drafting; while the student who must, by force of circumstances, be self-instructed, could not be better provided therefor.

The treatment of valve-motion is admirable. The precedence given the Bilgram diagram over the Zeuner, although unusual, is fully warranted, the former being far superior for designing, while possessing equal merits with the latter for analysis.

The frequent shaded perspectives will be especially appreciated by the beginner in machine drawing, obviating, as they do, in considerable degree, the necessity for the models recommended but not always obtainable.

Among the more important features appearing for the first time in this edition are the "Course in Lettering" and the "Present Practise in Drafting Room Methods," the latter a summary of replies, from two hundred of the leading engineering firms of this country, to thirty-five questions as to shop practise. An ample index completes this altogether valuable work.

FREDERICK N. WILLSON

SCIENTIFIC JOURNALS AND ARTICLES

THE February number (volume 15, number 5) of the *Bulletin of the American Mathematical Society* contains the following papers: "The Second Regular Meeting of the Southwestern Section," by O. D. Kellogg; "Remarks Concerning the Second Variation for Isoperimetric Problems," by Oskar Bolza; "Notes on the Simplex Theory of Numbers," by R. D. Carmichael; "The Solution of Boundary Problems of Linear Differential Equations of Odd Order," by W. D. A. Westfall; "A Class of Functions Having a Peculiar Discontinuity," by W. D. A. Westfall; "On Certain Determinants Connected with a Problem in Celestial Mechanics," by H. E. Buchanan; "Sylvester's Mathematical Papers," by L. E. Dickson; "Hilton's Finite Groups," by Arthur Ranum; "Shorter Notices": Ball-Freund's Histoire des Mathématiques, and Günther's Geschichte der Mathematik, by D. E. Smith; Tannery's Manuscrits de Evariste Galois and Minkowski's Diophantische Approximationen, by L. E. Dickson; Sturm's Lehre von den geometrischen Verwandtschaften, Band II., by Virgil Snyder; Arnoux's Arithmétique graphique, by W. H. Bussey; Enriques-Fleischer's Fragen der Elementargeometrie, by H. E. Hawkes; Poincaré's Leçons de Mécanique celeste, by F. R. Moulton; Gutzmer Tätigkeit der Unterrichtskommission, by J. W. A. Young; "Notes"; "New Publications."

The March number of the *Bulletin* contains: "The Fifteenth Annual Meeting of the American Mathematical Society," by F. N. Cole; "The Winter Meeting of the Chicago Section," by H. E. Slaught; "The Sixteenth Meeting of the American Association for the Advancement of Science," by G. A. Miller; "Some Surfaces Having a Family of Helices as One Set of Lines of Curvature," by Eva M. Smith; "Note on Enriques's Review of the Foundations of Geometry," by A. R. Schweitzer; "Notes"; "New Publications."

SPECIAL ARTICLES

A POSSIBLE ERROR IN THE ESTIMATES OF THE RATE OF GEOLOGIC DENUDATION[1]

THE presentation at the Baltimore meeting of the American Chemical Society of a paper by Dole and Stabler on the rapidity of geologic denudation recalls attention to a possible source of error in such estimates which has been already implied in the writings of Walther, Udden and other students of æolian geology. The peculiarly thorough and comprehensive figures of Dole and Stabler are deduced, as have been all previous ones, from the examination of river waters, and are based upon the assumption that all material which is removed from the land to the sea is carried in suspension or solution by outward-flowing water. Recent studies on the magnitude of æolian transport cast some doubt upon the validity of this assumption. It has become apparent that much surface material is moved from place to place by æolian action and that much of this transport is to be ascribed to the slow and unnoticed, but continuous, action of

[1] Published by permission of the Secretary of Agriculture.

ordinary winds. The winds are so ubiquitous and so incessantly in motion that their aggregate geologic work is by no means negligible, though it may be momentarily inappreciable. If the winds are constantly carrying material they must be carrying some of it to sea, and of this the major part will be deposited in the ocean and only a small fraction returned to the land. Land breezes are notoriously dusty, and that the winds blowing inward from the ocean are much more free from solid contamination is known, not only deductively and from general observation, but as the result of actual counts of the dust particles.[2]

Udden[3] has calculated on very conservative data that the transport capacity of the winds blowing outward from the Mississippi Basin is at least one thousand times greater than that of the river. This, of course, refers only to transport *capacity,* and no one imagines that the actual amounts of material moved are in the same ratio. The air, unlike the water, is seldom loaded to any considerable fraction of its capacity. It is evident, however, that if the wind performs only an infinitesimal part of the carriage for which it has the ability, its activity is nevertheless far too great to be neglected. Neither is the Mississippi Basin a region especially susceptible to æolian action. The immense amount of wind-borne material carried out of deserts is universally admitted, and the example of the sirocco dust which constantly leaves the Sahara for the Atlantic to the west and the Mediterranean to the north is universally familiar.

From the information at present available it is entirely impossible to estimate with accuracy the yearly rate of æolian removal or the resultant error in the calculations of the rapidity of denudation. It seems, however, not improbable that the error is of some moment and that the present estimates are too low in a not unimportant degree, even when their admittedly approximate character is taken into account. These conclusions derive added force from two recent papers by Thoulet[4] in which he records his conviction that a considerable fraction of the mud of the sea bottom is terrestrial dust borne to its position by winds and fallen through the overlying water in an approximately vertical path.

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[2] Aitkin, *Trans. Roy. Soc. Edinb.*, 42: 486, 1902.

[3] *Jour. Geol.*, 2: 318–331, 1894.

[4] *Comptes Rendus*, 146: 1184–1186, 1346–1349, 1908.

THE AMERICAN SOCIETY OF ZOOLOGISTS

The regular triennial joint meeting of the Eastern and Central Branches of the American Society of Zoologists was held at the Johns Hopkins University, Baltimore, Md., on December 29, 30 and 31, 1908.

The following resolutions were adopted:

Resolved, That this society most urgently recommends to the Committee on Ways and Means, or other body having the matter in charge, that the present duty on scientific books published in English, and on scientific apparatus be removed.

Resolved, That, in the opinion of this society, the migratory birds of the United States should be properly protected by national laws, and that this society urges immediate consideration of the bill, introduced by Representative Weeks, now before Congress.

The officers elected were:

EASTERN BRANCH

President—Herbert S. Jennings, Johns Hopkins University.

Vice-president—H. V. Wilson, University of North Carolina.

Secretary-Treasurer—Lorande Loss Woodruff, Yale University.

Additional Member of Executive Committee—Maynard M. Metcalf, Oberlin College.

CENTRAL BRANCH

President—Edward A. Birge, University of Wisconsin.

Vice-president—Michael F. Guyer, University of Cincinnati.

Secretary-Treasurer—Charles Zeleny, University of Indiana.

The following papers were presented:

Diverse Races of Paramecium and their Relation to Selection and to Conjugation: H. S. Jennings, Johns Hopkins University.