described, all of which resemble known sex-linked mutants of *D. melanogaster*; 5 of these have been shown by actual crossing to be allelomorphous with the corresponding *melanogaster* types, and 1 is certainly not allelomorphous. The crossover relations show that the order of these 5 allelomorphous genes in the 2 species is the same, but the amount of crossing over is not identical. Non-disjunction and gynandromorphism occur in *D. simulans*, and 2 apparent somatic mutations similar to known mutations in *D. melanogaster* occurred.—*H. H. Plough.*

131. STURTEVANT, A. H. Genetic studies on *Drosophila simulans*. III. Autosomal genes. General discussion. *Genetics* 6: 179-207. 6 fig. 1921.—In this paper the autosomal genes of *D. simulans* so far discovered are described, and data are given on their genetic behavior both within the species and in interspecific hybrids with *D. melanogaster*. Six mutant genes are shown to belong to a group corresponding to the 2nd chromosome of *D. melanogaster*, and 7 to one corresponding to the 3rd. Direct tests in hybrids show that 2 of the 3rd-chromosome genes,—scarlet and peach,—are allelomorphous to similar genes in the other species, but they show about 15 times as much crossing over in *D. simulans*. One 2nd-chromosome gene produces intersexes,—females with a varying number of male characters. Two characters are described, each of which is dependent on genes located in 2 chromosomes. In addition to these facts a discussion of intersexuals is given, including other forms which have a genetic constitution similar to that demonstrated for intersexual *D. simulans*. Finally, a discussion of the genetics of related species in general appears. It is brought out that parallel mutations in related species can be considered identical only when the genes are shown to be allelomorphous by actual hybridization tests. A number of investigators working with both plants and animals have established the fact that mutant genes of one species produce similar effects in interspecific hybrids,—that is, that identical wild-type genes are present. In this study for the first time it is shown that 7 similar mutations appearing independently in each of 2 species are actually allelomorphous as shown by crosses. Thus there is definite proof that related species have many genes in common and that identical mutations may occur in different species.—*H. H. Plough.*

132. STURTEVANT, A. H. Intersexes in *Drosophila simulans*. *Science* 51: 325-327. 1920.—A distinct sex-type, intermediate between male and female, is reported. The "intersex" resembles the female (penis and sex-combs absent, ovipositor and spermathecae present), but the genital tergite, anal plates, claspers, and coloring at tip of abdomen are approximately those of the male-type. There are no gonads. The sexual behavior is female-like. Genetically, intersexes are modified females, even the male parts having the XX constitution. The  $F_2$  ratio is 3 ♀ : 1 ♂ : 4 ♂. The modifier is a 2nd-chromosome recessive (linked to plum, independent of yellow). The normal sex-producing mechanism is not interfered with; but its action is modified by a gene not even in the sex-chromosomes.—*Calvin B. Bridges.*

133. THADANI, K. I. Some notes on cotton in Sind. *Agric. Jour. India* 15: 393-397. 1920.—A report is presented of natural crossing and the extent to which it occurs in *Gossypium neglectum*. The results show that vicinism causes 50-84 per cent of the plants to become affected by natural cross-fertilization. The author reports the existence of cleistogamic flowers.—F. M. Schertz.
134. TISCHLER, G. [German rev. of: HERTWIG, PAULA. *Haploide und diploide parthenogenese*. (Haploid and diploid parthenogenesis.) *Biol. Zentralbl.* 40: 145-174. 1920 (see Bot. Abstr. 6, Entry 1695).] *Zeitschr. Bot.* 13: 463-465. 1921.
135. TISCHLER, G. [German rev. of: TÄCKHOLM, G. On the cytology of the genus *Rosa*. (A preliminary note.) *Svensk. Bot. Tidskr.* 14: 300-311. 3 fig. 1920 (see Bot. Abstr. 7, Entry 243).] *Zeitschr. Bot.* 13: 467-468. 1921.
136. UPHOF, J. TH. Breeding disease-resistant plants. *Gard. Chron.* 69: 275. 1921.—Examples are given of the successful control of plant diseases by means of the production of disease-resistant forms. The necessity of cooperation between the plant pathologist and the geneticist is emphasized.—H. K. Hayes.
137. VILMORIN, JACQUES DE. Sur les croisements de pois à cosses colorées. [On the crossing of peas with respect to the color of the pods.] *Compt. Rend. Acad. Sci. Paris* 172: 815-817. 1921.—Among purple-flowered peas 1 variety is known with purple or partly purple pods, this character being dominant over green pod color. When purple is present in yellow-podded peas a bright red hue results. Among white-flowered plants grown at Verrières, some had faint traces of purple on the young green pods, and pink on the young yellow pods which disappeared as the pods matured. This case is similar to Lock's "ghost" mapped seeds in plants with white flowers, the complete manifestation of mapling being present only in purple-flowered plants.—A cross made between a white-flowered plant with young pods faintly marked with pink, and *Pisum elatius*, having purple flowers and green pods, resulted in a 1st-generation progeny all having purple pods, as was expected. The 2nd generation gave a wide variation of colors, the pods being green, purple, slightly purple, yellow, and red (purple present in yellow pods), and the flowers white, purple, and pink. The seeds were garnet, mapled, plain garnet, and, in the white-flowered plants, round white, or white faintly mapled. The same result was obtained in a 2nd cross using a pink-flowered plant with green pods as the male parent. In this cross the seeds of purple-flowered plants were red-speckled or plain red. Evidently these characters all behave in Mendelian fashion, but the number of individuals was too small to establish this fact. It is suggested that many so-called "latent" characters in animals and plants may be recognized by close observation, as, in the present instance, faint purple coloring in the green pods.—Francena E. Meyer.
138. WATSON, J. A. S. Problems of animal breeding. *Scottish Jour. Agric.* 2: 449-456. 1919.—The ideal type to be striven for by the breeder of livestock must be based on commercial utility. Not enough weight has been given to producing ability in breeding Ayrshires; too much weight is given to legs, pasterns, feet, and hair in judging Clydesdales and not enough to the more essential points, such as muscular development and width and substance of body. There is great need for the development of dual-purpose short-horns and disease-resistant sheep.—While neither practical breeders nor geneticists can point out easy methods by which the ideals in type and utility can be acquired, certain breeding principles are discussed. Mass selection: Selecting breeding stock on individuality alone frequently gives unsatisfactory results because the visible characters do not picture the inborn hereditary qualities. Family selection: The pedigree must be judged by the success as breeders of the immediate ancestors rather than by their individual merit, and selection should be made from good families rather than from good individuals. Inbreeding: Animals produced by violent out-crosses are generally unsatisfactory breeders and therefore the aim should be to have some degree of similarity of type between parents and some measure of actual blood relationship. The question of how closely inbreeding may be practiced can not be answered, but it is pointed out that in



oroughbred horses an inbred animal has never won a race. The latest scientific contribution on inbreeding suggests that it is only a majority of an inbred strain that suffers the evil effects while the remainder may acquire all the benefits of inbreeding without any of the evil effects. The family craze: Pedigrees should be valued on the breeding ability of the immediate ancestors and the degree of consanguinity between them. The weight given to animals distant generations is excessive. The family craze, which results in animals of fashionable unities being retained for breeding purposes regardless of worth, and which permits good animals to go because they lack aristocratic names, is doing a great deal of harm. THOMAS BATES is blamed for initiating the family craze and it is pointed out that "our own AMOS CRUTKSHANK who cared nothing for families or for high-sounding names, would be a better model to imitate."—*R. R. Graves.*

139. WEBBER, HERBERT J. The place of plant breeding in commercial seed companies.—*Florists' Exchange* 51: 1476-1477. 1921.—The author cites instances of successful plant-breeding work, both governmental and private, and discusses the alternative merits of plant breeding and of pedigreed-seed production by government agencies on the one hand and by private industries on the other. It is argued that government agencies should not engage in large-scale breeding for practical seed production if private companies can do the work equally well, and that the activities of government agencies act as a deterrent to private industry along these lines.—*J. Marion Shull.*

140. WELLINGTON, R. Report on vegetable investigations being carried on by experiment stations and similar institutions. *Proc. Amer. Soc. Hort. Sci.* 17: 267-275. 1920 [1921].—The main projects now under way are briefly described. These include studies in selection, breeding, and pollination with the vegetable crops.—*H. K. Hayes.*

141. WHITE, ORLAND E. The pollination of flowers. *Brooklyn Bot. Gard. Leaflets Series* 9<sup>3,4</sup> 15 p. 1921.—A general discussion of flower pollination is presented. The interrelationships between plants and insects are described in an interesting manner.—*H. K. Hayes.*

142. WOODWARD, B. B. [Rev. of: PELSNER, PAUL. *Les variations et leur hérédité chez les mollusques.* (Variations and their inheritance among the mollusks.) *Mem. Acad. Roy. Belgique Cl. Sci. Collection in 8°.* II, 3: 1-326. 286 fig. 1920.] *Nature* 107: 7. 1921.

143. WRIGHT, SEWALL. Systems of mating. I. The biometric relations between parent and offspring. *Genetics* 6: 111-123. 2 fig. 1921.—The method of path coefficients previously determined by the author (see *Bot. Absta.* 9; Entry 280) is brought to bear on the various relationships which may exist between parent and offspring. After discussing the various consequences of the Mendelian mechanism expected in equilibrium and for the various systems of mating, the author points out how the effects of the residual heredity or the separate effects of heredity and environment may be measured mathematically. Methods of allowing for the effect of dominance are discussed as well as the expected relations between zygotes and gametes. His fundamental formula is  $h^2 + d^2 + e^2 = 1$ , in which  $h$  represents the constitution of the fertilized egg,  $d$  the tangible environmental factors, and  $e$  the intangible environmental factors. Different formulae are then offered to express the other relationships previously enumerated, and all are assembled in table 2 at the close of the paper, presenting the cases for consanguine mating, equilibrium, and random mating. The general formula in consanguine mating for the correlation between 2 parents is  $r_{PP} = mh'$  in which  $m$  represents the correlation between egg and sperm and  $h'$  the sygotic constitution of the parents. Similarly, the correlation between parent and offspring is  $r_{PO} = abhh'(1+m)$ , in which  $a$  is the path coefficient from gamete to zygote,  $m$  and  $h'$  have the meaning previously given,  $h$  is the sygotic constitution of the offspring, and  $b$  is the correlation between the hereditary constitution of the gamete from the sire producing the individual in question and the hereditary constitution of the paternal zygote. The correlation between 2 offspring is  $r_{OO} = 2a^2bh^2(1+m) + e^2$ .—*Edward N. Wentworth.*

144. WRIGHT, SEWALL. Systems of mating. II. The effects of inbreeding on the genetic composition of a population. *Genetics* 6: 124-143. 18 fig. 1921.—The results of different systems of inbreeding on the composition of the population are expressed in terms of variation which is purely genetic, although the method of considering the tangible and intangible environmental factors is demonstrated. The method of path coefficients is shown to be more general in application than the previous methods of attack on the results of inbreeding, and the series for the percentages of heterozygosis in descendant generations as calculated by previous investigators was shown to agree with the results secured by the method of path coefficients. The series for brother-sister matings, self-fertilization, parent-offspring matings, double first cousins, and single first cousins was developed, followed by more complex systems impracticable of development under the older methods. Such matings as quadruple second cousins, octuple third cousins, half brother and sister, half brother and 2 sisters, half brother and 2 half sisters plus half sister with 2 half brothers, half first cousins and second cousins are developed in detail, and their relation to practical breeding demonstrated.—Edward N. Wentworth.

145. WRIGHT, SEWALL. Systems of mating. III. Assortative mating based on somatic resemblance. *Genetics* 6: 144-161. 7 fig. 1921.—Selective mating based on somatic types such as is commonly followed by practical breeders is analyzed by the method of path coefficients. The general theory is discussed, first in the absence of dominance. The author assumes that a certain correlation,  $r_{pp}$ , exists between the mated individuals because of their somatic resemblance. He further assumes that the somatic correlation implies a correlation,  $m$ , between the zygotic constitutions. This requires that there be a correlation between factors of different sets of allelomorphs which act on the same character. There are 2 types of this correlation,  $f_u$  representing the correlation between factors of the same set of allelomorphs, and  $f_s$  the correlation between factors of different sets of allelomorphs. Assuming the same relative frequency of dominant to recessive factors in the case of all allelomorphs, the author calculates a series of formulae. One interesting contingency arising in the case of matings based on somatic resemblance that does not arise in the case of matings based on blood relationships is that somatic resemblances indicate not only a tendency to mate individuals of like genetic composition but also individuals affected by similar external conditions. He then develops a means of separating these 2 effects. Discussions are presented of the expectations in the case of equilibrium in the population, in the case of dominance, and in the case of assortative mating combined with inbreeding. This latter form of mating is demonstrated to be the most rapidly effective since it combines the correlation due to inbreeding with the correlation between uniting gametes due to the relation of the zygotic constitution to the somatic type.—Edward N. Wentworth.

146. WRIGHT, SEWALL. Systems of mating. IV. The effects of selection. *Genetics* 6: 162-166. 1 fig. 1921.—After reviewing the expectation in the case of selection for 1 factor, and showing that no fixation of type can occur in the case of heterozygotes lacking dominance, the author considers the effect of selection on a characteristic depending on  $n$  pairs of allelomorphs. He assumes plus and minus factors of each pair to be equally numerous, all factors to be of equal weight, and dominance absent. The distribution of plus factors in  $(2n + 1)$  classes can be found from expanding  $(\frac{1}{2} + \frac{1}{2})^{2n+1}$ , and assuming the coefficients thus obtained to begin with the class having the greatest number of plus factors present. The distribution of the minus factors can be found by the same formula, but it is necessary to begin their application with the class having the next greatest number of plus factors present. This permits determination of the ratio of plus factors to total factors in any class, it being always  $\frac{1}{2}$  of the middle class. For a deviation of  $x$  classes beyond the middle the ratio  $q$  is shown to be  $\frac{n+x}{2n}$  or in terms of the standard deviation,  $\frac{1}{2}(1 + \frac{x}{\sqrt{2n}})$ . By selecting for mating only individuals of a middle class, the author shows that the only effect lies in the 1st selection, and return to random breeding reestablishes the same proportions as were found in the original unselected population. In a population of limited size this intermediate type may be

fixed since there will be a degree of inbreeding consequent upon small numbers. If selection is directed toward a type between a mean and one of the extremes almost the full effect of selection is reached in the 1st generation and further selection merely reduces the variability slightly. If all the variation is not due to genetic causes, the usual condition, the point will be reached below which variation can not be reduced and selection therefore becomes continually more ineffective.—*Edward N. Wentworth.*

147. WRIGHT, SEWALL. Systems of mating. V. General considerations. *Genetics* 6: 167-178. 7 fig. 1921.—In this paper the author discusses some of the more important results of his previous papers (see the preceding 4 entries) unencumbered by mathematics. He shows that with random mating, inbreeding, or assortative mating, the relative frequency of the different genetic factors in the original population remains constant in any subsequent descendant population as a whole and random breeding restores the original composition. On the other hand, selection which is due to a differential rate of reproduction among different classes modifies the relative frequencies of genetic factors and effects a permanent change. The combination of all systems of mating he has studied is shown to be the most effective way of modifying the characteristics of a stock. Charts showing the differential rates of progress under different systems of mating are presented. The rate of obtaining homozygosis is considered important since it measures the permanency of the change effected by the system of mating and is a very important quality in increasing prepotency. It is shown that selection produces progress toward perfect homozygosis only when directed toward an extreme type. Close inbreeding or assortative mating leads to increased variability in the population as a whole while disassortative mating holds the population together. Matings between relatives more remote than first cousins have little significance as inbreeding unless the population is small.—*Edward N. Wentworth.*

148. ZIEGLER, A. Unterscheidungsmerkmale der Gerste mit besonderer Berücksichtigung der Basalborste. [Distinguishing characters of barley with special reference to the basal bristles.] *Deutsch. Landw. Presse* 47: 184-185. 1920.—A description is given of 2 types of basal bristle in 2-rowed barley: Type A, hairs long, sharp-pointed, single-celled; type C, hairs shorter, branched, blunt, and usually several-celled. The author finds non-heritable variations within the type, but the types themselves are well separated by these distinguishing characters.—*F. P. Bussell.*

## HORTICULTURE

J. H. GOUMLEY, *Editor*

H. E. KNOWLTON, *Assistant Editor*

(See also in this issue Entries 28, 84, 85, 99, 125, 126, 127, 128, 129, 140, 211, 231, 248, 294, 295, 303, 314, 319, 381)

## FRUITS AND GENERAL HORTICULTURE

149. ANONYMOUS. [Rev. of: COPELAND, E. B. *The coconut. 2nd ed. revised, xiv + 226 p.* Macmillan and Co.: London, 1921.] *Nature* 107: 391. 1921.

150. ALLEN, R. H. Eighteenth annual report of the state nursery inspector. *Massachusetts State Nursery Inspector Ann. Rept.* 18: 1-12. 1920.—One hundred and forty eight nurseries were inspected and certificates issued, also 200 shipments of foreign stock were examined. A list of the insects and fungus diseases found is given. Work in the control of white pine blister rust was carried on in cooperation with the U. S. Department of Agriculture. Eradication of *Bibio* in the southeastern area was continued, and through financial aid from the State Forestry Department and private sources further work in Petersham and other towns was carried on. A tabulated summary of the work done and costs is given. The European orn borer was found in extended areas and the work of eradication in infested areas and maintaining a quarantine against these areas continued.—*J. K. Shaw.*

151. ALLEN, W. J. The pruning of Rome Beauty. *Agric. Gaz. New South Wales* 32: 429-434. 10 fig. 1921.
152. BAKKE, A. L., W. A. RADSPINNER, AND T. J. MANEY. A new factor in the determination of the hardness of the apple. *Proc. Amer. Soc. Hort. Sci.* 17: 279-289. 1920 [1921].—The investigators used the current season's wood growth of 18 varieties of apples, 15 years old, and wood from varieties of nursery trees 2 years old. Samples were collected during the dormant season, when the buds were swelling, at blossoming time, during summer growth, and at the wood-ripening period. Tests were made on each for the depression of the freezing point, water content, ash content, and hydrogen-ion concentration. Since the hydrogen-ion concentration proved to be the same throughout, it was dropped from consideration. Tables are given for each period and include the date of collecting, variety, freezing point lowering, per cent of moisture, and the hardness factor. In separating the varieties into groups of 4 according to recognized hardness the per cent of ash generally increases as hardness decreases, which appears to be of some significance. During the period at which buds are swelling the lowering of the freezing point is least. The authors state "the results obtained point out the possibility of using the depression of the freezing point and the moisture content as an index in ascertaining comparative hardness. The solutes which are responsible for differences in the ash appear to be significant in the general question of hardness." It is thought that measurements and tests to determine the hardness should be made at a time when the metabolic processes of the plant are at their maximum.—*H. W. Richey*.
153. CHASSET, L. Ébrogne d'hiver des yeux du poirier. [Winter disbudding of pear trees.] *Rev. Hort.* 93: 263-264. 1921.—If branches are cut back in winter, 2 strong branches almost certainly will develop immediately below the cut, and the buds remaining below them are starved. By carefully judging the amount of heading according to the vigor of the variety and age of the tree, and then removing the 2 buds immediately below the topmost one, the remaining buds are nourished to better advantage, and the development of fruit buds and fruit spurs is likely to follow.—*E. J. Kraus*.
154. CHASSET, L. Quelques bonnes cerises à cultiver. [Some good cherries worth growing.] *Rev. Hort.* 93: 274-275. 1921.—A list is given of several varieties, suitable for various regions.—*E. J. Kraus*.
155. COOPER, J. R. Commercial grape growing. *Arkansas Agric. Exp. Sta. Bull.* 174. 40 p., 16 pl. 1921.—The author presents a general bulletin giving recommendations for the selection of varieties for Arkansas, directions for preparation of the soil, planting, trellising, and pruning. Fruiting habits and systems of training are described and illustrated. Methods of cultivation, cover-cropping, and fertilizing suited to Arkansas conditions, are given. A discussion of pests includes brief descriptions of some of the insect pests and diseases, with general control measures, a spray schedule, and a discussion of spray materials used.—*D. Reddick*.
156. ENFFER, V. Les incisions sur les branches charpentiers du poirier. [Incisions on the scaffold branches of the pear.] *Rev. Hort.* 93: 250-251. 1921.—Specific directions are given on making incisions in the vicinity of several types of branches in order to direct the character of the growth of the branches, behavior, and fruit-bud production.—*E. J. Kraus*.
157. H., T. A. Cocoa and chocolate. [Rev. of: KNAPP, A. W. *Cocoa and chocolate: their history from plantation to consumer.* zii + 210 p. Chapman and Hall: London, 1920.] *Nature* 107: 357. 1921.
158. JAHANDIEZ, E. La grande gelée des 17 et 18 décembre 1920 sur le littoral méditerranéen. [The great freeze of December 17 and 18, 1920, on the Mediterranean coast.] *Rev. Hort.* 93: 266-267. 1921.—Notes are given on the extent of the damage to many species of plants caused by temperatures ranging to as low as  $-13^{\circ}\text{C}$ . in various sections.—*E. J. Kraus*.

159. MANUEL, H. L. Vineyard notes for June. *Agric. Gas. New South Wales* 32: 437-438. 1921.

160. ROLFS, F. M. Report of horticultural department. *Oklahoma Agric. Exp. Sta. Rept.* 29: 46-53. 1920.—This article gives a report of progress on various horticultural and pathological projects.—*John A. Elliott.*

161. SWARTWOUT, H. G. Small fruit growing in Missouri. *Missouri Agric. Exp. Sta. Bull.* 184. 87 p. 1921.—This is a brief discussion of the culture of small fruits. The results of 2 years varietal experiments with raspberries, blackberries, and strawberries are reported.—*L. J. Stadler.*

162. WILDING, E. H. Hybridization; the elimination of foreign interference. *Rhododendron Soc. Notes* 2: 48. 1920 [1921].—To eliminate the possibility of the introduction through insect agency of other pollen than that applied artificially, the floral envelope together with the stamens is removed when about half developed. The pistils deprived of the corolla were not visited by insects and only those developed seed capsules which were fertilized artificially. In 1 case 200 flowers were treated, of which 50 were fertilized artificially; of the latter 43 set seed capsules, while of the 150 not artificially fertilized, not one developed into a seed capsule.—*Alfred Rehder.*

#### FLORICULTURE AND ORNAMENTAL HORTICULTURE

163. ANONYMOUS. [Notes.] *Rhododendron Soc. Notes* 2: 1-50. 1920 [1921].—The number for the year 1920 contains 17 mostly short notes contributed by members of the Society; of these notes, 15 consist chiefly of reports on the behavior, hardiness, flowering, cultivation, etc., of rhododendrons in different places in Great Britain. [See also *Bot. Absts.* 10, Entry 162.]—*Alfred Rehder.*

164. ANONYMOUS. [Rev. of: STOUT, MARY, AND MADELINE AGAR. *A book of gardening for the sub-tropics.* 200 p. F. and G. Witherby: London, 1921.] *Nature* 107: 232. 1921.—This book applies particularly to the Cairo district.—*O. A. Stevens.*

165. BONVALLET, E. Le pyrèthre rose (*Pyrethrum roseum*). [Pyrethrums.] *Rev. Hort.* 93: 262-263. 1 pl. (colored). 1921.—Brief cultural notes and somewhat detailed descriptions of several types, and of a dozen named varieties, are given.—*E. J. Kraus.*

166. HEBEDE, A. VAN DEN. Rusticité des souches de Dahlias. [Hardiness of dahlia stocks.] *Rev. Hort.* 93: 248. 1921.—In northern France, dahlia roots remained without injury in the open ground over winter when protected by a covering of manure and leaves 50 cm. in depth.—*E. J. Kraus.*

167. MILLET, L. Quelques nouvelles violettes. [Some new violets.] *Rev. Hort.* 93: 246-247. 1 pl. (colored). 1921.—The varieties *Coeur d'Alsace* and *Souvenir de ma Fille* are figured and their origin and qualities noted in detail; several others are mentioned.—*E. J. Kraus.*

168. MOREL, F. Le Weigélla à feuilles pourpres: *Diervilla florida* Sieb et Zucc. [The purple leaved weigella.] *Rev. Hort.* 93: 278-279. 1 pl. (colored). 1921.—The variety is a seedling of *D. florida*, selected and introduced by L. Chenault.—*E. J. Kraus.*

169. MOTTET, S. Clematis Armandi grandiflora. *Rev. Hort.* 93: 276-278. Fig. 68. 1921.—Detailed descriptive and brief cultural notes are given. The variety is considered much superior to *C. Armandi*.—*E. J. Kraus.*

170. MOTTET, S. Le pin de Macedoine (*Pinus Peuce*). [The Macedonian pine.] *Rev. Hort.* 93: 244-246. Fig. 65-67. 1921.—Because of its entire hardiness, resistance to drought, and its compact growth, this species is well adapted for planting in small gardens and as specimens on lawns.—*E. J. Kraus.*

171. PINELLE, J. *Nerprun hybride: Rhamnus hybrida*. [Hybrid *Rhamnus*.] Rev. Hort. 93: 264-265. Fig. 87. 1921.—The tree is excellent for planting singly or in masses on poor soils. Brief historical and descriptive notes are given.—E. J. Kraus.
172. POUPION, J. *Le Saurauja punctuana* Wall. Rev. Hort. 93: 260-262. Fig. 65-66 1921.—Descriptive and detailed cultural notes are given.—E. J. Kraus.
173. POUPION, J. *Phytelephas macrocarpa: sa culture en serre*. [Greenhouse culture of *P. macrocarpa*.] Rev. Hort. 93: 248-249. Fig. 64. 1921.—General directions for planting the seeds, care of seedlings, and maintaining the plants are given.—E. J. Kraus.
174. PUVILLAND, J. *Marronnier d'Inde à fleurs blanches pleureur: Aesculus hippocastanum var. pendula*. [White-flowered weeping horse-chestnut.] Rev. Hort. 93: 231. 1921.
175. ROLET, A. *Les oeillets crevards*. [Split carnations.] Rev. Hort. 93: 275-276. 1921.—Quickened vegetation after a period of relative inactivity, excess of nitrogen, lack of light, irregular temperatures, dry soils, and character of the variety are among the factors which have been assigned as causes of calyx splitting. The subject is still a matter for investigation of individual varieties.—E. J. Kraus.

## VEGETABLE CULTURE

176. MEUNISSIER, E. *L'épinard: culture printanière*. [Spring culture of spinach.] Rev. Hort. 93: 251-252. 1921.

## MORPHOLOGY, ANATOMY AND HISTOLOGY OF VASCULAR PLANTS

E. W. SINNOTT, Editor

(See also in this issue Entries 91, 133, 294, 295, 302)

177. BATESON, W. *Variation in a fern*. Nature 107: 233. 1921.—The author corrects a statement made in the Croonian Lecture (see Bot. Absts. 8, Entry 226). Prothallia of variegated *Adiantum* show light areas when examined by transmitted light.—O. A. Stevens.
178. BRIQUET, J. *Sur la présence d'acarodomaties foliaires chez les Clethracees*. [On the presence of foliar acarodomatia among the Clethraceae.] Compt. Rend. Soc. Phys. et Hist. Nat. Genève 37: 12-15. 1920.—Foliar acarodomatia are unknown among the Clethraceae except in 1 species, *Clethra barbinervis* Sieb. et Zucc., of China and Japan. The leaves have 2 kinds of trichomes, strigose and stellate. At the points where the lateral veins leave the midrib, there is a dense tuft of fascioled hairs, persisting throughout the duration of the leaf. These usually contain mites or their remains.—A. Gundersen.
179. BRIQUET, J. *Sur l'organization et l'edaphisme des feuilles ericoïdes chez les Pertya phylloïdes Jeffrey*. [On the organization and edaphism of the ericoid leaves of *Pertya phylloïdes* Jeffrey.] Compt. Rend. Soc. Phys. et Hist. Nat. Genève 37: 15-19. 1920.—The species of the genus *Pertya*, Compositae-Mutisiaceae, have no special vegetative peculiarities; *Pertya phylloïdes*, described in 1912 and growing on arid calcareous cliffs in Yunnan at 3000 m. altitude, is, however, an exception. The leaf is completely rolled, forming an interior chamber filled with long hairs. The chamber communicates with the exterior by a long slit, narrower toward the summit. Very minute stomata are numerous on the inside. The parietal canals of the exterior epiderm probably facilitate the rapid growth of the thick cuticle.—A. Gundersen.
180. CAMPBELL, D. H. *The eusporangiate ferns and the stelar theory*. Amer. Jour. Bot. 8: 303-314. 7 figs. 1921.—Following VAN THURBERG's stelar hypothesis, it is commonly assumed that the fibrovascular skeleton of the fern stem is a strictly canaliculate stele with which

the corresponding foliar bundles are connected by the so-called "leaf traces." The author presents evidence that in the Ophioglossales and Marattiales, at any rate, the stelar system begins as a single strand common to the first leaf and root. The stem is absent or insignificant at first and no procambium is developed within it. In the Ophioglossales and the earlier stages of the Marattiales the stelar structures of the stem are built up entirely of leaf traces, though in older plants of the latter order a few true cauline strands are formed. The "foliar gaps" are not breaks in a single tubular stele but are merely spaces between coalescent leaf-traces. The cortex is largely of foliar origin, also, and the pith is not stelar in nature but is a portion of the ground tissue which has been surrounded by coalescent foliar steles. The condition found in the axis of the eusporangiate ferns is more in accord with the older theory of "common" bundles traversing a ground tissue and united to form the woody cylinder of the axis, than with the assumption of a true cauline stele. This condition is probably also characteristic of the Eusporangiateae. In the lycopods, conifers, and many angiosperms, however,—groups in which the leaf is not the dominant portion of the shoot,—a cauline stele is undoubtedly present.—*E. W. Sinnott.*

181. DENHAM, H. J. Method of cutting cotton hairs. *Nature* 107: 299. 1921.—The method is a modification of that of BRECKNER (*Zeitschr. Wiss. Mikrosk.* 25: 29. 1906). The author uses a coating of celloidin followed by paraffin-wax, and imbeds in paraffin.—*O. A. Stevens.*

182. HARRIS, J. ARTHUR, AND EDMUND W. SINNOTT. The vascular anatomy of normal and variant seedlings of *Phaseolus vulgaris*. *Proc. Nation. Acad. Sci. [U. S.]* 7: 35-41. 4 diagrams. 1921.—The authors report on a statistical study, employing pure lines. Trimerous seedlings, with 3 cotyledons and 3 primordial leaves, typically have one-half more root protoxylem poles, hypocotyledonary bundles, and primary epicotyledonary bundles, than normal (dimerous) seedlings. Intercalary bundles often occur in the hypocotyl, more frequently in dimerous than in trimerous seedlings. The number of primary bundles, intercalary bundles, and double bundles which divide is notably variable; this variability differs with the type of seedling and the region considered. Both in dimerous and in trimerous seedlings, the total number of bundles at the base of the hypocotyl shows considerable positive correlation with the total number in the mid-region of the hypocotyl, but little or none with the total number in the mid-region of the epicotyl.—*Howard B. Frost.*

183. SOURÈGES, RENÉ. Embryogenie des Labiées. Développement de l'embryon chez la *Mentha viridis* L. [Embryogeny of the Labiatae. Development of the embryo of *Mentha viridis*.] *Compt. Rend. Acad. Sci. Paris* 172: 1057-1058. 1921.—The development of the embryo of this plant resembles very much that of *Veronica arvensis*, the same difference occurring between *Mentha viridis* and *Veronica arvensis* as between *Capsella bursa pastoris* and *Oenothera biennis*.—*C. H. Farr.*

## MORPHOLOGY AND TAXONOMY OF ALGAE

E. N. TRANSEAU, *Editor*

(See in this issue Entries 325, 332)

## MORPHOLOGY AND TAXONOMY OF BRYOPHYTES

ALEXANDER W. EVANS, *Editor*

(See in this issue Entries 325, 328)

## MORPHOLOGY AND TAXONOMY OF FUNGI, LICHENS, BACTERIA, AND MYXOMYCETES

H. M. FITZPATRICK, *Editor*

(See in this issue Entries 268, 292, 325 and those in the Section Pathology)

## PATHOLOGY

G. H. COONS, *Editor*C. W. BENNETT, *Assistant Editor*

(See also in this issue Entries 6, 9, 11, 27, 38, 66, 67, 80, 99, 106, 136, 150, 160, 175, 304, 305, 315)

## PLANT DISEASE SURVEY (REPORTS OF DISEASE OCCURRENCE AND SEVERITY)

184. BETHEL, ELLSWORTH. Notes on the Peridermiums of pines in Colorado and California. [Abstract.] *Phytopathology* 11: 45. 1921.

185. DRECHSLER, CHARLES. Occurrence of *Rhynchosporium* on *Dactylis glomerata* and *Bromus inermis*. [Abstract.] *Phytopathology* 11: 42. 1921.

186. McCUBBIN, W. A. The present status of the potato wart in Pennsylvania. [Abstract.] *Phytopathology* 11: 58. 1921.

187. SEYMOUR, EDITH K., AND FRANK T. McFARLAND. Loss from rye ergot. [Abstract.] *Phytopathology* 11: 41. 1921.

188. STAKMAN, E. C., R. S. KIRBY, AND A. F. THIEL. The regional occurrence of *Puccinia graminis* on barberry. [Abstract.] *Phytopathology* 11: 39-40. 1921.

189. WOLLENWEBER, H. W. Der Kartoffelkrebs, seine Verbreitung und Bekämpfung. [The potato canker, its distribution and control.] *Zeitschr. Kartoffelbau* 1: 61-64. Fig. 1-3. 1921.—Potato wart disease, at first restricted to small plantations, has spread widely in spite of all warnings and exclusion measures and is now a problem for the serious consideration of potato growers generally. Disease has been reported from Hungary, England, Scotland, Ireland, Germany, Newfoundland, Holland, Sweden, Norway, and the U. S. A. It seems to have since disappeared in Hungary and to have been eradicated from Sweden; in Norway and Ireland it has been kept from spreading by fallowing infected land. On the other hand, it has spread widely in England and in Germany, so that in the aggregate 1500 hectares are infested in Germany and 2500 in the northern hemisphere. It is significant that all loci of infection in Europe are found between the 50th and 60th parallels, while in America the altitude of the infested regions is such that it occurs down to 40° latitude.—Sulphur, mercuric chloride, and sulphuric acid have not been effective as soil disinfectants, but ERICSSON found the application of 10 l. of 1 per cent formaldehyde per square m. successful in disinfecting soil; also tools and storage bins. The remarkably long persistence of the pathogene in the soil and the fact that the tomato, nightshade, and bittersweet may serve as hosts make starving out processes tedious and uncertain in result. The use of immune varieties is the only practicable means of control known. Some immune varieties are of high commercial value, but many have been abandoned by their originators owing to poor yield or susceptibility to other disease. Maximum value in each of these respects, as well as immunity to the wart disease, must be the breeder's goal in future work. A list of varieties immune to wart and of widest adaptability to German conditions of potato culture is given.—*F. Weiss*.

## THE HOST (RESISTANCE, SUSCEPTIBILITY, MORBID ANATOMY AND PHYSIOLOGY)

190. CRAWFORD, R. F. Overwintering of mosaic on species of *Physalis*. [Abstract.] *Phytopathology* 11: 47. 1921.

191. DICKSON, JAMES G. The influence of soil temperature on the development of seedling blight of cereals caused by *Giberella saubinethii*. [Abstract.] *Phytopathology* 11: 35-38. 1921.



192. DOOLITTLE, S. P. Influence of temperature on the development of mosaic diseases. [Abstract.] *Phytopathology* 11: 46-47. 1921.

193. DOOLITTLE, S. P. The relation of wild host plants to the overwintering of cucurbit mosaic. [Abstract.] *Phytopathology* 11: 47. 1921.

194. FROMME, F. D., AND S. A. WINGARD. Varietal susceptibility of beans to rust. *Jour. Agric. Res.* 21: 385-404. 5 pl. 1921.—The relative susceptibility of 64 varieties of garden and field beans to rust (*Uromyces appendiculatus*) has been determined, taking the susceptibility of the variety Tennessee Green Pod as a standard. Variation from the standard in reduction in number of infections, reduction of size of uredinium, abortion of infection, immediate production of telia instead of uredinia, and lengthening of the period of infection, has been considered. With the exception of a few varieties, little or no variation occurred in the susceptibility of individuals in the majority of varieties studied. Correlation between rust-resistance and various plant and seed characters were observed. As a class, bush beans are more resistant than pole beans, and varieties with wax pods more resistant than those with green pods. Varieties having red (mottled or self-colored seeds) are resistant. White-seeded types, as a class, are more susceptible than colored-seeded types. Varieties having the "marrow" type of seeds are resistant, while those of the "pes" type are most susceptible. Experiments with dry-shell beans show that the rust, under certain conditions, may reduce the yield of seeds 50 per cent or more. Two biological strains of the rust fungus are described.—*W. H. Burkholder.*

195. FROST, JOHN F., AND G. N. HOFFER. Kernel starchiness as an index of susceptibility to root, stalk, and ear-rots of corn. [Abstract.] *Phytopathology* 11: 33-34. 1921.

196. MCCLINTOCK, J. A. Overwintering of mosaic of annuals. [Abstract.] *Phytopathology* 11: 47. 1921.

197. NELSON, RAY. Tissue breakdown in fruits and vegetables. [Abstract.] *Phytopathology* 11: 44. 1921.

198. WEISS, FREEMAN, AND C. R. ORTON. Second report of the reaction of American potato varieties to the wart disease. [Abstract.] *Phytopathology* 11: 57. 1921.

#### THE PATHOGENE (BIOLOGY, INFECTION PHENOMENA, DISPERSAL)

199. FAWCETT, H. S. Some relations of temperature to growth and infection in the citrus cab fungus, *Cladosporium citri*. *Jour. Agric. Res.* 21: 243-253. 1921.—Tests were made under controlled conditions to determine thermal relations. Sour orange (*Citrus aurantium*) seedlings in actively growing condition were used. The conditions for infection are, viable spores of *Cladosporium*, young leaves of a susceptible species, moisture, and temperatures between 6 and 23°C. Detached leaves are infected at temperatures from 16 to 27.5°C.; the optimum temperature is from 16 to 27.5°C. The optimum temperature for growth of *C. citri* is 21°C., with 27.5 the maximum in water and 32 on corn-meal agar. The incubation period is shortest with plants held at 21°C.—*Cladosporium citri* is atypical for the genus. At certain temperatures the spores are ejected with considerable force from the ends of the hyphae.—*D. Reddick.*

200. JACKSON, H. S., AND E. B. MAINS. The acidium of the orange rust of wheat, *Puccinia triticina*. [Abstract.] *Phytopathology* 11: 40. 1921.

201. MCFARLAND, FRANK T. Infection experiments with *Claviceps*. [Abstract.] *Phytopathology* 11: 41-42. 1921.

202. MONTEITH, JOHN, JR. Seed transmission and overwintering of cabbage black rot. [Abstract.] *Phytopathology* 11: 53-54. 1921.

203. RAND, FREDERICK V., AND LILLIAN C. CASH. Stewart's disease of corn. Jour. Agric. Res. 21: 263-264. 1921.—Wilt of maize, caused by *Aplanobacter stewarti*, is widely distributed in the U. S. A. Sweet corn is most affected, and of its varieties the early-maturing ones are most susceptible (up to 100 per cent), the late-maturing ones least so. In tests with 45 varieties of field corn, 32 have shown no wilt. A few varieties of dent field corn have shown up to 5 per cent infection, and early-maturing varieties of flint corn are more susceptible than late-maturing ones.—“No evidence whatever of infection from the soil or from proximity to diseased stalks has thus far been obtained.” Seed transmission is indicated. Infection of young plants is most likely during the first 2 weeks of growth; high soil moisture at this time results in much infection, the amount under identical moisture conditions being greater at higher temperatures. Heating seed at 60 to 70°C. for 1 hour is a promising method of control.—D. Reddick.

204. RICHARDS, B. L. The pathogenicity of *Corticium vagum* as affected by soil temperature. [Abstract.] Phytopathology 11: 56. 1921.

205. WALKER, J. C., AND L. R. JONES. The relation of soil temperature and other factors to onion smut and infection. [Abstract.] Phytopathology 11: 52-53. 1921.

206. WESTON, W. H. Significant points in the life history of the Philippine maize mildew. [Abstract.] Phytopathology 11: 32. 1921.

#### DESCRIPTIVE PLANT PATHOLOGY

207. BARTHE, A. E. La Oficina de Sanidad Vegetal de la Secretaría de Agricultura, Comercio y Trabajo. Resumen de las plagas ya estudiadas y combatidas. [Review of the plagues so far studied and combatted.] Rev. Agric. Com. y Trab. [Cuba] 3: 290-296. 15 fig. 1920.—An account is given of bud rot of coconut which is said to have reduced exportation of coconuts by a third in 15 years. For control various sanitary measures are recommended together with the spraying of new plantations in affected areas with a mixture of Bordeaux and Paris green. The Panama disease of plantains is found through Cuba except in the Orient province. Affected plants nearing maturity develop yellow leaves which soon fall, the raceme develops poorly, and a cross section of the trunk shows yellow, red, or black spots. Burning of diseased plants, sterilizing tools, and a rotation are recommended. Sugar cane mosaic is also discussed.—F. M. Blodgett.

208. BEACH, W. S. A *Phytophthora* crown rot of rhubarb. [Abstract.] Phytopathology 11: 55-56. 1921.

209. BIRMINGHAM, W. A. Ergot. Agric. Gaz. New South Wales 32: 410-412. 8 fig. 1921.—A popular description of the disease and methods of control are presented.—L. R. Waldron.

210. BISBY, G. R. Sclerotinia disease of sunflower in Manitoba. [Abstract.] Phytopathology 11: 49. 1921.

211. COONS, G. H., AND RAY NELSON. Celery yellows. [Abstract.] Phytopathology 11: 54-55. 1921.

212. ELLIOTT, JOHN A. A new *Phoma* disease of cotton. [Abstract.] Phytopathology 11: 48. 1921.

213. GILMAN, J. C. A *Fusarium* wilt of corn in Iowa in 1920. [Abstract.] Phytopathology 11: 33. 1921.

214. GLOVER, W. O. Blister canker of apple and its control. New York Agric. Exp. Sta. [Geneva] Bull. 485. 71 p., 18 pl. 1921.—Data are presented which establish the pathogenicity of *Nummularia discreta* (Schw.) Tul. as the causal agent of lesions occurring on the trunks

and branches of the cultivated apple (*Malus sylvestris*) and commonly known as blister canker. The disease produced appears in several different forms called staghead, yellow streak, sunscald, the enclosed form, and the common form. Cankers resulting from artificial inoculation enlarge most rapidly at the beginning of growth in the spring. When the wood is parasitized without the formation of cankers the presence of the fungus may be detected by the appearance of black streaks in the wood. The fungus is disseminated chiefly by means of the ascospores, which are discharged normally in August. Usually, 2 years are required for the maturity of the ascospores. The virulence of the disease and the success of attempts to control it are largely dependent upon environmental and other conditions, such as location, soil, rainfall, pruning, spraying, variety, overbearing, and age of host. Shellac followed by coal tar was found to be the most satisfactory dressing for the wounds made in pruning out diseased branches.—*F. C. Stewart.*

215. HILEY, W. E. The larch needle-cast fungus, *Meria laricis* Vuill. *Quart. Jour. Forest.* 15: 57-62. 2 figs. 1921.—This fungus appears to be exceedingly common in Britain. It causes young larch needles to turn brown and fall during the summer months. This type of leaf-cast has commonly been attributed to frost, but can easily be distinguished from frost injury. The youngest needles are not affected, only those a few inches from the shoot apices, and the disease spreads gradually up the shoots. The needle is not killed outright as when frosted; instead the apex first becomes brown and this discoloration then spreads gradually to the base. The bulk of the needles on the dwarf shoots are unaffected. The disease is most prevalent in wet weather, and most destructive in the nursery. Young plantations are often attacked and trees as much as 30 feet high have become very brown in August. As stems are unaffected by the disease, trees are seldom if ever killed. The European and western American larches are subject to attack, but the Japanese larch seems immune. Fruiting bodies of the fungus are formed only in a humid atmosphere. They consist of bundles of conidiphores growing out through the stomata. The hyphae, which compose the bundle, are colorless and septate. From the apex of each segment conidia are abstricted, which may infect other larch needles. Whether the germ-tubes affect entry through stomata or by piercing the cuticle is unknown.—*C. R. Tillotson.*

216. HUNT, T. F. *Pythiacystis* "brown rot" affecting deciduous trees. *Monthly Bull. Dept. Agric. California* 10: 143-145. 1921.—The *Pythiacystis* rot is distinct from that caused by *Sclerotinia cinerea*. The causal organism lives over in the soil and most of the infection develops on parts of the tree nearest the ground, a small, dark spot on the bark being the first indication. Under favorable weather conditions the disease spreads rapidly over trunk and twig. No definite control measures have been determined. Bordeaux and lime-sulphur sprays together with good drainage are suggested as control measures.—*E. L. Overholser.*

217. JONES, L. R., AND MAUD MILLER WILLIAMSON. Bacterial leaf spot of red clover. [Abstract.] *Phytopathology* 11: 50. 1921.

218. MELCHERS, L. E. *Rhizopus* sp. associated with a decay of unripe strawberries in the field. [Abstract.] *Phytopathology* 11: 44. 1921.

219. MORRIS, H. E., AND D. B. SWINGLE. An important new disease of the cultivated sunflower [*Sclerotinia libertiana*]. [Abstract.] *Phytopathology* 11: 50. 1921.

220. POVAH, ALFRED H. W. Valsa poplar canker. [Abstract.] *Phytopathology* 11: 45. 1921.

221. RAP, C. W. Bacterial blight of beans. *Oklahoma Agric. Exp. Sta. Bull.* 131. 40 p., 17 figs. 1920.—The history of the disease, its distribution, and importance are reviewed. The methods of infection and distribution of the organism are outlined. It is reported to live over winter on the seed, straw, and in the soil, and to be disseminated by rain, dew, insects, and

dust. Cultural characters of the organism are given. Tests reported show considerable differences in varietal susceptibility. Spraying, seed treatment, and seed selection seemed valueless or impractical as control measures. Three-year old seed gave blight-free plants, as did pod-selected seed. Selection for resistance is considered the most practical method of control.—*John A. Elliott.*

222. ROBBINS, W. W. Mosaic of sugar beets. [Abstract.] *Phytopathology* 11:48. 1921.

223. SLAGG, C. M. A new seedling disease of tobacco. [Abstract.] *Phytopathology* 11:49. 1921.

224. SMITH, ERWIN F., AND G. H. GODFREY. Bacterial wilt of castor bean (*Ricinus communis* L.). *Jour. Agric. Res.* 21:255-261. *Pl. 55-67.* 1921.—The disease is caused by *Bacterium solanacearum*. It seems to be more prevalent on the alkaline soil of central and west Florida than on the acid soil of the East coast; it is also more prevalent on "new" land than on old. The organism was cultured and infection produced in various known hosts by needle-prick inoculations. Additional hosts are cotton (*Gossypium*), *Vanilla planifolia*, sunflower (*Helianthus annuus*), and *Fuchsia* sp. [See also Bot. Absts. 1, Entry 362.]—*D. Reddick.*

225. TISDALE, W. B., AND MAUD MILLER WILLIAMSON. Bacterial leaf spot of lima bean. [Abstract.] *Phytopathology* 11:52. 1921.

226. TISDALE, W. B. Two sclerotium diseases of rice. [Abstract.] *Phytopathology* 11:42. 1921.

227. WALKER, J. C. A *Macrosporium* rot of onion. [Abstract.] *Phytopathology* 11:53. 1921.

#### ERADICATION AND CONTROL MEASURES

228. BUSBY, G. R. The cooperative potato spraying project. [Abstract.] *Phytopathology* 11:60. 1921.

229. BROCK, W. S. Spraying versus dusting in Illinois. *Proc. Amer. Soc. Hort. Sci.* 17:108-110. 1920 [1921].—The author states that only 1 orchard was dusted in Illinois in 1920 and that none will be dusted in 1921. During the four years of experimental work in Illinois curculio was uniformly controlled in all cases, dusting being superior to spraying. With an average infestation of codling moth for 3 years of 33 per cent on the checks, the average infestation on liquid- and dust-treated trees was 6 and 12 per cent respectively. Dusting has failed to control scab satisfactorily. With a 4-year average of 82 per cent scabby fruit on check trees there was an average infestation of 12 and 41 per cent respectively on sprayed and dusted trees. The author concludes that "there is no experimental evidence to show that dusting with sulphur-arsenate of lead powder will be advisable in Illinois." Extracts were read from communications received from 8 commercial growers in various sections of the state; each grower had discontinued the use of dust. One, however, found it entirely satisfactory for control of curculio, scab, and rot on peaches; another found it effective for the bloom spray on apples, provided the weather was calm; while a third was interested in having further experimental work done with dusting.—*H. W. Richey.*

230. DUDDESTON, B. H., AND G. N. HOFFER. The improved rag-doll germinator as an aid in controlling root, stalk and ear-rots of corn. [Abstract.] *Phytopathology* 11:33. 1921.

231. GILMAN, J. C., AND A. T. ERWIN. Greenhouse propagation of cabbage resistant to yellows. [Abstract.] *Phytopathology* 11:54. 1921.

232. HAMBLEN, C. O. Treatment of scab in seed potatoes. *Agric. Gaz. New South Wales* 32:417-419. *Fig.* 1921.

233. LANCE, ROBERT. Sur l'emploi d'écrans colorés pour combattre les maladies cryptogamiques des végétaux. [The use of colored screens in the combating of cryptogamic diseases of plants.] Compt. Rend. Acad. Sci. Paris 172: 1201. 1921.—A colored screen permitting blue, violet, and ultraviolet rays to pass is found to be useful in destroying cryptogamic organisms causing diseases of plants, especially those on grapes. A description of the method of making the screen is given. [See also following entry.]—C. H. Farr.

234. LANCE, ROBERT. Sur un produit anticryptogamique. [Concerning an anticryptogamic substance.] Compt. Rend. Acad. Sci. Paris 172: 1201-1202. 1921.—Toxic effects upon parasitic fungi were obtained with light passed through screens made with zinc chloride or zinc sulphate. [See also preceding entry.]—C. H. Farr.

235. LOCHHEAD, W. The story of spraying mixtures. Sci. Agric. [Canada] 1: 113-116. 1921.—A concise account is presented of the development of liquid and dust spraying, especially from 1890 to 1920, with mention of the part played by Canadian workers.—B. T. Dickson.

236. MCCLINTOCK, J. A. The control of peach brown rot and curculio. [Abstract.] Phytopathology 11: 43. 1921.

237. MACKIE, W. W., AND FRED N. BRIGGS. Chemical dusts for the control of bunt. [Abstract.] Phytopathology 11: 38-39. 1921.

238. FETCH, C. E. Spraying versus dusting. Sci. Agric. [Canada] 1: 171-172. 1921.—In Quebec orchard dusting has developed rapidly in the past 8 years and has proved as efficient as spraying in controlling apple scab and biting insects. It is not yet possible to say that dusting furnishes an economic control for sucking insects.—B. T. Dickson.

239. PORTER, R. H. Cooperative seed treatment using hot formaldehyde. [Abstract.] Phytopathology 11: 59. 1921.

240. VALLEAU, W. D. Resistance as a basis of control of corn root rot. [Abstract.] Phytopathology 11: 34. 1921.

241. VAUGHAN, R. E. Inoculated sulphur for potato scab control. [Abstract.] Phytopathology 11: 58. 1921.

#### REGULATORY MEASURES

242. ANONYMOUS. Erlass des Ministers für Landwirtschaft, Domänen und Forsten über Bekämpfung des Kartoffelkrebses. [Order of the Minister for Agriculture, Public Lands and Forests relative to the potato wart disease.] Zeitschr. Kartoffelbau 17: 59-61. 1921.—Owing to the difficulty of administering wart disease control work during the war and the subsequent occupation of the Rhine province, the disease has continued to spread, and strictest adherence to provisions of the order of February, 1918, is enjoined upon all officials. The order provides for notification of wart infection, destruction of diseased plants, and use of only approved immune varieties.—F. Weiss.

#### MISCELLANEOUS (COGNATE RESEARCHES, TECHNIQUE, ETC.)

243. BURNS, G. P. Tip-burn and the leafhopper. [Abstract.] Phytopathology 11: 56-57. 1921.

244. G., R. R. [Rev. of: SMITH, ERWIN F. An introduction to bacterial diseases of plants. xxx + 688 p. W. B. Saunders Co.: New York and London, 1920 (see Bot. Absts. 7, Entry 1273).] Nature 107: 168. 1921.

245. JOHNSON, JAMES. The use of sterilized soils in pathological research. [Abstract.] Phytopathology 11: 51. 1921.

246. LARUE, CARL D. Lightning injury to *Hevea brasiliensis*. [Abstract.] *Phytopathology* 11: 46. 1921.

247. STEVENS, F. L. The relation of plant pathology to human welfare. *Amer. Jour. Bot.* 8: 315-322. 1921.—The author cites examples of the enormous economic loss caused by plant disease. Plant pathology has aided in the prevention of disease by demonstrating the value of protective applications, sprays and dusts; excision; seed steep; general sanitation leading to diminution of infective material; breeding for disease resistance; modifications of agricultural practice; and quarantine restrictions. The bulk of our present knowledge is the outcome of scientific investigation, and the future usefulness of the plant pathologist will depend on his vigorous prosecution of fundamental research rather than on a mere administration of protective measures. The author makes a plea for the encouragement of the individual worker and for the unification of all botanical activities.—*E. W. Sinnott*.

248. VAYSSIÈRE, M. P. *Revue de phytopathologie*. [Phytopathological review.] *Rev. Gén. Sci. Pures et Appl.* 32: 11-22. 1921.—The writer discusses the advances made in phytopathology and entomology since his previous review in *Rev. Gén. Sci. Pures et Appl.* in 1918. The work of French investigators on copper fungicides and the effect of varying degrees of acidity and alkalinity on their value is reviewed. The salts of arsenic (other than lead arsenate) have also received considerable attention since his last review. The work along this line is reviewed. The investigations of VERMOREL and DANTONY (see Bot. Abstrs. 3, Entry 1200; 7, Entry 1254) and of BRUTTINI on calcium sulphate or polysulphides of calcium as insecticides and fungicides are reviewed. The utilization of products of the war for combating insects has also received considerable attention by French investigators.—The American investigations of mosaic diseases of plants receives special treatment by the reviewer.—A section of the review is given to the investigations of insect pests.—*H. W. Anderson*.

## PHARMACEUTICAL BOTANY AND PHARMACOGNOSY

HEBER W. YOUNGKEN, *Editor*

E. N. GATHERCOAL, *Assistant Editor*

(See also in this issue Entries 15, 380)

249. FICK, I. A. R. The value of lavender. *Amer. Bee Jour.* 61: 232-233. 1921.—As it has been stated that 1 acre of lavender (*Lavandula officinalis* var. *vera*) will yield a ton of honey, further information is well worth seeking. Light, dry soils, well supplied with lime and fully exposed to the sun, are best adapted to growing lavender. From 5 to 10 tons of the flowers are bought annually in the U. S. A. by druggists and distillers of perfumes. From an acre, 600-1,200 pounds of fresh blooming tips are obtained; the dry weight is about  $\frac{1}{4}$  of the green weight. The yield of oil varies from 12 to 15 pounds per acre. During the 1st week in March ordinary lavender flowers sold in the New York wholesale market for 18 to 24 cents per pound; select flowers for 21 to 25. It is desirable to test the plant in the U. S. A., both for the commercial value of its flowers and as a honey producer.—*J. H. Lovell*.

250. GORIS, A., ET CH. VISCHNIAC. Sur les alcaloïdes de la valériane. [On the alkaloids of *Valeriana*.] *Compt. Rend. Acad. Sci. Paris* 172: 1059-1061. 1 fig. 1921.—The authors confirm the work of WALISZEWSKI and of CHEVALIER as to the existence of 2 alkaloids, chatmine and valerine, in the root of valerian.—*C. H. Farr*.

251. MIRANDE, MARCEL. Sur le lathyrisme ou intoxication provoquée par les graines de *Cesaea*. [Concerning lathyrisms, or intoxication caused by seeds of chickling vetches.] *Compt. Rend. Acad. Sci. Paris* 172: 1142-1143. 1921.—Intoxication of men and animals is reported as a consequence of eating seeds of certain chickling vetches, namely, *Lathyrus sativus* and *L. Cicera*.—*C. H. Farr*.

## PHYSIOLOGY

B. M. DOUGGAR, *Editor*CARROLL W. DODGE, *Assistant Editor*

(See also in this issue Entries 9, 93, 152, 191, 205, 233, 234, 245, 250, 316)

## GENERAL

252. B[LACKMAN], V. H. [Rev. of: ONSLOW, MURIEL WHELDALE. *Practical plant biochemistry*. i + 173 p. Cambridge University Press: 1920 (see Bot. Absts. 8, Entry 602).] *New Phytol.* 20: 43. 1921.

253. D., C. [Rev. of: EICHWALD, E., UND A. FODOR. *Die physikalisch-chemischen Grundlagen der Biologie*. (The physico-chemical bases of biology.) 510 p., 119 fig. J. Springer: Berlin, 1919. Price, unbound, M. 42.] *Zeitschr. Phys. Chem.* 94: 507-508. 1920.—It appears that although the general field of physical chemistry is covered by the book, topics of biological interest are treated at relatively greater length. The reviewer questions the advisability of including a chapter on the infinitesimal calculus, though believing that its usefulness can not be predicted in advance. The whole treatment is considered to be in refreshing contrast to that in the usual text books, and, although vague in places, it is judged a good and useful work.—*H. E. Pulling*.

254. FREUNDLICH, H. [Rev. of: OSTWALD, WO. *Die Welt der vernachlässigten Dimensionen*. (The world of neglected dimensions.) 3rd. ed., 222 p. Theodor Steinkopf: Dresden and Leipzig, 1919. Price M. 9.] *Zeitschr. Phys. Chem.* 94: 506. 1920.—Although the reviewer disagrees with the author on many points and would place his emphasis differently in many cases, he heartily commends the book. It is stated that while the work is entertainingly written and presents colloid chemistry from an attractive point of view, one misses the information that might properly be expected in an "introduction," which the book purports to be.—*H. E. Pulling*.

255. HARDEN, A. [Rev. of: BERTRAND, G., AND P. THOMAS. *Practical biological chemistry*. Translated from the third edition by H. A. COLWELL. xxxii + 348 p. G. Bell and Sons: London, 1920.] *Nature* 107: 390. 1921.—The reviewer considers this book of much value to students and especially to teachers of biochemistry.—*O. A. Stevens*.

## DIFFUSION AND OTHER PHYSICAL PHENOMENA

256. HARRIS, J. A., R. A. GORTNER, AND J. V. LAWRENCE. On the differentiation of the leaf tissue fluids of ligneous and herbaceous plants with respect to osmotic concentration and electrical conductivity. *Jour. Gen. Physiol.* 3: 342-345. 1921.—The osmotic concentration shown by freezing point lowering,  $\Delta$ , of sap from tissues of ligneous plants is materially higher than that of herbaceous plants. The specific electrical conductivity,  $K$ , is materially lower. The ratio  $\frac{K}{\Delta}$  is about 90 per cent higher in herbaceous than in ligneous plants. Material from the Arizona desert, the Jamaica rain forest, and Long Island give concordant results.—*E. L. Proebsting*.

257. LOEB, JACQUES. Chemical and physical behavior of casein solutions. *Jour. Gen. Physiol.* 3: 547-555. 1921.—Experiments with casein show that, as with gelatin and crystalline egg albumin, the forces determining the combination between proteins and acids or alkalies are the same forces of primary valency which also determine the reaction between crystalloids and acids and alkalies. Valency and not the nature of the ion determines the effect on the physical properties of the protein.—*On's F. Curtis*.

258. LOEB, JACQUES. Ion series and the physical properties of proteins. I. Jour. Gen. Physiol. 3: 85-106. 1920.—The writer has conducted experiments to determine whether the effects of acids and alkalies on proteins (gelatin and egg albumin) as measured by viscosity and osmotic pressure can be explained on the basis of ion series or on a purely chemical basis. The data all indicate that differences previously obtained by other workers and explained as due to differences in ion series are probably due to the fact that rather large and equivalent quantities of acids and alkalies were used rather than low concentrations having the same  $P_H$  values. When solutions of protein with the acids HCl, HBr, HNO<sub>3</sub>, acetic, monochloroacetic, also di- and trichloroacetic, succinic, tartaric, citric, and phosphoric were used at the same  $P_H$  values and with the same concentrations of originally isoelectric protein there were no differences between the acids in their effects on the osmotic pressure and viscosity of gelatin and on the osmotic pressure of crystalline egg albumin. These protein acid salts all behaved as if the anions were monovalent. H<sub>2</sub>SO<sub>4</sub> formed protein salts with dibasic anion and these salts have osmotic pressures and viscosities of only one-half or less that of the protein salts with monovalent anion (protein chloride) at the same  $P_H$  values and with the same concentration of originally isoelectric gelatin, while oxalic acid behaves as if most of the anions were monovalent but a few divalent. It was also found that the osmotic pressures and viscosities of the solutions of Li, Na, K, and NH<sub>4</sub> salts of proteins are the same at the same  $P_H$  values. Ca(OH)<sub>2</sub> and Ba(OH)<sub>2</sub> form salts with proteins in which the cations are dibasic, and the osmotic pressures and viscosities of their salts are only one-half or less than half those of salts with monovalent cations at the same  $P_H$  values.—*Otis F. Curtis.*

259. LOEB, JACQUES. Ion series and the physical properties of proteins. II. Jour. Gen. Physiol. 3: 247-269. 1920.—This paper gives additional evidence (see preceding abstract) that the physical properties of proteins, especially hydration, viscosity, and osmotic pressure, are determined by the purely chemical forces of primary valency and not by the ion series of Hofmeister. The relative solubilities of gelatin solutions in alcohol mixtures are in a similar sense independent of ion series. Conductivity measurements of solutions of gelatin salts do not show a definite relation between the physical properties of proteins and changes in degree of ionization.—*Otis F. Curtis.*

260. LOEB, JACQUES. Ion series and the physical properties of proteins. III. The actions of salts in low concentration. Jour. Gen. Physiol. 3: 391-414. 1921. (See also the 2 preceding abstracts.)—Ions with sign of charge opposite to that of a protein ion diminish the swelling, osmotic pressure, and viscosity of the protein solution, while ions with the same sign of charge as the protein ion, excepting H and OH ions, seem to have no effect on the phenomena mentioned so long as the concentration of the electrolytes does not exceed about M/16. The relative depressing effects of different ions on the physical properties are functions of the valency and of the sign of charge of the ions; and those ions of the same sign of charge and of the same valency have practically the same depressing effects on gelatin solutions of the same  $P_H$ . The depressing effect increases rapidly with an increase in valency. The Hofmeister ion series is explained as an error due to a failure to recognize the influence of the addition of various salts on the hydrogen ion concentration of the solution.—*Otis F. Curtis.*

261. LOEB, JACQUES. The colloidal behavior of proteins. Jour. Gen. Physiol. 3: 557-564. 1921.—The writer has applied the Donan equilibrium, which supposes that one of the ions in solution can not move through a membrane while another may, to the colloidal behavior of proteins showing that curves presenting potential differences ( $P.D.$ ) as a function of the hydrogen ion concentration resemble those for osmotic pressure, and that these  $P.D.$  and, therefore, the physical properties of protein solutions, can be predicted from the differences between the  $P_H$  of the solutions inside and outside of the membrane on the basis of the Nernst formula  $E = \frac{RT}{nF} \ln \frac{C_1}{C_2}$ ; if it is assumed that the  $P.D.$  are due to differences in the hydrogen ion concentrations on the 2 sides of the membrane.—*Otis F. Curtis.*



262. MELLON, R. R., S. F. ACREE, P. M. AVERY, AND E. A. SLAGLE. The ionization constants of glycerophosphoric acid and their use as buffers, especially in culture mediums. *Jour. Infect. Diseases* 29: 1-6. 1921.—The precipitation of phosphates in culture media on the alkaline side of neutrality can be prevented by the use of disodium glycerophosphate. This salt being a solvent for calcium and magnesium salts can also be used in the washing of agar, in the precipitation of casein, and for the study of the effect of calcium and magnesium ions on the growth of various organisms. The ionization constants of the glycerophosphates are about the same as those of the ordinary phosphates; the former can, therefore, be substituted as buffers.—*Selman A. Waksman.*

263. PRIESTLEY, J. H. The mechanism of root pressure. *New Phytol.* 19: 189-200. *Fig. 1-2.* 1920.—The attempt is made to interpret data presented by others bearing on the mechanism of root pressure. An osmotic gradient exists cell by cell from the root hair to the xylem duct. The resultant entrance of water into the parenchyma within the endodermis causes the development of a considerable hydrostatic pressure within the vascular cylinder, since the endodermis is unable to expand because of the lignification of its radial walls. Moreover, it does not permit the passage of water except by osmosis through its protoplasts. The assumption is made that increased permeability of the protoplasm of the parenchyma cells adjoining ducts allows this hydrostatic pressure to force water and solutes into the ducts.—*I. F. Lewis.*

#### WATER RELATIONS

264. MACDOUGAL, D. T. Water deficit and the action of vitamins, amino-compounds and salts on hydration. *Amer. Jour. Bot.* 8: 296-302. 1921.—The author suggests that plant protoplasm is a colloidal mixture of 2 separate but interwoven aggregates, the proteins and the pentosans, with soap films enclosing the more solid phase of the double meshwork. The separate elements in this albumin-pentosan-soap structure differ in their capacity for hydration and in the conditions under which hydration may occur within them. The metals represented by the usual nutrient salts are found to increase the hydration capacity of the principal components of biocolloids. The presence of a small amount of soap in a biocolloid increases its hydration capacity, but this capacity is much lessened by even a very dilute acid. Yeast vitamin (water-soluble B) in a solution slightly acid, increases the hydration in some living and dead plant cell masses and lessens it in others; similar diverse action on biocolloids was found. All of the substances tested which are known to facilitate growth in plants are found to increase hydration capacity in some of the test objects.—*E. W. Sinnott.*

265. WEISER, H. B., AND E. E. PORTER. Spontaneous evaporation. *Jour. Phys. Chem.* 24: 233-341. 1920.—Careful repetition of experiments by BABINGTON (see *Proc. Roy. Soc. London* 10: 132. 1859), which led the latter to conclude that some salts when dissolved in water accelerate evaporation of the water, showed that these salts actually retard evaporation and indicated that Babington's error was chiefly owing to an increase in surface produced by a creeping of the solution, although failure to maintain constant conditions contributed to the error. The authors found the use of a rotating table necessary to obtain concordant results.—*H. E. Pulling.*

#### PHOTOSYNTHESIS

266. ANONYMOUS. De koolzuurassimilatie in verband met de bemesting. [Carbon dioxide assimilation in connection with manuring.] *Cultura* 33: 110-117. 1921.—A general outline is given of the work of Blackman, Willstätter, Stoll, Klein, Reinau, Bornemann, and others.—*J. C. Th. Uphae.*

#### METABOLISM (GENERAL)

267. BLACKMAN, F. F. The biochemistry of carbohydrate production in the higher plants from the point of view of systematic relationship. *New Phytol.* 20: 2-9. 1921.—Carbohydrate production is analyzed into 3 strata: (1) The primary photo-reduction of carbonic acid

involving light-energy and specific pigments; (2) the immediate appearance of sugars, which seems to be universal; (3) the subsequent appearance, though by no means universally, of complex polysaccharides, which are deposited in the chloroplasts.—The author discusses the 2nd and 3rd strata. Consideration is given to the work of Næz on the spontaneous chemical changes undergone by sugars in the presence of impurities as bearing on the fact that plant sugars tend to take the form of hexoses, or less often pentoses. The relation between sucrose and the production of pentoses is discussed.—The high critical sugar-concentration of monocotyledons and the low concentration of the dicotyledons, while general, are ranked with those morphological characters of secondary and tertiary importance in their classificatory value because of exceptions.—The work of Reichert on the starch grain is reviewed.—The uniformity of the chlorophyll pigments is contrasted with the diversity of the starches.—*I. F. Lewis.*

268. DAVIS, D. J. Food accessory factors in bacterial growth. III. Further observations on the growth of Pfeiffer's bacillus (*B. influenzae*). IV. The "satellite" or symbiosis phenomenon of Pfeiffer's bacillus (*B. influenzae*). V. The value of the satellite (or symbiosis) phenomenon for the classification of hemophilic bacteria. *Jour. Infect. Diseases* 29: 171-189. 1921.—The growth requirement of *B. influenzae* may be represented by a plain medium plus a heat-resistant substance (hematin or derivative) plus a heat-labile substance. In the blood the heat-resistant and the heat-labile substances are present, but the latter is destroyed by heating in the autoclave (120°C.) for a few minutes or at lower temperatures for longer periods. The heat-labile substance can be obtained from plant, animal, and bacterial extracts, none of which by themselves support a growth of *B. influenzae*.—Profuse growth of *B. influenzae* occurs immediately around colonies of organisms or pieces of plant or animal tissue. The product of bacteria, of fungi, of tissues, etc., which stimulates the growth of the organism is thermolabile and stimulates growth in conjunction with hematin or with hemoglobin. This is a phenomenon of "satellitism" (symbiosis) and is of value in identifying and in classifying members of the hemophilic group.—*Selman A. Waksman.*

269. DUPONT, GEORGES. Contribution à l'étude des constituants acides de la gemme du pin maritime. Isomérisation des acides pimariques. [The constituent acids of the leaf buds of the maritime pine. The isomerization of pimaric acid.] *Compt. Rend. Acad. Sci. Paris* 172: 1373-1375. 1921.—Heat, acetic acid, and hydrochloric acid are found to isomerize laevo- and dextro-pimaric acids. Laevo pimaric acid is changed into  $\alpha$  pimarabietic acid, which is later changed into  $\beta$  pimarabietic acid.—*C. H. Farr.*

270. JONESCO, STAN. Contribution à l'étude du rôle physiologique des anthocyanes. [A study of the physiological rôle of the anthocyanins.] *Compt. Rend. Acad. Sci. Paris* 172: 1311-1313. 1921.—It is found that plants lose anthocyanin in the dark. Upon analysis there proves to be a conversion of the anthocyanin into anthocyanic glucosides, which are in turn changed into flavonic glucosides. These latter also disappear in darkness. It is therefore concluded that the anthocyanins are utilized in the nutrition of the plant when in darkness. To the theory of PRINGSHEIM, that these pigments protect the chlorophyll against too strong illumination; to that of STAHL, that they facilitate the rise of temperature in the plant; and to that of PALLADIN, that they are involved in respiration, these findings are thought to add an additional explanation of their physiological significance.—*C. H. Farr.*

271. LATHAM, R. O. The colour of primrose flowers. *Nature* 107: 301. 1921.—The author inquires the cause of the red color in flowers normally pale yellow. It is considered to be due to an anthocyan pigment, not present in normal flowers, produced by reduction from the normal sap pigments, the cause of the reaction being unknown.—*O. A. Stevens.*

272. PATY, F. A. The production of hydrocyanic acid by *Bacillus pyocyaneus*. *Jour. Infect. Diseases* 29: 73-77. 1921.—Different strains of *B. pyocyaneus* produce varying quantities of HCN when grown in whole egg broth or even synthetic media, the optimum reaction being  $E_K$  5.4-5.8. This is an aerobic phenomenon and is not produced by an extracellular enzyme.—*Selman A. Waksman.*

273. PRINSTELEY, J. H. Suberin and cutin. *New Phytol.* 20: 17-29. 1921.—This is a review and summary of certain work on the macro- and microchemistry of suberin and cutin.—*I. F. Lewis.*

274. SAMEC, ET ANKA MAYER. Sur la substance organique fondamentale de l'amylopectine. [The fundamental constituent of amylopectin.] *Compt. Rend. Acad. Sci. Paris* 172: 1079-1082. 1921.—Various reactions of amylopectin are given, following out the work of MAQUENNE on the amyloses. Amylopectin is considered to be formed from certain of the amyloses by union with polybasic acids.—*C. H. Farr.*

275. ZOLLER, H. F., AND W. M. CLARK. The production of volatile fatty acids by bacteria of the dysentery group. *Jour. Gen. Physiol.* 3: 325-330. 1921.—These studies show: (1) In the presence of 1 per cent glucose and under aerobic conditions a close agreement exists among the organisms studied in the total quantity of volatile fatty acids produced and in the ratio of formic to acetic acid. (2) On peptone under aerobic conditions, volatile fatty acids are produced in appreciable quantities, although the reaction of the solution becomes more alkaline. There is no formic acid, but propionic and acetic acids are found. (3) On peptone under anaerobic conditions, formic, acetic, and butyric acids are produced. The reaction is more acid than in (2). (4) On glucose under anaerobic conditions, the results are similar to those under aerobic conditions. (5) The enormous quantity of formic acid produced by these bacteria may play a significant part in the digestive disturbances and in the symptoms of intoxication accompanying the infection of the human intestinal tract by such forms.—*E. L. Probsting.*

#### METABOLISM (NITROGEN RELATIONS)

276. KAYSER, E. Influence des sels d'urane sur le fixateur d'azote. [The influence of uranium salts on the fixation of nitrogen.] *Compt. Rend. Acad. Sci. Paris* 172: 1133-1134. 1921.—With mannite as an organic nutrient, uranium salts are found in general to have an injurious effect on the fixation of nitrogen by *Azotobacter chroococcum*. Uranium acetate (1:8,000) is an exception. With glucose media uranium acetate (1:15,000) increases nitrogen fixation.—*C. H. Farr.*

277. KAYSER, E. Recherches sur l'*Azotobacter*. [Investigations on *Azotobacter*.] *Compt. Rend. Acad. Sci. Paris* 172: 939-940. 1921.—A study of the effect of color on the fixation of nitrogen by *Azotobacter* is reported. Yellow and blue colors were compared, mannite was used as food, and 2 successive periods of 13 days each marked the extent of the study. No striking differences in the effects of the colors were secured.—*C. H. Farr.*

#### METABOLISM (ENZYMES, FERMENTATION)

278. BOURQUELOT, EM., ET BRIDEL. Application de la méthode biochimique de recherche du glucose a l'étude des produits de l'hydrolyse fermentaire de l'inuline. [Application of the biochemical method of research on glucose to the study of the products of hydrolysis of inulin by fermentation.] *Compt. Rend. Acad. Sci. Paris* 172: 946-949. 1921.—The hydrolysis of the inulin of *Atractylis* by the inulase of *Aspergillus niger* gives reduction products which have the rotatory power of *d* fructose. These products do not combine with methyl alcohol under the influence of emulsin. If glucose is added to the solution a combination with methyl alcohol is effected, therefore the reduction would not seem to yield glucose but methyl-glucoside ?.—*C. H. Farr.*

279. HAMMARSTEN, HARALD. Aldolkondensation und Harzbildung bei Einwirkung von verdünnten Alkalien auf Acetaldehyd. [Aldol condensation and resin formation by the action of dilute alkalies upon acetaldehyde.] *Ann. Chem.* [Liebig] 421: 293-315. 1920.

280. KOEHLER, S. A. Trehalose fermentation in the differentiation of the paratyphoid-intestinalis group. *Jour. Infect. Diseases* 29: 67-72. 1921.—*Bacillus suispestifer* is unable to

attack trehalose, while *B. paratyphosus*, *B. Schottmulleri*, the animal para B sub-group, and *B. enteritidis* ferment trehalose with the production of acid and gas. A further differentiation of *B. Schottmulleri* strains from the animal para B group is accomplished by employing a serum water medium containing 0.5 per cent trehalose and 1 per cent Andradé indicator.—*Selman A. Wakeman*.

281. MIRANDE, MARCEL. Sur les graines à autofermentation sulfhydrique de la famille des Papilionacées. [Hydrogen sulphide autofermentation of seeds of the Papilionacées.] *Compt. Rend. Acad. Sci. Paris* 172: 1202-1204. 1921.—Seeds of certain legumes are found to undergo auto-fermentation when placed in a little water, splitting off active  $H_2S$ . More than 9 species are named which produce much  $H_2S$ , 9 are given which produce only a little, and 5 which do not produce it at all. There is also a discussion of the fermentation capacity in the flour of these legumes, in bread made in part from such flour, and in soup preparations.—*C. H. Farr*.

282. NORTROP, JOHN H. The significance of the hydrogen ion concentration for the digestion of proteins by pepsin. *Jour. Gen. Physiol.* 3: 211-227. 1920.—The writer suggests that proteins are acted upon by pepsin only when they are in the ionized condition. Evidence in support of this is given as follows: (1) Curves for the rate of digestion of the proteins, oxyhemoglobin, egg albumin, and gelatin run parallel to the conductivities of the solutions when these are both plotted against the  $P_H$  values. (2) The decrease in the rate of digestion induced by an excess of HCl above the optimum is duplicated by the addition of an excess of this same Cl ion in equivalent concentrations when in combination with 6 different cations. (3) Oxyhemoglobin, with its isoelectric point at about  $P_H$  6.8, is more highly ionized at  $P_H$  4.5 than are other proteins with isoelectric points at more nearly  $P_H$  4.5, and it is also more rapidly digested at this hydrogen ion concentration.—*Olis F. Curtis*.

283. PEASE, R. N., AND H. S. TAYLOR. Promotor action in catalysis. *Jour. Phys. Chem.* 24: 240-265. 1920.—Promotor action is to be distinguished from activation ("by a substance relatively inert catalytically, or by a small quantity of a relatively active substance") and from co-activation ("of a number of catalysts each by the rest") in that it includes "all those cases in which a mixture of two or more substances is capable of producing a greater catalytic effect than can be accounted for on the supposition that each substance in the mixture acts independently and in proportion to the amount present." Examples of each type are given and these include actions of enzymes and co-enzymes as well as various technical catalytic processes.—*H. E. Pulling*.

284. POTTER, M. C. The influence of electric potential upon the velocity of fermentation. *Proc. Univ. Durham Phil. Soc.* 6: 16-21. 1915-1920.—In a previous paper the author showed that a rise of potential amounting to as much as 3-.5 volt is produced by yeast growing in a fermentable liquid. In order to determine the influence of the difference of potential on the velocity of reaction, the author compared the rate of fermentation of glucose by yeast in a flask carefully insulated, or raised to a definite potential, with that in a similar flask in which the glucose was grounded. No difference in the rate of fermentation was observed.—*J. S. Cooley*.

285. WILLSTÄTTER, RICHARD. IV. Über Peroxydase. [Concerning peroxidase.] *Ann. Chem. [Liebig]* 422: 47-73. 1921.—The peroxidase value is the purpurogallin number of 5 gr. of plant tissue. This number designates the number of mgr. of purpurogallin formed by the reaction during 5 minutes between 1 mgr. enzyme-containing plant tissue, 5 gr. pyrogallol, and 50 mgr. hydrogen peroxide, in a volume of 2 l. at 20°C. The peroxidase value of fresh roots of horseradish varied from 800 to 1520. The use of toluol, or aspiration with oxygen, during the extraction of the tissue greatly reduced the peroxidase value. Dialysing for several days this value increases, as is especially true of the soluble form of peroxidase. The insolubility of the peroxidase suggests a chemical combination within the cell, but it is not made soluble by either barium hydroxide or oxalic acid. The use of oxalic acid was found to permit

the dialysis of tissue with little loss of enzyme. This effect is ascribed to adsorption, following a change in the reaction of the proteins to which the enzyme had been bound. The use of dipotassium citrate as a buffer in determining the peroxidase value retarded the formation of purpurogallin. A raw preparation was made by coarse maceration, dialysis for 8 days, treatment with oxalic acid, the addition of barium hydroxide in alcohol, neutralising with carbon dioxide, and centrifuging. In the solution, bichloride of mercury precipitated a basic glucoside and freed peroxidase; this enzyme is amphoteric. It is adsorbed by a variety of agents, aluminium hydroxide being best. A limited ratio of this substance adsorbed 80 per cent of peroxidase in  $\frac{1}{2}$  hour from a 0.05 per cent solution of enzyme in dilute alcohol. Carbon dioxide favors elution (diffusion of enzyme from adsorption medium to solvent), the process having little temperature effect, and reaching an equilibrium in about 1 hour. Protocols show the method of adsorption of enzyme to be much superior to that of adsorption of impurities. By the best method evolved, 5 kgr. of roots (presumably horseradish) gave a yield of 0.31 gr. of the enzyme preparation with a purpurogallin number of 860.—*W. E. Tottinham.*

#### METABOLISM (RESPIRATION)

286. BAILEY, C. H. The storage of wheat. Operative Miller 24: 352, 381-382. Fig. 1-4. 1919; 25: 5-6. Fig. 5-7. 1920.—Heating of grain in storage is caused by respiration, which experiments indicate to be about 20 times as great in the embryo as in the endosperm. Determination of the  $\text{CO}_2$  produced by lots of plump, hard spring wheat stored at  $100^\circ\text{F}$ . for 4 days at known varying moisture contents, showed a steady increase in heat as the moisture was increased from 12 to 14.5 per cent, and a very rapid rise thereafter. Twice as much heat developed at 15 per cent as at 12.5 per cent, while more than 5 times as much developed at 16 per cent. At a moisture content of 13 per cent there was little difference between hard spring and soft wheats in the amount of heat produced, but at a moisture content of 13.6-13.8 per cent the soft wheats produced as much heat as hard spring wheat at 14.5 per cent. Shrunken wheat, having a bushel weight of 47.5 pounds, produced as much heat at 12.8 per cent moisture content as did plump hard spring wheat at 14.5 per cent. The weight per kernel of the shrunken wheat was less than half that of the normal wheat so that the proportion of embryo was much larger. Frosted wheat kernels also respired much more rapidly than sound wheat, due in part to the greater sugar content.—The respiration of wheat increased with increase in the period of damp storage. Wheat stored at room temperature respired more vigorously than wheat stored at a temperature slightly above freezing. Respiration increased steadily with rise of temperature from  $35^\circ\text{C}$ . up to  $55^\circ\text{C}$ ., after which it steadily diminished. Respiration diminished as the quantity of accumulated  $\text{CO}_2$  increased.—*Carleton R. Ball.*

287. BROOKS, MATILDA M. Comparative studies on respiration. XIV. Antagonistic action of lanthanum as related to respiration. Jour. Gen. Physiol. 3: 337-342. 1921.—Concentrations of  $\text{La}(\text{NO}_3)_3$  weaker than 0.000025M have little effect on the respiration of *Bacillus subtilis* as measured by the production of  $\text{CO}_2$  according to the Osterhout method. At 0.00006M there is an increase in the rate while at concentrations above 0.000025M there is increasing retardation. Distinct antagonistic effects between  $\text{La}(\text{NO}_3)_3$  and NaCl are evident from respiration measurements while only slight antagonism is evident between  $\text{La}(\text{NO}_3)_3$  and  $\text{CaCl}_2$ .—*Otis F. Curtis.*

288. BROOKS, MATILDA M. Comparative studies on respiration. XV. The effect of bile salts and of saponin upon respiration. Jour. Gen. Physiol. 3: 527-532. 1921.—The addition of sodium taurocholate produces an increase in the rate of respiration of *Bacillus subtilis* at a concentration of about 0.0000125M and decreases the rate at higher concentrations. Antagonism was found between NaCl and sodium taurocholate as measured by respiration. Solutions of saponin at concentrations between 0.00005M and 0.001M retarded respiration while at lower concentrations no effect was noticeable.—*Otis F. Curtis.*

289. GUSTAFSON, F. G. Comparative studies on respiration. XII. A comparison of the production of carbon dioxide by *Penicillium* and by a solution of dextrose and hydrogen peroxide.

Jour. Gen. Physiol. 3: 35-39. 1920.—A neutral solution of dextrose and hydrogen peroxide acts like *Penicillium chrysogenum* in producing an increased amount of CO<sub>2</sub> upon the addition of acid, but not upon the addition of alkali.—*Author's summary.*

290. INMAN, O. L. Comparative studies on respiration. XVI. Effects of hypotonic and hypertonic solutions upon respiration. Jour. Gen. Physiol. 3: 533-537. 1921.—In highly hypertonic solutions of sea water the rate of respiration of *Laminaria Agardhii* is very much reduced as measured by CO<sub>2</sub> production according to the Osterhout method. In highly hypotonic solutions the rate is also reduced, but less markedly. Hypertonic solutions of NaCl, CaCl<sub>2</sub>, and mixtures of the 2 in the proportion 50:1 caused a decrease in the respiration of wheat seedlings.—*Otis F. Curtis.*

291. IRWIN, MARION. Comparative studies on respiration. XIII. An apparatus for measuring the production of minute quantities of carbon dioxide by organisms. Jour. Gen. Physiol. 3: 203-206. 1920.

292. ITANO, A., AND J. NEILL. A microscopic method for anaerobic cultivation. Jour. Infect. Diseases 29: 78-81. 1921.—There is described a modification of the usual moist chamber preparation, whereby anaerobiosis is obtained by the absorption of oxygen by alkaline pyrogallate.—*Selman A. Waksman.*

293. NICHOLS, H. J. The production of CO<sub>2</sub> by the typhoid bacillus and the mechanism of the Russell double sugar tube. Jour. Infect. Diseases 29: 82-85. 1921.—The typhoid bacillus produces CO<sub>2</sub> in significant amounts both from sugars and from proteins.—*Selman A. Waksman.*

#### GROWTH, DEVELOPMENT, REPRODUCTION

294. LUYTEN, IDA. De Periodiciteit van de Knopontwikkeling bij den Pruim. [On the periodicity of bud development in the plum.] Mededeel. Landbouwhoogeschool Wageningen 18: 103-148. Pl. 2, fig. 9. 1921.—Bud development was studied with the varieties Drap d'Or d'Espere and Reine Claude. With the flower buds, a bud-scale and a flower-forming period were distinguished. In May and June, 1919, the growing point of the flower buds produced scales. About July 1, the growing point initiated the formation of the flower, and after July 23 the formation of the different parts of the flower proceeded at a fairly rapid rate. Soon after the bracts were separated from the remaining flower primordia the calyx was differentiated, each flower lying in the axil of a bract. Next, the petal primordia were formed. On August 29 the stamens began to appear, followed by indications of the carpel. The greatest change in the carpel took place about September 20. After October no further external changes occurred until about the middle of January, when growth slowly began.—With the foliage leaves still in the bud, the origin of the buds of the following year became visible as naked growing points. The earliest date at which the growing point in the axil of the leaf could be observed was August 13.—*J. C. Th. Uphof.*

295. VERSLUYS, MARTHA C. De Periodiciteit van de Knopontwikkeling bij den Kers. [Periodicity and bud development in the cherry.] Mededeel. Landbouwhoogeschool Wageningen 18: 149-191. Pl. 2, fig. 10. 1921.—Flower formation was the chief object of this study, made upon certain varieties of cherry as follows: Bruine Waalache (Brown Wallon), Abbesse do Moulant, and Hedelfinger Riesenkirsche. In the last named variety, especially, the terminal bud usually produces a long shoot, whereas lateral leaf buds produce either short shoots or longer ones effecting ramification.—In the middle of May, 1919, the flower buds for the next season which had formed in the axils of the lowest leaves on a short shoot, exhibited on the average 7-8 scales. On July 3 this number had increased to 17, and on July 30 to about 26. On August 25 petals of the flower were clearly visible, the receptacle was flat, and the stamens were very vague. On September 23 the sepals touched each other; the petals were broader and flatter; the stamens, appearing in 4 whorls of usually 10 each, already showed a differentiation into arther sacs; and the carpel had become elevated, with the cones already

in close contact. On October 12 the ovary, style, and stigma were practically complete, and in this state the flower entered the winter, during which season no important changes took place.—*J. C. Th. Uphof.*

296. WEST, C., G. E. BRIGGS, AND F. KIDD. Methods and significant relations in the quantitative analysis of plant growth. *New Phytol.* 19: 200-207. 1920.—Suggestions are offered for a method of quantitative analysis of plant growth week by week. For such an analysis the primary data are "measurements of dry-weight and leaf area at intervals of a week or less accompanied by measurements of respiration, assimilation, transpiration and chemical analysis of the plant tissue, and continuous records of the various environmental factors likely to affect growth." The significant secondary relations may be expressed through 4 series of numbers, which can be put in the form of graphs,—*relative growth rate, leaf area rates, unit leaf rate, and relative leaf growth rate.* Definitions and formulae are given for these.—*I. F. Lewis.*

#### MOVEMENTS OF GROWTH AND TURGOR CHANGES

297. BIBB, L. B. Summation of dissimilar stimuli applied to leaflets of sensitive brier (*Schrankia*). *Jour. Gen. Physiol.* 3: 523-526. 1921.—In the morning the closure of 1 leaflet of *Schrankia uncinata* Willd. does not result in the closure of the next distal leaflet, while in the afternoon such closure will inaugurate a wave of closures of the distal leaflets in turn. It was found that, at a time of day when the closure of 1 leaflet would not normally cause the closure of the others, an exposure of the pinnae to chlorine or ammonia gas would so sensitise them that all of the leaflets would close in turn when 1 was touched. This is taken as a demonstration of the summation of dissimilar stimuli.—*Otis F. Curtis.*

298. SMALL, J. Preliminary note on a hydriion differentiation theory of heliotropism. *New Phytol.* 19: 275-276. 1920.—The possibility is suggested that the direction of heliotropic curvatures is governed by the hydriion concentration of the continuous phase of the plasma membranes of the perceptive cells.—*I. F. Lewis.*

299. SMALL, J. Preliminary notes on additional evidence for the hydriion differentiation theory of geotropism. III. A theory of the origin of leaves. *New Phytol.* 19: 210-212. *Fig. 1-5.* 1920.—Analogies are suggested between the zones of potential differences in the stem and its lateral organs and the lines of force of certain magnetic fields.—*I. F. Lewis.*

300. SMALL, J., AND M. W. LEA. Preliminary notes on additional evidence for the hydriion differentiation theory of geotropism. I. On the reversal of geotropic curvature in the stem. *New Phytol.* 19: 208-209. 1920.—In most cases, when shoots of different plants are coated with vaseline and placed horizontally in the dark, they curve downward. The reversal of the geotropic response is due to the accumulation of CO<sub>2</sub> within the tissues.—*I. F. Lewis.*

301. SMALL, J., AND M. J. LYNN. Preliminary notes on additional evidence for the hydriion differentiation theory of geotropism. II. On the angle of balance in roots, stems and leaves. *New Phytol.* 19: 209-210. 1920.—Announcement is made that the angle at the junction of a lateral organ (root, stem, or leaf) with the main axis varies directly with the length of the lateral, (*L*), and inversely as the distance to the tip of the main axis, (*D*). The fraction  $\frac{L}{D}$  varies as the sine of the angle.—*I. F. Lewis.*

#### REGENERATION, CORRELATION

302. CHILD, C. M. Certain aspects of the problem of physiological correlation. *Amer. Jour. Bot.* 8: 286-295. 1921.—The author describes briefly the existence in animals of physiological or metabolic gradients from a dominant apical region to a subordinate basal one and shows that the localization and differentiation of organs and parts occur in a definite relation to this gradient and are determined by it. The range of dominance of the apical region of such a gradient is usually limited, and regions beyond this range become physiologically

isolated. The author believes that this relation of dominance and subordination is not a matter of chemical or transportative correlation but is due to the transmission of an excitation through the living protoplasm. It is possible to produce such gradients by exposing undifferentiated cells to localized external stimuli. He discusses the electro-chemical conception of the transmission of excitations proposed by R. S. LILLIE. Among plants the author has worked with *Bryophyllum calycinum*, *Phaseolus multiflorus*, and *Saxifraga sarmentosa*. By cooling a zone of the petiole or stem he succeeded in preventing the dominance of the apical region over parts below the cooled portion without interrupting the upward flow of liquids through it. These experiments provide further evidence that in plants the correlative factor is not a transported substance but a transmitted excitation.—E. W. Sinnott.

#### TEMPERATURE RELATIONS

303. APPLEMAN, CHARLES O., AND S. V. EATON. Evaluation of climatic temperature efficiency for the ripening processes in sweet corn. Jour. Agric. Res. 20: 795-805. 1921.—An ear of sweet corn is considered ripe when the growth of kernels ceases and the chemical changes in the corn have nearly attained equilibrium positions. The maturing of ears consists essentially in the loss of water. The important change in percentage composition of corn during ripening consists in the depletion of sugar and the increase of starch. In early stages of ripening, reducing sugars predominate so that the highest total sugar content may not represent the stage of greatest sweetness. On a dry weight basis, the changes in fat, crude fiber, and total nitrogen occur in the very early stages of ripening, and subsequently they remain fairly constant. Consequently, the rate at which the ratio of total sugar to starch decreases is a good measure of the ripening date. Temperature is the controlling factor for the rate of ripening. Several temperature indices were employed to evaluate climatic temperature efficiency for the ripening process, but exponential indices were found to furnish the best criteria. The rate of ripening in sweet corn, for a wide range of temperature, adheres rather strictly to the van't Hoff-Arrhenius principle, and as this rate is inversely proportional to the exponential indices a basis is furnished for prediction within 1 day of the number of days required in different localities and at different seasons in the same locality for sweet corn to pass from the beginning of kernel formation to the best edible stage, as well as the number of days that the corn may be expected to remain in this condition.—D. Reddick.

304. ESTY, J. R., AND P. H. CATHCART. The change in the hydrogen-ion concentration of various mediums during heating in soft and pyrex glass tubes. Jour. Infect. Diseases 29: 29-39. 1921.—In thermal death point determinations, the hydrogen-ion concentration of the solution must be known during the entire period of heating. The type of glass to be used for this purpose is important, since heating the solution in the glass greatly affects the hydrogen-ion concentration, particularly when soft glass tubes are used. In the case of juices from canned corn, peas, string beans, spinach, beets, sweet potatoes, and pumpkin, the hydrogen-ion concentration is less affected by soft glass tubes than by hard glass.—Selman A. Waksman.

305. FAWCETT, HOWARD S. The temperature relations of growth in certain parasitic fungi. Univ. California Publ. Agric. Sci. 4: 183-232. Fig. 1-11. 1921.—This is a study of vegetative growth of *Phytophthora terrestris*, *Phomopsis Citri*, *Pythiacystis citrophthora*, and *Diplodia natalensis* at maintained temperatures. Careful consideration was given to: (a) The nature of the organism (the previous history of the fungus), (b) the nature of the medium, (c) temperature conditions, (d) radiation conditions, and (e) the duration condition. The observations were based on the diameter increments of the mycelial disk as it grew over the surface of a corn-meal agar plate. The diameter increments were considered as rates, expressed in millimeters per 24 hours.—In general form and shape the growth-temperature curves of the 4 fungi studied were much alike in the second 24-hour period. Beginning with the lowest temperature tested, the curves all rise gradually to maximum values, then descend rapidly to minima at the highest temperatures permitting growth were approached. However, the growth-temperature curves for each organism show characteristic differences in subsequent 24-hour periods. The apparent temperature optimum and maximum were lower at each successive



24-hour period of observation. A comparison of the growth-temperature graphs of the 4 fungi for the second 24-hour period shows that the total ranges of temperature within which growth rate values are  $\frac{1}{2}$  or more of the maximum rate includes from 32.5 to 37°C. of the temperature scale. Of this range, 70-80 per cent is below the optimum temperature for growth.—At the lower temperatures the growth rate increased with the age of cultures throughout the culture period, but the reverse change occurred in cultures at the highest temperatures maintained.—The value of  $Q_{10}$ , the temperature coefficient for growth, was greatest for the lowest temperatures used and regularly decreased toward the highest temperatures. The value of the temperature coefficient was always largest for the first 24-hour period after inoculation and, as a rule, diminished as time increased. Since the value of  $Q_{10}$  decreases in value from infinity to zero, there must be some point at which its value is unity. This point will lie at the middle of a range within which the optimum temperature will be found. For temperature values below this range the values of  $Q_{10}$  will be greater than unity, for higher temperatures, less than unity. The use of the coefficient-temperature graphs furnishes a direct method of comparing the growth-temperature relations of different organisms, no matter in what units the rates have been expressed.—*H. S. Reed.*

#### TOXIC ACTION

306. MOLLARD, MARIN. Influence du chlorure de sodium sur le développement du *Sterigmatocystis nigra*. [The influence of sodium chloride on the development of *Sterigmatocystis nigra*.] *Compt. Rend. Acad. Sci. Paris* 172: 1118-1120. 1921.—This fungus was grown in culture media to which various percentages of sodium chloride were added. It is found that a solution of NaCl as low as 1 per cent retards the formation of conidia and reduces the number of conidia formed, and that no conidia are formed in a solution stronger than 3 per cent. The rate of growth is diminished in a solution of 2-5 per cent NaCl, it becomes very slow in a 10 per cent solution, and ceases in 12 per cent. Many data are given to show that within certain limits the ratio of increase in weight of the fungus to the amount of sugar consumed decreases with an increase in concentration of HCl, that is, the amount of sugar consumed is fairly constant though the increase in weight is decreased. It was demonstrated that the suppression of conidia was due to the formation of free HNO<sub>3</sub> in the higher concentrations of NaCl.—*C. H. Farr.*

307. SARTORY, A., ET P. BAILLY. Du pouvoir agglutinant du sulfate de thorium sur les spores d'*Aspergillus fumigatus* Fr. [The agglutinating power of the spores of *Aspergillus fumigatus* in the presence of thorium sulphate.] *Compt. Rend. Acad. Sci. Paris* 172: 1257-1258. 1921.—The maximum effect is secured in a concentration of from 1:1000 to 1:2000. It is very strong between 1:400 and 1:1000, very weak below 1:200 or above 1:10,000, and is absent in very concentrated solutions.—*C. H. Farr.*

#### ELECTRICITY AND MECHANICAL AGENTS

308. HALBAN. [Rev. of: KELLER, RUDOLF. *Neue Versuche über mikroskopischen Elektrizitätsnachweis*. (Recent researches on the microscopical demonstration of electricity.) 180 p. Wilhelm Braumüller: Wien and Leipzig, 1919.] *Zeitschr. Phys. Chem.* 94: 509. 1920.—For a long time the author has been investigating vital staining with animal dyes and inorganic precipitates. Conclusions, supported by electrical measurements, on the original potential differences in living tissues are drawn from this work. Besides these experimental investigations the author includes, it is reported, totally unrelated theoretical discussions, such as the uselessness of the concept of unordered motion in the kinetic theory of matter.—*H. E. Pulling.*

309. LILLIE, RALPH S. The recovery of transmissivity in passive iron wires as a model of recovery processes in irritable living systems. Part I and II. *Jour. Gen. Physiol.* 3: 107-128, 129-143. 1920.

## PHYSIOLOGY OF DISEASE

310. LUMIÈRE, AUGUSTE, ET HENRI COUTURIER. L'anaphylaxie chez les végétaux. [Anaphylaxis in plants.] Compt. Rend. Acad. Sci. Paris 172: 1313-1315. Fig. 1-5. 1921.—Three experiments were made: (1) Of 4 leaves of equal size on a wild sorrel plant 2 were injected with 0.01 cc. horse serum. Observing no difference after 1 month, the same 2 leaves were reinjected and also 1 of the control leaves treated with 0.3 cc. serum. The reinjected leaves succumbed within 5 days. (2) Of 3 hyacinths growing in the same pot 2 were injected with 0.02 cc. horse serum, and as these remained healthy for 3 weeks, the control bulb and 1 of those previously treated were given each a dose of 0.25 cc., the reinjected bulb succumbing 11 days later. (3) An experiment with ass serum on onion bulbs gave results comparable to the preceding.—It is inferred that a state of anaphylaxis may be established in plants.—*B. M. Duggar.*

## MISCELLANEOUS

311. ACREE, S. F., R. R. MELLON, P. M. AVERT, AND E. A. SLAGLE. A stable single buffer solution. Jour. Infect. Diseases 29: 7-10. 1921.—The authors suggest a mixture having components whose dissociation constants are so graded that when the titration curve of one component ends the next begins. This gives a continuous smooth curve covering a wide range of  $P_H$  values.—The components, as employed in the buffer solution, are: (1) 1 mol. of  $KH_2PO_4$  with a  $K_a$  of  $1.1 \times 10^{-7}$ ; (2)  $\frac{1}{2}$  mol. of sodium formate, with a  $K_a$  of  $2 \times 10^{-4}$ ; (3)  $\frac{1}{2}$  mol. of sodium acetate, with a  $K_a$  of  $2 \times 10^{-5}$ ; (4) the 2nd group of  $K_2HPO_4$ , with a  $K_a$  of  $2 \times 10^{-7}$ ; (5) 1 mol. of sodium phenol sulphonate, with a  $K_a$  of approximately  $10^{-10}$ ; (6)  $M/200$  thymol to saturation (for  $H_2O$ , 0.08), with an approximate  $K_a$  of  $0.5 \times 10^{-10}$ ; (7) the 3rd group of  $H_2PO_4$ , with a  $K_a$  of  $10^{-12}$ .—To obtain any desired  $P_H$  it is only necessary to locate the point on the curve intercepted by the desired  $P_H$  value, and read off the amount of  $\frac{M}{2}$  HCl or NaOH necessary to produce this  $P_H$ .—*Selman A. Waksman.*

312. BANCROFT, W. D. [REV. OF: SEIDELL, ATHERTON. Solubilities of inorganic and organic compounds. 2nd revised ed., 24 x 16 cm., xxii + 843 p. D. Van Nostrand Co.: New York, 1919.] Jour. Phys. Chem. 24: 332. 1920.—"The new edition is very much more valuable than the first one and is a book of which the author may well be proud."—*Reviewer's summary.*

## SOIL SCIENCE

J. J. SKINNER, Editor

F. M. SCHERTZ, Assistant Editor

(See also in this issue Entries 7, 14, 59)

313. ANONYMOUS. The potash position. Nature 107: 321-322. 1921.—This editorial reviews the supply and consumption of potash. The deposits of Alsace-Lorraine are regarded as the most promising for the immediate future.—*O. A. Stevens.*

314. CROUZEL, E. De l'emploi des sables ferrugineux en viticulture et en arboriculture. [Concerning the use of ferruginous sand in vinegrowing and in arboriculture.] Repertoire Pharm. 33: 129-131. 1921.—Iron is an essential and indispensable element in plant growth. If not present in sufficient quantity, there is a marked diminution in the power of the plant to resist diseases, especially, those due to cryptogams. It is extensively used in vineyards and orchards. Ferruginous sand is much used on account of its abundance, cheapness, and favorable chemical properties.—*M. Dunn.*

315. DAVIS, W. A. A study of the indigo soils of Bihar. Indigo Publ. Agric. Res. Inst. Pusa 1. 76 p. 1918.—The exhaustion of Bihar indigo soils has been gradual and progressive during the past 20 years. It was first indicated by the gradual failure of the yield of Java indigo seed and then by the rapidly increasing failure of khoonties (2nd cuttings). The failure

of the crop was first attributed to the "wilt" disease, but no evidence of bacterial or fungous infection has been obtained. The theory is put forward that the failure of indigo is due to lack of soluble phosphate in the soils. Low fertility or failure of crops can, in most cases, be correlated with an abnormally low content of available phosphate in the soils. Available phosphate is exceptionally low in the sub-soil and as indigo is a deep rooting plant, the lack of such nutrient material is manifested in the wilting or dying out of the indigo plant after the 1st cutting. Although Java indigo seed cannot now be grown at factories in Bihar, very good crops have been obtained in soils outside Bihar, particularly in Assam. In every case where Java indigo produces seed the soil has been found to be exceptionally rich in available phosphate. In many cases outside Bihar, the rainfall is excessive (150 inches) and the lands frequently get water-logged, but this has not prevented high yields of Java indigo plant and seeds. "Wilt" is most prevalent in Bihar on the highest, lightest and best drained soils; this is attributed to the low content of plant food which they contain. The soil responds generally to superphosphate, Java indigo at Dalsing Sarai increasing 50 per cent in the 1st cuttings and 100 per cent in the 2nd. In many cases the Tirhoot soils are also low in organic matter and treatment with green manure, such as sann hemp, is necessary before they respond to superphosphate.—*B. M. Amin.*

316. DULEY, F. L., and M. F. MILLER. The effect of a varying supply of nutrients upon the character and composition of the maize plant at different periods of growth. *Missouri Agric. Exp. Sta. Res. Bull.* 42. 86 p. 1921.—Corn plants were grown in washed quartz sand with nutrient solutions. A standard Pfeffer's nutrient solution was used as the optimum nutrient and a solution  $\frac{1}{2}$  this strength as the minimum nutrient. Fourteen different treatments were used, each in duplicate, including all possible combinations of the 2 solutions, applied in the three 30-day periods of the life of the plants.—The 2nd period was by far the most important in the production of vegetative parts. Ear production was confined to the 3rd period. A low supply of nutrient, particularly during the last period, was conducive to increased root growth. Optimum nutrient during the 3rd period largely determined ear production, though fair ears were produced when a copious supply of mineral nutrients was present at the end of the 2nd period and when the minimum nutrient was used in the 3rd period. The percentage of nitrogen and potassium in the plants was approximately proportional to the supply of nutrients during the last period, while the percentage of phosphorus was much less influenced by variation in the nutrient supply. The proportion of total nitrogen of the plant contained in the roots increased whenever the minimum nutrient was applied. In the most fully developed plants the proportion of potassium in the roots was increased during the 3rd period. Minimum nutrient supply allowed a greater proportional storage of nitrogen, phosphorus, and potassium in the roots than did optimum nutrient.—A review of the literature and a bibliography of 20 titles are included.—*L. J. Stadler.*

317. HUDIG, J. Wat kan het landbouwkundig onderzoek doen voor de droog te leggen Zuiderzee [What can agricultural research accomplish for future drained lands of the Zuiderzee?] *Cultura* 33: 151-154. 1 fig. 1921.—When the new lands are deprived of the sea water from the Zuiderzee, and influenced by the atmosphere, many changes will take place in the soil; a knowledge of these will be of great importance for agriculture. The soils will vary from heavy clay to sand and will vary chemically and physically.—*J. C. Th. Uphof.*

318. MARCHAND, B. DE C. The soils of Natal and the Transvaal. II. The soils of the Transvaal. *South African Jour. Indust.* 4: 181-187. 1921.—The decomposition of organic matter is very rapid and nitrification takes place quickly. The soils are low in calcium and phosphate and high in iron. Nitrogen does not appear to be needed.—*J. J. Skinner.*

319. SKINNER, J. J. Fertilizer experiments with pecans conducted by the United States Department of Agriculture. *Proc. Georgia-Florida Pecan Growers' Assoc.* 1921:4-11. 1921.—A report is made on the fertilizer experiments made in Georgia and Florida for the last 3 years. The experiments conducted are based on the triangle, being ratio studies of phosphate, nitrate, and potash. Different sources of phosphorus, nitrogen, and potash are also

investigation. The soils on which the pecan experiments are located are the Greenville sandy loam, Orangeburg sandy loam, and the Norfolk sandy loam. For best growth and development of a young orchard, a complete fertilizer high in nitrogen has given best results. Older orchards have a somewhat higher phosphate requirement. The amount of nitrogen in the fertilizer used can be reduced where leguminous cover crops are grown and plowed under. The fertilizer combinations giving maximum yield increased nut production from 20 to 35 per cent.—*J. J. Skinner.*

320. TRUFFAUT, G., ET N. BESSONOFF. Augmentation du nombre des *Clostridium Pastorianum* (Winogradski) dans des terres partiellement stérilisées par le sulfure de calcium. [Increase in the number of *Clostridium Pastorianum* organisms in soil partially sterilized by the addition of calcium sulphide.] *Compt. Rend. Acad. Sci. Paris* 172: 1319-1322. 1921.—It is contended that *Clostridium Pastorianum* and not *Azotobacter* is the principal agent of nitrogen fixation in the soil. *Clostridium Pastorianum* was found to the extent of 100,000 colonies per gr. against 500 of *Azotobacter*. The highest number reported for *Azotobacter* is 1800 per gr.—*C. H. Farr.*

321. WILLIAMS, C. O. The soils of Natal and the Transvaal. I. The composition of Natal soils. *South African Jour. Indust.* 4: 177-181. 1921.—The soils generally are acid and are characterized by the complete absence of calcium carbonate, except the soils of the Ladysmith and Weenen districts, which are alkali soils. The phosphate content is low and the potash content normal.—*J. J. Skinner.*

## TAXONOMY OF VASCULAR PLANTS

J. M. GREENMAN, *Editor*

E. B. PAYSON, *Assistant Editor*

(See also in this issue Entries 25, 126, 262)

### GENERAL

322. ANONYMOUS. [Rev. of: BRITTON, N. L., AND C. F. MILLESPAUGH. *The Bahama flora*. viii + 896 p. The authors: New York Botanical Garden; Dulau and Co.: London, 1920 (see *Bot. Abstr.* 7, Entry 1429).] *Nature* 107: 327-328. 1921.

323. ANONYMOUS. [Rev. of: HORWOOD, A. R. *A new British flora: British wild flowers in their natural haunts*. (In 6 vols.) Vol. 1, iv + 244 p.; vol. 2, xi + 243 p., 17 pl. The Gresham Publishing Co.: London, 1919.] *Nature* 107: 232. 1921.

324. ANONYMOUS. [Rev. of: SHOOLBRED, W. A. *The flora of Chesetow*. x + 140 p. Taylor and Francis: London, 1920.] *Nature* 106: 564. 1920.

325. HITCHCOCK, A. S. The type concept in systematic botany. *Amer. Jour. Bot.* 8: 251-255. 1921.—The author points out the importance of codes of nomenclature in stabilizing the naming of plants and indicates the advantages resulting from the Paris Code of 1867 and the Vienna Code of 1905. These have been found, however, to lack definiteness in directing the application of names. Names were originally applied rather to concepts than to entities. During the last 30 years the system of applying names by means of types has grown up in America and the type concept lies at the basis of modern botanical nomenclature. It is not referred to in the Paris and Vienna Codes, but was recognized by the American Code and by the Brussels Congress. The Type-basis Code, formulated by the Committee on Nomenclature of the Botanical Society of America, is described and its operation illustrated by various examples. The advantages of accepting the concept of types are pointed out, and it is shown that this does not involve the acceptance of any particular set of rules for selecting types.—  
F. W. GREENMAN

326. KNOWLTON, C. H. Herbarium of Rev. W. P. Alcott. *Rhodora* 23: 47. 1921.—The author notes the recent acquisition of this collection at the Peabody Academy of Sciences at Salem, Massachusetts. It is of most interest to the local student for its collection of wool-waste plants, made at North Chelmsford, Massachusetts.—James P. Poole.

327. KNOWLTON, C. H., AND WALTER DEANE. Reports on the flora of the Boston District.—XXXIV. *Rhodora* 23: 113-118. 1920.—The authors present a continuation of the report of the Committee on Local Flora of the New England Botanical Club. A list of the reported species and their distribution about Boston, Massachusetts, is given.—James P. Poole.

328. MATSUMURA, KINZO. *Icones Plantarum Koiskavenses*, or figures with brief descriptive characters of new and rare plants, selected from the University Herbarium. Maruzen Company, Ltd.: Tôkyô.—This work is published in parts at various intervals, there being 6 parts to a volume. Vol. I, iv + 168 p., 84 pl. 1913-1920. Parts 1-4 inclusive and part 6 of the 1st volume appeared in 1920. Part 5 (p. 127-146, pl. 64-73) bears the date June, 1913. Each species and variety included is illustrated and accompanied by descriptive matter in Latin and in Japanese. The following are designated either as new species, varieties, or new combinations: *Vaccinium japonicum* Miq. var. *ciliare* Matsum., *V. Myrtillos* L. var. *Yatabei* Matsum. & Komat. (V. *Yatabei* Makino), *Enkianthus Matsudai* Komat., *Diplazium Matsumurae* Kodama (*Asplenium Matsumurae* Christ), *Viola dissecta* Ledeb. var. *albida* Nakai (V. *albida* Palib.), *Clematis oligantha* Nakai, *Luzula campestris* DC. var. *lutescens* Koidz., *Streptopus streptopoides* Koidz. (*Smilacina streptopoides* Ledeb.), *S. streptopoides* var. *atrocarpa* Koidz., *Pasania cleistocarpa* O. Seem. (*Quercus cleistocarpus* O. Seem.), *Cacalia nantica* Komat., *Salvia trisecta* Matsum., *Deutzia hebecarpa* Nakai, *Peucedanum Makinoi* Nakai, *Angelica confusa* Nakai, *Diplazium simplicifolium* Kodama, *Rhododendron Nakaii* Komat., *Eriocaulon Takae* Koidz., *Dryopteris pseudo-erythrosera* Kodama.—*Ibid.* Vol. II, iii + 122 p., pl. 85-145. 1914-1920. Of this volume Parts 2, 4, 5, and 6 appeared in Sept., 1920. Part 1, p. 1-22, pl. 85-95, was published in Jan., 1914, and Part 3, p. 45-64, pl. 107-116, bears the date July, 1914. The new species, varieties and combinations in this volume are: *Dryopteris izuensis* Kodama, *D. Fauriei* Kodama, *Vaccinium angustifolium* Komat., *Betula nikoensis* Koidz., *Lobelia boninensis* Koidz., *Fritillaria amabilis* Koidz., *Cardamine geifolia* Koidz., *Thalictrum Nakamurae* Koidz., *Aconitum Komatsui* Nakai, *A. Matsumurae* Nakai (*A. sigzag* Nakai, not Lévl. & Vnt.), *A. metajaponicum* Nakai, *Eriocaulon monococcum* Nakai, *Dryopteris gracilifera* O. Ktze. subsp. *glanduligera* (Ktze.) Chr. var. *abbreviata* Kodama, *D. insularis* Kodama, *Polystichum miyashimensis* Kodama, *Skimmia japonica* Thunb. var. *intermedia* Komat., *Cornus subumbellata* Komat., *Blasagnus crocea* Nakai, *Iris koreana* Nakai, *Rhododendron leptanthum* Hayata (*R. leptosanthum* Hayata), *Mnium Nakanishikii* Broth., *Juglans sachalinensis* Komat., *Aulacopilum japonicum* Broth.—*Ibid.* Vol. III, iii + 134 p., pl. 149-212. 1916-1920. Part 4, p. 65-84, pl. 178-187, of this volume bears the date Dec., 1916; all the other parts appeared in Sept., 1920. The new species, varieties, and combinations in this volume are: *Vittaria ogasawarensis* Kodama, *Polystichum microclamys* Kodama (*Aspidium microclamys* Christ), *Morus Kagayayamae* Koidz., *Malus asiatica* Nakai, *Mnium Kawadei* Sh. Okamura, *Macromitrium comatulum* Broth., *Rhododendron pentaphyllum* Max. var. *nikoense* Komat., *Diplazium longicarpum* Kodama, *Garovaglia formosica* Sh. Okamura, *Ozorrhynchium Sasaokae* var. *immersum* Sh. Okamura, *O. Schottmulleri* Broth. var. *perlongicladum* Sh. Okamura, *Aconitum membranaceum* Nakai, *Pieris formosana* Komat., *P. pilosa* Komat., *Dianthus superbus* L. var. *bibracteolata* Koidz., *Boonymus tricarpa* Koidz., *Morus caudatifolia* Koidz., *Platanthera amabilis* Koidz., *Thalictrum yakusimense* Koidz., *Geranium Yoshianum* Koidz., *Vaccinium hangchowense* Komat. (V. *Donianum* Wright var. *hangchowense* Matsuda), *Woodсия microsora* Kodama, *Calliargon perrecurrans* Broth., *Sphagnum Takadae* Sh. Okamura, *Viola glabella* Nutt. var. *rainfolia* Koidz., *Leucothoe glauca* Koidz., *Betula incisa* Koidz., *Athyrium acutissimum* Kodama.—*Ibid.* Vol. IV, Parts 1-3. 79 p., pl. 213-248. Sept., 1920.—The first 3 parts of this volume contain the following new species, varieties, and combinations: *Dryopteris tozensis* Kodama, *Thalictrum raphanorhizon* Nakai,

*Rhododendron Kaempferi* Pl. var. *angustifolium* Nakai, *Macromitrium Okamurae* Broth., *M. Nakanishikii* Broth., *Banunculus altaicus* Laxmann var. *minor* Nakai, *Polygonum ussuriense* Nakai (*P. sagittatum* L. var. *ussuriense* Regel), *Athyrium rupestre* Kodama. Part 4, p. 73-84, pl. 249-254. May, 1920. This part includes the following species new to science: *Leontopodium leirolepis* Nakai, *Pertya macrophylla* Nakai, *Aconitum hondoense* Nakai, and *Tripterocladium japonicum* Broth.—J. M. Greenman.

329. MIYABE, KINGO, AND YUSHUN KUDO. *Icons of the essential forest trees of Hokkaido.* 27 × 58.5 cm. Fasc. 1. 1-15, pl. 1-4. 1920; Fasc. 2. 15-26, pl. 5-7, fig. 1-2. 1920; Fasc. 3. 27-55, pl. 8-10. 1921. Published by the Hokkaido Government.—These fascicles represent the first of a series treating of the more important forest trees of Hokkaido. Each species here presented is copiously illustrated by a colored plate giving detailed representations of the important taxonomic features. The illustrations are accompanied by a text that gives detailed synonymy, citation of bibliography for the species involved, extended descriptions, statements of the habitat and distribution, and economic uses of the trees. In some cases a comparison is also made between the species described and closely related species with which it might be confused. In the first 3 fascicles 10 species of Coniferae are described and illustrated. The following new species, varieties, and combinations occur: *Abies Mayriana* (A. *sachalinensis* Fr. Schm. var. *Mayriana* Miyabe & Kudo), *A. Wilsonii*, *Larix dahurica* Turcz. var. *kamchatca* (*Larix kamchatca* Carr.), *Pinus himokomatsu*. In addition to the above, *Taxus cuspidata*, *Picea glehnii*, *P. jezoensis*, *Pinus pentaphylla*, *P. pumila*, and *Thuja japonica dolabrata* are depicted in the first 3 fascicles.—E. B. Payson.

330. FETCH, T. *Recent revisions of Ceylon botany.* Ann. Roy. Bot. Gard. Peradeniya 7: 139-166. 1920.—The author reviews various papers published in other periodicals in which additions are made to the known Ceylonese flora, proposed changes in nomenclature, etc.—E. D. Merrill.

331. SALISBURY, E. J. [Rev. of: ARBER, AGNES. *Water plants: A study of aquatic angiosperms.* xvi + 438 p., 171 fig. Cambridge University Press: 1920 (see Bot. Absts. 9, Entry 374).] Sci. Prog. [London] 15: 669-670. 1921.

332. SANDWICH, NOEL Y. *Some British plants.* Jour. Botany 59: 21-22. 1921.—Notes on *Fumaria paradoxa* Pugsley (*F. Martini* Clavard), *Galeopsis speciosa*, *Pinguicula vulgaris*, *Nitella translucens*, *Sparganium neglectum*, and *Crataegus oxyacanthoides* are given.—K. M. Wiegand.

#### SPERMATOPHYTES

333. ANONYMOUS. [Note on *Bupleurum protractum*.] Proc. Linn. Soc. New South Wales 44: 820. 1919 [1920]. A note is given on specimens of *Bupleurum protractum* Link. & Hoffm. from the National Herbarium, and means of distinguishing it from *B. rotundifolium* L.—Eloise Gerry.

334. ANONYMOUS. [Rev. of: The flowering plants of South Africa. Edited by I. B. Pole Evans. Vol. 1, No. 1. ii p., + 10 pl. L. Reeve and Co.: London; The Speciality Press of South Africa: 1920.] Nature 107: 40. 1921.

335. ANONYMOUS. [Rev. of: Moss, C. E. *The Cambridge British Flora.* Vol. III. *Portulacaceae to Fumariaceae.* Folio, xvi + 200 p., 181 pl. Cambridge University Press: 1920.] Jour. Botany 59: 24-27. 1921.

336. BAILEY, L. H. *A collection of plants in China.* Gentes Herbarum 1: 1-49. 17 fig. 1920.—Under the title "Gentes Herbarum," the author has started a series of occasional papers relating to systematic botany, consisting of contributions from his private herbarium (Ithaca, New York). The first fascicle deals with a collection of plants made by him in eastern and central China in 1917; of particular interest are the collections from Honan, as the flora of that province was scarcely represented before in any herbarium. The short introduction

contains some notes on the vegetation of the regions traversed, and a recommendation to replace the term "new combination" by "new status" (*Status novus*) for new combination with change of rank, and "new transfer" (*translatio nova*) for those without change of rank. Following this, there is a systematic enumeration of the plants collected, about 900 species and varieties, with illustrations of the novelties. The following species, varieties, forms and combinations are new, and are proposed by the author, except when otherwise indicated: *Carex chikungana*, *C. kulingana*, *Smilax herbacea* var. *flaccida* (Wright) and *S. oblonga* (Wright) Norton, *Salix Baileyi*, *S. chikungensis* and *S. Matsudana* f. *pendula* Schneider, *Ficus Baileyi* Hutchinson, *Pilea Henryana* C. H. Wright, *Amaranthus gangeticus* var. *angustior*, *Raphanus sativus* var. *longipinnatus*, var. *nonpinnatus* and var. *parvipinnatus*, *Roripa microsperma* (DC.), *Philadelphus incanus* var. *Baileyi* Rehder, *Rosa cathayensis* (Rehd. & Wils.) and var. *exigua*, *Eubus innominatus* var. *Kuntzeanus* (Hemsl.) and var. *quinatus*, *R. kulinganus*, *R. triphyllus* var. *eglandulosus*, *Lespedeza distincta*, *L. Stottae*, *Maackia honanensis*, *Vicia kiohanica*, *V. kulingana*, *Ampelopsis brevipedunculata* var. *kulingensis* and var. *Maximowiczii* (Reg.) Rehder, *Vitis pentagona* var. *honanensis* Rehder, *Lysimachia argentea*, *L. chikungensis*, *Salvia honania*, *Satureia gracilis* (Benth.), *Stachys arrecta*, *Justicia quadrifaria* var. *lanifolia*, *Abelia Zanderi* var. *latifolia* Rehder, *Atractylis separata*, *Cacalia ruesscens* (S. Moore), *Chrysanthemum coronarium* var. *spatiosum*.—Alfred Rehder.

337. BLAKE, S. F. New trees and shrubs from Yucatan. Proc. Biol. Soc. Washington [D. C.] 34: 43-46. 1921.—*Acacia dolichostachya*, *A. Gaumeri*, *Diospyros anisandra*, *Citharexylum trinerve*, *Randia Millspaughiana*, and *Notoptera leptoccephala* are described as new species.—J. C. Gilman.

338. [BLATTER, E., and F. HALLBERG.] Species novae Indiae Orientalis. Decas I. Jour. Indian Bot. 2: 44-54. 3 fig. 1921.—Descriptions in Latin are given of the following new species: *Mryiophyllum spatulatum*, *Bonnayodes* a new genus of the Scrophulariaceae with one species *B. himnophloides*, *Leucas macrantha*, *Euphorbia khandallensis*, *Lemna maxima*, *L. minima*, *Dendrobium actinomorphyum*, *Pancreatium St. Mariae*, *Scilla viridis*, and *Commelina heterosperma*, all from the Bombay Presidency and Rajputana.—Winfield Dudgeon.

339. BONNIER, GASTON. Flore complète illustrée en couleurs de France Suisse et Belgique. [Complete flora, illustrated in color, of France, Switzerland, and Belgium.] 4 to. Fasc. 1-40. 156 p., 240 pl. Librairie Général de l'Enseignement: Paris.—This is a somewhat popular work which has appeared in parts during the past 10 years and is still current. The parts bear no date of publication. The families treated thus far are the Ranunculaceae to the Umbelliferae inclusive and their sequence is essentially that of Bentham and Hooker's "Genera Plantarum." Rather full descriptions are given of the families, genera, and species, and accompanying the scientific name and description of the species are recorded a limited synonymy, common name, uses, properties, and distribution. No keys have been introduced in the work.—J. M. Greenman.

340. BRITTON, N. L., and J. N. ROSE. Neoabbottia, a new Cactus genus from Hispaniola. Smithsonian Misc. Collection 72: 1-6. Pl. 1-4, fig. 1-2. 1921.—The new genus *Neoabbottia*, based on *Cactus paniculatus* Lam., is described and discussed. The only species is *N. paniculata* (Lam.) Britton & Rose.—S. F. Blake.

341. CHASE, AGNES. The North American species of *Pennisetum*. Contrib. U. S. Nation. Herb. 22: 209-234. Fig. 63-76. 1921.—A short introduction, giving an account of the relationship of the genus and mentioning some of the more important cultivated species, is followed by the description and synonymy of the genus and by a key to the 14 North American species recognized. Under each of these are given synonymy, description, and a list of specimens examined. Each species is illustrated by a figure showing the panicle and usually also the leaves. *Pennisetum prolificum* from Mexico is the only new species described, but the name *P. distachyum* (Pourn.) Rupr. is apparently here first properly published.—S. F. Blake.

342. CHEEL, E. Notes on *Callistemon* species. Proc. Linn. Soc. New South Wales 45: 221. 1920.—Note is made of an exhibit of herbarium specimens with samples of timber from 2 distinct forms of *Callistemon riminalis* (Sol.) Cheel distinguished by their calyx tubes and bark, and of 2 varieties of *C. pachyphyllus* Cheel differing from the type specimens, from a different locality, in having narrower leaves and different colored flowers.—*Eloise Gerry*.
343. DUTHIE, J. F. Flora of the Upper Gangetic Plain and of the adjacent Siwalik and Sub-Himalayan Tracts, Vol. III, Part II, Coniferae to Juncaceae. p. 169-263. Superintendent Government Printing: Calcutta, 1920.
344. FASSETT, NORMAN C. An estuarine variety of *Scirpus Smithii*. *Rhodora* 23: 41-43. 1921.—A hitherto undescribed form of bulrush is described as *Scirpus Smithii* Gray var. *levisetus* n. var. The type was collected on the tidal flats of the Cathance River, at Bowdoinham, Maine, and at its mouth in Merrymeeting Bay.—*James P. Poole*.
345. FASSETT, NORMAN C. *Sium suave*: a new and an old form. *Rhodora* 23: 111-113. 1921.—A new form of this species has been found by the author in a tidal estuary of the Cathance River, Bowdoinham, Maine. It is here described as *Sium suave* Walt. forma *fasciculatum* f. nova. The author concludes that *Sium Carsonii* Durand is a weak aquatic state of *S. suave* and consequently reduces it to *S. suave* Walt. forma *Carsonii* (Durand) comb. nov.—*James P. Poole*.
346. FAWCETT, WILLIAM, AND A. B. RENDEL. Notes on Jamaica plants. Jour. Botany 59: 17-19. 1921.—(Continued from Jour. Bot. 57: 314. 1919 [see Bot. Absts. 6, Entry 395].)—Notes are given under Euphorbiaceae (III), Rutaceae, Anacardiaceae, Aquifoliaceae, and Celastraceae. A key to the species of *Comocladia* is inserted. The following species are described as new: *Comocladia troyensis*, *Ilex florifera*, *I. uniflora*, and *Maytenus microcarpa*.—*K. M. Wiegand*.
347. FERNALD, M. L. *Scutellaria epilobiifolia*. *Rhodora* 23: 85-86. 1921.—The American species *Scutellaria epilobiifolia*, distinguished by Arthur Hamilton in 1832, has been very generally reduced to the Old World *S. galericulata* L. The present author shows, however, that when fully mature nutlets of the 2 plants are examined they show such striking differences that it becomes apparent that Hamilton's species should be recognized. The American plant is, then, *S. epilobiifolia* Hamilton. For 2 striking color variations which occur Fernald proposes: *S. epilobiifolia* Hamilton forma *rosea* (Rand & Redfield) n. comb., and *S. epilobiifolia* Hamilton forma *albiflora* (Millsp.) n. comb. Parallel color-forms of *S. lateriflora* are proposed as forma *rhodantha* n. f., and forma *albiflora* (Farwell) n. comb.—*James P. Poole*.
348. FERNALD, M. L. The North American representatives of *Scirpus cespitosus*. *Rhodora* 23: 22-25. 1921.—The author cites evidence from the European and the American literature to show that the common sedge, *Scirpus cespitosus* L., is represented in North America by 2 varieties, namely, *S. cespitosus* L. var. *callosus* Bigelow and *S. cespitosus* L. var. *dedicalulus* n. var. The bibliography, description, synonymy, and distribution of each of the varieties are given.—*James P. Poole*.
349. FERNALD, M. L., AND HAROLD ST. JOHN. The American variations of *Silene acaulis*. *Rhodora* 23: 119-120. 1921.—The authors publish the bibliography of *Silene acaulis* L. var. *escapa* (All.) DC., and discuss its earlier recognition and description in the unpublished *Flore de Terre-Neuve*, St. Pierre et Miquelon by Bachelot de la Pylaie about a century ago. Another variety of this species, occurring in the Rocky Mountains from Wyoming to New Mexico and Arizona, is here published as *S. acaulis* var. *subcaulescens* (F. N. Williams) n. comb.—*James P. Poole*.
350. FERNALD, M. L., AND C. A. WEATHERBY. *Equisetum fluviatile* or *E. limosum*? *Rhodora* 23: 43-47. 1921.—For nearly 50 years before the publication, in 1893, of the List of Pteridophyta and Spermatophyta of Northeastern North America, the common horsetail



of our marshes and rivershores was universally known to American botanists as *Equisetum limosum* L. In that work, the first attempt to apply the American Code, the name *E. fluviatile* was substituted. The present authors, after an investigation of the nomenclatorial history of the species, find that according to the International Rules, *E. limosum* must stand. They agree with the earlier authors that there appear to be no true varieties of the species in America, that the apparent varieties intergrade freely, occur commonly in the same colonies and sometimes even on the same rootstock, and recognize the more striking forms as *E. limosum* L. forma *minus* A. Br., forma *verticillatum* Doell, and forma *polystachium* (Brückn.) Doell. A key to these forms is published as well as the synonymy, bibliography, and distribution of each.—James P. Poole.

351. GODFREY, M. J. Two new orchid hybrids. Jour. Botany 59: 57-60. Pl. 557. 1921.—Plants collected by A. M. Forbes in Italy are described as  $\times$  *Serapicampsis Forbesii*, and are interpreted as a hybrid of *Serapias Lingua* L. and *Anacamptis pyramidalis* Rich. The reasons for this view are given at length. Notwithstanding the great difference in length of spur in these 2 species it is believed that cross pollination may occur. Another orchid, from France, probably a cross between *Ophrys arachnitiformis* Gren., and *O. scolopaz* Cav., is described as  $\times$  *Ophrys Cranbrookeana*.—K. M. Wiegand.

352. HAINES, H. H. Some new species of plants from Bihar and Orissa. Jour. Asiatic Soc. Bengal 15: 309-317. Pl. 9-11. 1920.—The following new species are described: *Hypericum Gaitii*, *Aglais Haslettiana*, *Atylosia cajanifolia*, *Mucuna minima*, *Jussiaea fissendocarpa*, *Pimpinella bracteata*, *Ligusticum alboalatum*, *Melothria zehnerioides*, *Oldenlandia arenaria*, *Lobelia aligera*, *Thesium unicaule*, and *Tragia Gagei*.—E. D. Merrill.

353. HAMILTON, A. A. Notes from the Botanic Gardens, Sydney. Proc. Linn. Soc. New South Wales 45: 260-264. 1920.—Information is given on the following species: *Scirpus supinum* L., *Schoenus Moorei* Benth., *Lepidosperma quadrangulata* n. sp., *Grevillea pumicea* R. Br. var. *crasseifolia* n. var., *Hakea saligna* R. Br. var. *angustiflora* n. var., *Pultenaea ferruginea* Rudge, *Prostanthera densa* n. sp., *P. rhombea* R. Br., *P. saziola* R. Br. var. *montana* n. var., and *P. debilis* F. v. M.—Eloise Gerry.

354. HENRIOT, PHILIPPE. Plantes rares ou nouvelles recueillies aux environs de Sainte-Foy-la-Grande. [Rare or new plants collected in the vicinity of Sainte-Foy-la-Grande.] Proc. Verb. Soc. Linn. Bordeaux 70: 106-121. 1917-1918.—Attention is called to the comparative richness of the flora in the northeastern portion of the department of Gironde, France. The author gives an extensive list of the flowering plants that are rare or have not been reported previously from this locality. Notes are given describing the exact stations at which many species occur together with miscellaneous information as to peculiarities of distribution.—E. B. Payson.

355. KENOYER, L. A. Notes on *Vallisneria*. Jour. Asiatic Soc. Bengal 15: 303-304. 1920.—The differences between European, American, and Indian forms of the so-called *Vallisneria spiralis* are tabulated.—E. D. Merrill.

356. KHADILKER, T. R. Description of the inflorescence of *Amorphophallus campanulatus* Bl. Jour. Indian Bot. 2: 55-56. 1 fig. 1921.

357. McATEE, W. L. Notes on *Viburnum* and the assemblage *Caprifoliaceae*. Bull. Torrey Bot. Club 48: 149-154. 1 fig. 1921.—The species of *Viburnum* in the United States do not have "stellate" pubescence, but "fasciculate." *V. nudum* and *V. cassinoide*s intergrade; while the leaves of the former are generally said to be entire, crenulations can generally be found on both species by unrolling the margin; the shape of the pit of the fruit is a more reliable character. The 2 species seem to hybridize. Whorled leaves cannot be said to distinguish *Rubiaceae* from *Caprifoliaceae*, for many of the latter possess such, especially on strong root shoots. The same situation exists in the case of the stipules, for some of the

Caprifoliaceae may possess them. The Caprifoliaceae if merged with the Rubiaceae run to tribes in all parts of the family; since they do not remain a unit, they do not pass the test "which should leave any satisfactory plant family intact."—P. A. Munz.

358. MAIDEN, J. H. Notes on the colouration of the young foliage of *Eucalyptus*. Proc. Linn. Soc. New South Wales 44: 761-766. 1919 [1920].—Observations on the colors, which shade from crimsons and purples to greens and yellows, were made. The color is lost in a few hours after the removal of the branches but may be preserved for 1 or 2 days if the specimens are packed in closely shut tins. A grouping of species based on these colors is given.—*Eloise Gerry*.

359. MERRILL, ELMER D. On the application of the generic name *Melodorum* of Loureiro. Philippine Jour. Sci. 15: 125-137. 1919.—The genus *Melodorum* was proposed by Loureiro in 1790. Hooker and Thomson after examining the type regarded it as a plant of doubtful affinity but would retain *Melodorum* as interpreted by Dunal and Blume. Merrill thinks it best for the present to retain *Melodorum* as a genus closely allied to *Popovia* and proposes to adopt Griffith's *Fissistigma* as a generic name for the species currently but erroneously known as *Melodorum*.—*Albert R. Sweetser*.

360. MERRILL, E. D. On the identity of *Aegiphila viburnifolia* Jussieu. Philippine Jour. Sci. 16: 449-451. Pl. 1. 1920.—A study of Jussieu's type convinces the writer that it belongs to the genus *Elaeodendron*, and he proposes *E. viburnifolium* (Juss.) comb. nov., a species hitherto unreported from the Philippines but to be expected from the region around Jolo.—*Albert R. Sweetser*.

361. NEYRAUT, E. J. Matériaux pour servir à l'étude du genre *Prunus*. [Material to serve for the study of the genus *Prunus*.] Proc. Verb. Soc. Linn. Bordeaux 70: 172-179. 8 fig. 1917-1918.—*Prunus elegans* Clavaud is described in great detail.—*E. B. Payson*.

362. PENNELL, FRANCIS W. *Penstemon tenuiflorus*. Addisonia 4: 79, 80. Pl. 160 (colored). 1919.—An ornamental plant native of the central Mississippi Valley. It is closely related to *P. hirsutus* and is here proposed as new.—*T. J. Fitzpatrick*.

363. PFEIFFER, HANS. Zur Systematik der Gattung *Chrysithrix* L. und anderer *Chrysithrichinae*. [The systematic position of *Chrysithrix* L. and of other genera of the *Chrysithrichinae*.] Ber. Deutsch. Bot. Ges. 38: 6-10. 1920.—The author states that the genera *Chrysithrix*, *Lepironia*, and *Chorizandra* must, on the basis of their flower structure and of the anatomy of their stems, be removed from the Cyperaceae and placed in the Restionaceae.—*R. M. Holman*.

364. PHILLIPS, E. P. The Natal species of the Sapindaceae. Bothalia 1: 57-64. 1921.—Twelve genera have been recorded from South Africa and of these 9 occur in Natal.—*E. P. Phillips*.

365. PHILLIPS, E. P., AND J. HUTCHINSON. A revision of the African species of *Sesbania*. Bothalia 1: 40-56. 1921.—The results of this investigation might very well have been more satisfactory had there been more field notes available regarding the situation, habit, floral coloring, etc. That this information is vital in the determination and limitation of the species of *Sesbania*, at least, has been well demonstrated by PRAIN in his critical elucidation of the Indian species. In the case of the African species the appendages on the claw of the vexillum has been found a most useful and constant character.—*E. P. Phillips*.

366. PIPER, C. V. Two new legumes from Mexico and Costa Rica. Proc. Biol. Soc. Wash. 34: 41-42. 1921.—*Phaseolus chiapanus* and *Calopogonium ferrugineum* are described as new species.—*J. C. Gilman*.

367. POLE EVANS, I. B. The flowering plants of South Africa. Vol. I. Part 1. Pl. 1-10. 1920.—This number contains colored plates and descriptions of *Agapanthus umbellatus* L'Herit., *Aloe globuligemma* Pole Evans, *Arctotis Fosteri* N. E. Br. n. sp., *Cyrtanthus contractus* N. E. Br. n. sp., *Gerbera Jamesoni* Bolus, *Gladiolus psittacinus* Hook. f. var. *Cooperi* Baker, *Leucodendron Sokoei* Phillips n. sp., *Tulbaghia violacea* Harv., and *Richardia angustiloba* Schott. *Ibid.* Part 2. Pl. 11-20. 1921. Illustrations and descriptions are given of the following species: *Freesia Sparrmannii* N. E. Br. n. comb., (*Gladiolus Sparrmannii* Thunb.), *Crassula falcata* Wendl., *Clivia miniata* Regel, *Gardenia globosa* Hochst., *Richardia Rehmanni* N. E. Br., *Adenium multiflorum* Klotsch, *Aloe Pienarii* Pole Evans, *A. pretoriensis* Pole Evans, *Clerodendron triphyllum* Pearson n. comb. (*Cyclonema triphyllum* Harv.), and *Gladiolus Rehmanni* Baker.—E. M. Doidge.

368. PUGSLEY, H. W. On *Hieracium aurantiacum* L. *Jour. Botany* 59: 60-69. 1921.—This species as it occurs in Britain is divided by the author into 2 species, one with subterranean stolons, broad leaves, and orange red or brick red heads, and another with superficial stolons, narrow leaves, and brownish-orange heads. The former is considered to be the typical *H. aurantiacum* of Linnaeus, while the latter is described as new under the name *H. brunneo-roseum*.—K. M. Wiegand

369. REHDER, ALFRED. *Azalea* or *Loiseleuria*. *Jour. Arnold Arboretum* 2: 156-159. 1921.—The different conceptions of the genus *Azalea* are discussed and the conclusion reached that the type of *Azalea* L. is *A. procumbens* L., now generally referred to *Loiseleuria*, and that the name *Azalea* in the sense of DESVAUX should be replaced by another generic name and by another subgeneric or sectional name if referred to *Rhododendron*.—Alfred Rehder.

370. REHDER, ALFRED. New species, varieties and combinations from the herbarium and the collection of the Arnold Arboretum. *Jour. Arnold Arboretum* 2: 174-180. 1921.—The present article contains an enumeration of the forms of *Ampelopsis brevipedunculata* Koehne and the following new combinations, hybrids, varieties and forms: *Ampelopsis brevipedunculata* var. *Maximowiczii* f. *citruilloides* (Lebas) and f. *elegans* (K. Koch), *A. brevipedunculata* var. *vestita* (Rehd.) and var. *Hancei* (Planch.), *Columella oligocarpa* (Lév. & Vaniot), × *Juglans Bizbyi* and var. *lancastriensis*, *Rubus Henryi* var. *bambusarum* (Focke), *Xyloasma congestum* var. *pubescens* (Rehd. & Wils.), *Cornus florida* f. *xanthocarpa*, × *Symphoricarpos Chenaultii*. [See also Bot. Absts 7, Entries 1476, 2227; 8, 734].—Alfred Rehder.

371. REHDER, ALFRED. *Philadelphus verrucosus* Schrader spontaneous in Illinois. *Jour. Arnold Arboretum* 2: 153-156. 1921.—*Philadelphus verrucosus* Schrad., hitherto known only as a cultivated plant, was discovered in 1919 by E. J. Palmer in southern Illinois; the synonymy of the species and a description based on the wild plant are given.—Alfred Rehder.

372. SARGENT, C. S. Notes on American trees. VIII. *Jour. Arnold Arboretum* 2: 164-174. 1921.—The following combinations, varieties, and forms are new: *Cyrilla racemiflora* var. *parvifolia* (Shuttl.), *Acer glabrum* f. *trisetum*, *Acer nigrum* var. *Palmeri*, *Vaccinium arborecens* var. *glaucescens* (Greene), *Bumelia lanuginosa* var. *albicans*, *B. lanuginosa* var. *anomala*, *Diospyros virginiana* var. *platycarpa* with f. *atra*, *D. virginiana* var. *Mosieri* (Small), *Halesia monticola* (Rehd.), *H. monticola* var. *vestita* with f. *rosea*, and *Fraxinus caroliniana* var. *Rehderiana* (Lingelsh.). There are also notes on the geographical distribution of *Robinia Pseudacacia*, *R. neomezicana*, and *Halesia parviflora*, and on the synonymy of *Byronnima lucida*.—Alfred Rehder.

373. STEPHENSON, T., AND T. A. STEPHENSON. *Orchis latifolia* in Britain. *Jour. Botany* 59: 1-7. 1921.—In this paper the view is held that *O. latifolia* is a distinct but variable species. In this matter the author agrees with Godfrey and Druce, and not with Rolfe. Reasons for not considering it a hybrid are given. The relation of *O. latifolia* to *O. praetermissa*, *O. maculata*, *O. Fuchsii*, *O. purpurella*, *O. incarnata*, and *O. ericetorum* is discussed.—K. M. Wiegand.

374. TAYLOR, MARY A. The figworts of Ohio. *Ohio Jour. Sci.* 21: 217-239. 1921.—This study of the Scrophulariaceae of Ohio is based largely on the Ohio State Herbarium. The nomenclature follows that of Britton and Brown's Illustrated Flora, 2nd edition. A synopsis and key to the genera are included.—H. D. Hooker, Jr.

375. TRELEASE, WILLIAM. North American Pipers of the section *Ottonia*. Amer. Jour. Bot. 8: 212-217. Pl. 4. 1921.—Twelve North American species of *Piper*, belonging to the section *Ottonia*, are described, of which the following are new species: *P. Thiemeanum*, *P. Tatei*, *P. brachyypus*, *P. Rosei*, *P. Diguetianum*, *P. Mas*, *P. abalienatum*, and *P. albicaule*.—E. W. Sinnott.

376. WEATHERBY, C. A. A form of *Ilex opaca*. Rhodora 23: 118-119. 1921.—The author discusses that variant of the species which is distinguished by the possession of entire or sub-entire leaves. This investigation disclosed no distinctive characters other than those of the leaves. The author proposes this form as *Ilex opaca* Ait. forma *subintegra* f. nov.—James P. Poole.

377. WHITE, C. T. A revised account of the Queensland Lecythidaceae. Proc. Linn. Soc. New South Wales 44: 822-825. Pl. 44. 1919 [1920].—A revision of the species found in Queensland of the genera *Barringtonia* Forst. and *Careya* Roxb. is given. The recognized advisability of keeping these plants and their allies distinct from the Myrtaceae is pointed out. *Careya australis* F. v. M., *Barringtonia speciosa* Forst., *B. calyptrata* R. Br., *B. longiracemosa* sp. nov. (pl. 44), and an incompletely differentiated species are described. *B. acutangula* Gaertn. and *B. racemosa* Gaud. are excluded from the Queensland flora. Information on synonymy and distribution is included.—Eloise Gerry.

378. WIEGAND, K. M. *Amelanchier anabalis*, a new name. Rhodora 23: 48. 1921.—This new name is proposed to replace *A. grandiflora* which the author published in Rhodora 22: 149. 1920. While the latter paper was in press, *A. grandiflora* was proposed by REEDER for another common hybrid form, thus making a substitution necessary.—James P. Poole.

## MISCELLANEOUS

B. E. LIVINGSTON, Editor

S. F. TRELEASE, Assistant Editor

379. ANONYMOUS. A query concerning a lichen. Agric. Gaz. New South Wales 32: 412. 1921.—Lichen could not be considered a timber-preserving plant.—L. R. Waldron.

380. BANCROFT, W. D. [Rev. of: SLOSSON, E. E. Creative chemistry. 80 × 14 cm., x + 311 p. The Century Co.: New York, 1919.] Jour. Phys. Chem. 24: 329-331. 1920.—The book contains a great deal of unusual information concerning plant products, their uses, and the direct and indirect influences of war upon agriculture. "One is continually running across unsuspected information, as, for instance, that the red rubber sponge and eraser tips for pencils may be made from a gum extracted from the corn germ. There are relatively few mistakes," and "in spite of occasional defects the book is an extremely valuable one."—H. E. Pulling.

381. POTTER, M. C. British plants as a source of industrial alcohol. Nature 107: 170-171. 1921.—By-products of *Brassica* spp., such as cabbage stalks and petioles, petioles of turnips and rutabagas, contain considerable sugar which might be utilized. Other possible sources are sugar in rhizomes of couch grass (*Agropyron repens*) and in the uni-internodal corms of the bulbous oat-grass (*Arrhenatherum avenaceum*), starch in rhizome of bracken-fern (*Pteris aquilina*), and inulin in roots of spear thistle (*Carduus lanceolatus*).—O. A. Stevens.

382. ROTH, E. Nahrungsmittel aus Getreide. [Grain foods.] [Rev. of: MAURIZIO, A. Die Nahrungsmittel aus Getreide, ihre botanischen, chemischen und physikalischen Eigenschaften, hygienisches Verhalten, Prüfen und Beurteilen. (Grain foods, their botanical, chemical and physical qualities, hygienic nature, tests, and grades.) Vol. 1. xii + 488 p., 8 pl., 180 fig. Parey: Berlin, 1917.] Leopoldina 54: 42-44. 1918.—The reviewer recommends Maurizio's work highly, not only on account of its exhaustive treatment of grains from all points of view, but also on account of its avoidance, so far as possible, of technicalities.—A. W. Evans.