

The second volume, the printing of which has been begun, will appear in the near future and conclude this most important contribution of the working student of vegetable physiology.

RODNEY H. TRUE.

BUREAU OF PLANT INDUSTRY,

U. S. DEPARTMENT OF AGRICULTURE.

SCIENTIFIC JOURNALS AND ARTICLES.

The American Naturalist for May brings this journal up to date. It contains articles on the 'Affinities of the Genus *Equisetum*,' by D. H. Campbell; 'Movements of Diatoms and Other Microscopic Plants,' by D. D. Jackson, and, after a long interval, another of the valuable 'Synopsis of North American Invertebrates, XX., Families and Genera of Araneida,' by Nathan Banks; 'Biology of *Acmaea testudinalis* Miller,' M. A. Willcox; 'Habits of the West Indian Whitebait,' A. H. Clark, and notes and reviews.

THE May number (volume 11, number 8) of the *Bulletin of the American Mathematical Society* contains: Report of the February meeting of the San Francisco Section, by G. A. Miller; 'On the development of mathematical analysis and its relation to certain other sciences,' by Emile Picard (St. Louis address), translated by M. W. Haskell; 'On the class of the substitutions of various linear groups,' by L. E. Dickson; 'Note on a problem in mechanics,' by A. M. Hildebeitel; 'A geometric construction for quaternion products,' by Irving Stringham; Reviews of Lechalas's *Géometrie générale*, by Oswald Veblen; Netto's *Elementare Algebra*, by J. H. Tanner; Murray's *Infinitesimal analysis*, by W. B. Fite; Tanner's *Elementary algebra*, by James Pierpont; *Annuaire du Bureau des Longitudes*, by E. W. Brown; Gibbs-Roy's *Diagrammes et surfaces thermodynamiques*, by W. F. Durand; 'Notes'; and 'New Publications.'

SOCIETIES AND ACADEMIES.

THE MICHIGAN ACADEMY OF SCIENCE.

THE annual meeting of the Michigan Academy of Science took place at Ann Arbor, March 30, 31 and April 1. The programs of

papers were good, and the meetings well attended by members and others from all parts of the state. On the evening of March 30 the annual address was delivered in University Hall before an audience of two thousand by Professor T. C. Chamberlin, of the University of Chicago, the topic being 'Old and New Hypotheses of the Earth's Origin.' The evening of the thirtieth was spent in a social smoker tendered by the University Research Club; and the excellent address of the retiring president of the academy, Dr. A. C. Lane, state geologist of Michigan, was delivered the afternoon of April 1, the topic being 'Natural Resources, their Conservation and Compensation for Necessary Consumption, one Feature of which is a Scientific Search for Substitutes.'

The academy has had introduced into the state legislature a bill for a topographic survey, and another bill for a natural history survey. The prospect for the passage of these bills seems good, and the academy decided to engage in a vigorous campaign to effect that end.

Papers were read as shown by the following programs:

SECTION OF AGRICULTURE.

Vice-President, W. J. Beal, Agricultural College.
KENYON L. BUTTERFIELD, president of State Agricultural College, Rhode Island: 'Outline of a Course in Rural Sociology.'

W. O. HEDRICK, Agricultural College: 'Syllabus for an Elementary Course in Economics.'

R. S. SHAW, Agricultural College: 'Syllabus for a Four-year Course in Live-stock Husbandry.'

U. P. HEDRICK, Agricultural College: 'Syllabus for a Four-year Course in Horticulture.'

J. L. SNYDER, president of Agricultural College: 'Social Phases of Agricultural Education.'

U. P. HEDRICK, Agricultural College: 'Outline of Topics in Horticulture for some Grades of Common Schools.'

CLARENCE E. HOLMES, superintendent of State School for Blind, Lansing: 'The Place of Agriculture in the Rural Schools.'

F. L. KEELER, Mt. Pleasant: 'School Gardens.'

J. B. DANDENO, Agricultural College: 'Some Experience in the Management of School Gardens.'

ERNEST BURNHAM, Kalamazoo: 'The Preparation of Teachers for the Rural Common Schools.'

C. W. GARFIELD, Grand Rapids: 'The Rural School Museum.'

L. H. BAILEY, dean of Agricultural School, Cornell University: 'Planning Courses for Rural Schools.'

JOSEPH A. JEFFERY, Agricultural College: 'Some Lessons Concerning Soils for the Common Schools.'

SECTION OF BOTANY.

Vice-President, J. B. Dandeno, Agricultural College.

F. C. NEWCOMBE, Ann Arbor: 'Geotropic Response of Stems and Roots at Various Angles of Inclination.'

J. B. DANDENO, Agricultural College: 'Color Stimuli and Plant Functions.'

J. B. POLLOCK, Ann Arbor: 'A Canker of the Yellow Birch accompanied by Nectria.'

F. A. LOEW, Agricultural College: 'A Study of the Effect of Dilute Solutions of Hydrochloric Acid upon the Radicles of Corn Seedlings.'

ELLEN B. BACH, Agricultural College: 'The Toxic Action of Copper Sulphate upon Certain Algae, in the Presence of Foreign Substances.'

WALTER G. SACKETT, Agricultural College: 'The Relation of Bacteria to Plant Food.'

J. B. POLLOCK and C. H. KAUFFMAN, Ann Arbor: 'Michigan Fungi Not Previously Listed in the Reports of the Michigan Academy of Science.'

R. P. HIBBARD, Ann Arbor: 'Sexual Reproduction in a Red Alga (*Calithamnion Baileyi*).'

W. J. BEAL, Agricultural College: 'Vitality of Seeds after Twenty-five Years.'

J. B. POLLOCK, Ann Arbor: '*Polystictus hirsutus* as a Parasite on Mountain Ash, Maple and Carpinus.'

J. B. POLLOCK, Ann Arbor: 'Note on *Ganoderma* (*Fomes*) *sessile*, Murrill, Its Variation from the Original Description and Possible Parasitism.'

S. O. MAST, Holland: 'A Device for Aerating Aquaria.'

E. N. TRANSEAU, Alma: 'Climatic Centers and Centers of Plant Distribution.'

FRANCES STEARNS, Adrian: 'A Study of Plants in Ravines near Adrian.'

EDITH PETTEE, Detroit: 'Plant Distribution in a Small Bog.'

ALFRED DACHNOWSKI, Ann Arbor: 'Ravines in the Vicinity of Ann Arbor.'

H. S. REED, University of Missouri, Columbia, Mo.: 'History of Ecological Work.'

J. B. POLLOCK, Ann Arbor: 'A Species of *Hormodendrum* Parasitic on the *Araucaria*.'

S. ALEXANDER, Ann Arbor: 'A Southern Plant, New to the Flora of Michigan, Found Growing at Ann Arbor.'

SECTION OF GEOLOGY AND GEOGRAPHY.

Vice-President, M. S. W. Jefferson, Ypsilanti.

S. ALEXANDER, Ann Arbor: 'A Remarkable Floral Reversion Caused by Bud-Grafting.'

E. L. MOSELEY, Sandusky, O.: 'Changes of Level at the West End of Lake Erie.'

FRANK B. TAYLOR, Fort Wayne, O.: 'Relation of Lake Whittlesey to the Arkona Beaches.'

EDWARD H. KRAUS, Ann Arbor: 'Occurrence and Distribution of Celestite-bearing Rocks.'

W. H. SHERZER, Ypsilanti: 'Glaciers of British Columbia.'

I. C. RUSSELL, Ann Arbor: 'Drumlin Areas in Northern Michigan.'

FRANK LEVERETT, Ann Arbor: 'Interglacial Lake Clays of the Grand Traverse Regions.'

M. S. W. JEFFERSON, Ypsilanti: 'Beach Cusps.'

EDWARD H. KRAUS, Ann Arbor: 'Origin of the Sulphur Deposits at Woolmuth Quarry, Monroe Co., Mich.'

SECTION OF SANITARY SCIENCE.

Vice-President, T. B. Cooley, Ann Arbor.

V. C. VAUGHAN, Ann Arbor: 'The War Against Tuberculosis.'

F. G. NOVY, Ann Arbor: 'Bird Hematozoa.'

HENRY B. BAKER, Lansing: 'Am I My Brother's Keeper?'

CRESSY L. WILBUR, Lansing: 'The Scientific Necessity of Complete Registration of Vital Statistics.'

W. G. SACKETT, Agricultural College: 'The Relation of Bacteria to Plant Food.'

S. F. EDWARDS, Ann Arbor: 'Tryptophan Media.'

L. T. CLARK, Agricultural College: 'Technical Cultural Manipulation of Rhizobium.'

H. N. TORREY, Ann Arbor: 'Staining by the Romanowsky Method.'

BRONSON BARLOW, Guelph, Ont.: 'The Steam Still.'

W. R. WRIGHT, Agricultural College: 'The Relation of the Bacterial Content to the Ripening of Michigan Cheese.'

T. B. COOLEY, Ann Arbor: 'Some Bacterial Hemolysins.'

V. C. VAUGHAN, JR., Ann Arbor: 'The Action of the Intra-Cellular Poison of the Colon Bacillus.'

SYBIL MAY WHEELER, Ann Arbor: 'The Extraction of the Intra-Cellular Poison of the Colon Bacillus.'

MARY WETMORE, Agricultural College: 'The Germicidal Action of Fruit Juices upon Certain Pathogenic and Non-Pathogenic Bacteria.'

JAMES C. CUMMING, Ann Arbor: 'Disinfection by Means of Formalin and Potassium Permanganate.'

CHARLES E. MARSHALL, Agricultural College: 'Bacterial Products in Milk and Their Relation to Germ Growth.'

SECTION OF SCIENCE TEACHING.

Vice-President, W. H. Sherzer, Ypsilanti.

I. B. MEYERS, School of Education, University of Chicago: 'Elementary Field Work—Aims and Methods.' Discussion opened by L. H. Bailey, Cornell University.

M. S. W. JEFFERSON, State Normal College: 'Aims and Methods of Physiographic Field Work in Secondary Schools.' Discussion opened by R. D. Calkins, Central Normal School.

C. E. ADAMS, University of Michigan: 'Aims and Methods of Zoological Field Work in Secondary Schools.' Discussion opened by Miss Jessie Phelps, State Normal College.

H. C. COWLES, University of Chicago: 'Aims and Methods of Botanical Field Work in Secondary Schools.' Illustrated with lantern. Discussion opened by E. L. Moseley, Sandusky High School, Ohio.

J. HARLAN BRETZ, Albion College: 'Field Work in Botany for the Winter Season.'

SECTION OF ZOOLOGY.

Vice-President, Raymond Pearl, Ann Arbor.

J. E. DUERDEN, Ann Arbor: Natural History Notes from the Hawaiian Islands—'Role of Mucus in Corals,' 'Commensalism of Crab and Actinian.'

HUBERT LYMAN CLARK, Olivet College: 'The Value of the Pedicellariæ in the Taxonomy of Sea-urchins.'

L. MURBACH, Detroit: 'The Static Function in Some Crustacea.'

MISS JEAN DAWSON, Ann Arbor: 'An Ecological Study of Physa.'

S. O. MAST, Hope College: 'Light Reactions of Stentor.'

S. J. HOLMES, Ann Arbor: 'The Reflex Theory of Phototaxis.'

G. C. WHITTAKER, Olivet College: 'Variation in the Blue Racer.'

MISS S. A. AYRES, Ann Arbor: 'The Nervous System of *Cœnopsammia*.'

RAYMOND PEARL and FRANCES J. DUNBAR, Ann Arbor: 'Some Results of a Study of Variation in Paramecium.'

A. B. CLAWSON, Ann Arbor: 'Some Results of a Study of Correlation in the Crayfish.'

J. E. DUERDEN, Ann Arbor: 'Demonstration of Hawaiian Corals.'

The University Museum Expedition to Northern Michigan—CHARLES C. ADAMS, Ann Arbor: 'Introductory Remarks.' A. G. RUTHVEN, Ann Arbor: 'An Ecological Survey in the Porcupine Mountains and Isle Royale.' OTTO MCCREARY, Ann Arbor: 'Ecological Distribution of the Birds of the Porcupine Mountains.' BRYANT WALKER and A. G. RUTHVEN, Detroit and Ann Arbor: 'Annotated List of the Molluscs of the Porcupine Mountains and Isle Royale.' N. A. WOOD, M. M. PEET and O. MCCREARY, Ann Arbor and Ypsilanti: 'Annotated List of the Birds of the Porcupine Mountains.' N. A. WOOD, M. M. PEET and O. MCCREARY, Ann Arbor and Ypsilanti: 'Annotated List of the Birds of Isle Royale.'

BRYANT WALKER, Detroit: 'The Distribution of Polygyra in Michigan.'

FRANK N. NOTESTEIN, Alma College: 'The Ophidia of Michigan.'

MORRIS GIBBS, Olivet College: 'A Summary of the Work Hitherto done on Michigan Herpetology.'

HUBERT LYMAN CLARK, Olivet College: 'The Distribution of the Blue Racer and Rattlesnake in Michigan.' (With maps.)

MORRIS GIBBS, H. L. CLARK and FRANK N. NOTESTEIN, Olivet College and Alma College: 'A Provisional List of the Amphibia and Reptilia of Michigan.'

The officers elected for the ensuing year are as follows:

President—W. B. Barrows, Agricultural College.

Vice-Presidents of Sections—Agriculture, Professor W. J. Beal, Agricultural College; botany, Professor J. B. Dandeno, Agricultural College; geography and geology, Mr. Frank Leverett, Ann Arbor; sanitary science, Dr. V. C. Vaughan, Jr., University of Michigan; science teaching, Professor E. N. Transeau, Alma College; zoology, Dr. J. E. Duerden, University of Michigan.

Librarian—Dr. G. P. Burns, University of Michigan.

Secretary-Treasurer—Professor C. E. Marshall, Agricultural College.

F. C. NEWCOMBE.

THE TORREY BOTANICAL CLUB.

A REGULAR meeting was held on April 11, at the American Museum of Natural History, President Rusby in the chair and twenty-two additional members present.

The paper of the evening was on 'Some Edible Seaweeds,' by Professor H. M. Richards.

After reference to the indirect importance of plankton organisms as a source of food for animal life in the sea the speaker referred to those forms of algæ which are used directly by man as foodstuffs. They were grouped roughly under four heads—blue-green, grass-green, brown and red algæ.

In the first group, specimens of a form much prized by the Chinese were shown, which is, according to good authority, *Nostoc commune flagelliforme*. This becomes highly gelatinous when soaked in warm water and is used as a thickening or sauce. A Japanese form, 'Su-zen-ji-nori,' of more doubtful nature, but probably an Aphanothece, was also shown.

Among the grass-green forms mention was made of various species of *Ulva* and *Enteromorpha*, which in dried form go under the name of 'laver' in the British isles and 'ao-nori' among the Japanese.

Among the brown forms only one of the Fucaceæ was mentioned as an article of food, namely *Durvillea utilis*, which is said to be eaten by the natives in certain parts of Chili.

The *Laminaria* forms, however, include a large number of edible species. *Alaria esculenta*, common both here and in Europe, was at one time eaten occasionally in the occident. At the present time the Japanese and Chinese make great use of these forms, indeed, after fish, they constitute the chief article of export of the Hokkaido. They are exceedingly plentiful in that region and their collection and preparation for market is a thriving business. In this connection the report of Professor Miyabe and others was passed around and attention was called to the illustrations showing the mode of harvesting the seaweeds. The two most important species seem to be *Laminaria saccharina* (*Laminaria japonica*) and *Ulopteryx pinnatifida* (presumably iden-

tical with *Undaria distans* more recently separated by Miyabe and Okamura), which are known under the respective names of 'Kombu' and 'Wakame' by the Japanese. Many other forms are eaten, however.

After reference to the well-known examples 'Irish moss' (*Chondrus crispus*) and 'dulse,' it was said that the two types most used are the delicate *Porphyra* forms and the more massive cartilaginous kinds, such as various *Gigartina*, *Gelidium*, *Gloiopeltis* species. *Porphyra* has also been eaten by Europeans and is said to be used by the natives in parts of Alaska, but it is most highly prized by the Japanese and Chinese. Under the name of 'asakusa-nori' it is put up in neat tin boxes and largely sold in the Tokio markets, it being used by itself or for thickening, giving, as it does, a very glutinous mixture with hot water. 'Fu-nori,' used chiefly as we use starch, is a mixture of species of *Gloiopeltis* and *Endotrichia*, and, like all these forms, is sold dried.

The speaker referred to agar-agar, which, on Wiesner's authority, is said to come from different species in different regions. That of Ceylon is from *Gracilaria lichenoides*, that of Java from *Eucheuma spinosum*, while the Japanese variety is furnished by *Gelidium corneum* and *cartilagineum* and *Gloiopeltis tenax*. Agar, in addition to its uses as a culture medium in bacteriological research, is said to be employed sometimes as an adulterant in the jellies of commerce, where it may be recognized by the siliceous frustules of diatoms, etc., from which it is never free.

Other forms of Florideæ are used as foodstuffs, attention being called to their figures in a Japanese popular work on the useful plants of Japan.

In regard to the food value of algæ it appears that many of them, especially the blue-green forms, contain a very high percentage of proteids, though not much else of value. The gelatinifying substances obtained from the red forms appears to be a substance called gelose, which is similar to, or identical with, the pectic substances so commonly found either deposited in the middle lamella of the cells of higher plants, or in the walls themselves. Mention was incidentally made of the

use of seaweeds in the manufacture of iodine and soda-ash. Dr. Rusby exhibited specimens of *Fucus vesiculosus* and an unnamed form, which are used medicinally.

Dr. Howe spoke of dulse as an article of food and of its occurrence in the markets of New York.

After further discussion, adjournment followed.

L. H. LIGHTHIPE,
Secretary pro tem.

THE AMERICAN MATHEMATICAL SOCIETY.

A REGULAR meeting of the society was held at Columbia University on Saturday, April 29. On the preceding Saturday the Chicago section met at the University of Chicago. The two sessions of the New York meeting were attended by thirty-eight members. President W. F. Osgood occupied the chair, being relieved by Vice-President E. W. Brown and the secretary. The following new members were admitted: J. H. Grace, Peterhouse, Cambridge, Eng.; H. B. Leonard, University of Chicago; R. B. McClenon, Yale University; W. S. Monroe, Columbia, Mo.; J. C. Morehead, Yale University; Henri Poincaré, University of Paris; R. G. D. Richardson, Yale University; Miss S. F. Richardson, Vassar College; F. R. Sharpe, Cornell University; Miss M. S. Walker, University of Missouri. Six applications for membership were received. The total membership of the society is now 490, including 34 life members.

An appropriation of \$100 was made toward binding the rapidly accumulating library material. The catalogue of the library now includes nearly 2,000 volumes, accessions amounting to some 500 volumes per annum. The greater part of the expense of binding is borne by the Columbia University Library, in which the collection is deposited.

The society has recently issued, through The Macmillan Company, an octavo volume of 175 pages containing the lectures on mathematics delivered at the Boston colloquium, September, 1903, by Professors E. B. Van Vleck, H. S. White and F. S. Woods.

The following papers were read at the April meeting:

ARTHUR SCHULTZE: 'Graphic solution of quadratics, cubics and biquadratics.'

MAX MASON: 'On the derivation of the differential equation of the calculus of variations.'

D. R. CURTISS: 'Theorems converse to Riemann's on linear differential equations.'

VIRGINIA RAGSDALE: 'On the arrangement of the real branches of plane algebraic curves.'

J. C. MOREHEAD: 'Numbers of the form $2^k q + 1$ and Fermat's numbers.'

E. B. VAN VLECK: 'Supplementary note on theorems of pointwise discontinuous functions.'

JAMES PIERPONT: 'Inversion of double infinite integrals.'

JAMES PIERPONT: Multiple integrals (second paper.)

R. B. MCCLENON: 'On simple integrals with variable limits.'

E. O. LOVETT: 'On a problem including that of several bodies and admitting of an additional integral.'

M. B. PORTER: 'Concerning Green's theorem and the Cauchy-Riemann differential equations.'

M. B. PORTER: 'Concerning series of analytic functions.'

J. E. WRIGHT: 'Differential invariants of space.'

EDWARD KASNER: 'On the trajectories produced by central forces.'

E. B. WILSON: 'Sur le groupe qui laisse invariant l'aire gauche.'

E. J. WILCZYNSKI: 'Projective differential geometry.'

I. M. SCHOTTENFELS: 'On the simple groups of order $8!/2$ ' (preliminary communication).

I. M. SCHOTTENFELS: 'Certain trigonometric formulas for the quantity $x + ey$, where $e^2 = 0$.'

EDWARD KASNER: 'A theorem concerning partial derivatives of the second order, with applications.'

J. E. WRIGHT: 'On differential invariants.'

L. P. EISENHART: 'Surfaces of constant curvature and their transformations.'

L. E. DICKSON: 'On the class of the substitutions of various linear groups.'

JOSIAH ROYCE: 'The fundamental relations of logical and geometrical theory.'

The summer meeting of the society will be held at Williams College, Williamstown, Mass., on Thursday and Friday, September 7-8. The San Francisco section will also meet in September.

F. N. COLE,
Secretary.