somes may therefore be classed as a diploid growth in distinction to the original gametophytic or haploid stage with its $1n$ number of chromosomes. These diploid growths of diœcious (heterothallic) species remain entirely sterile, though producing apparently normal antheridia and archegonia. Attempts made to produce hybridization between these hermaphroditic diploid growths and male and female plants of the normal $1n$ generation resulted in failure.

With hermaphroditic (homothallic) species the condition is different and the aposporic outgrowths are fertile. Their gametes with $2n$ chromosomes unite and produce sporophytes with $4n$ chromosomes. These tetraploid sporophytes form spores with again $2n$ chromosomes, which grow into fertile gametophytes with double the normal chromosome number, thus producing a definitely fixed bivalent race (*e. g., Amblystegium serpens bivalens*). The regeneration from the tetraploid sporophyte gives rise to a race with $4n$ chromosomes which as yet has remained sterile. A sporophyte with $8n$ chromosomes might be produced if this $4n$ race could be induced to fruit.

No phenomena have been observed, such as apogamy or supplementary chromosome reduction, which would avoid the doubling of chromosomes in the races obtained from sporophytic regenerations.

A rather careful series of measurements were made of the size of the nuclei and cells in the different stages obtained, and it was found that the volume of the cells and of the nuclei were directly proportional to the number of chromosomes in the $1n$, $2n$ and $4n$ gametophytes as well as in the $2n$ and $4n$ sporophytes. Further, it was seen that this increase in size of the cells with an increase in the number of chromosomes resulted in the enlargement of certain organs such as the antheridia and archegonia.

The Marchals believe that apospory is likely to occur in nature from wounding of the sporophyte and that bivalent races have thus been formed.

There is promised a continuation of these investigations on the mosses which have proved already of such great interest to the students of sex.

A. F. Blakeslee
Connecticut Agricultural College,
Storrs, Conn.

A List of Geographical Atlases in the Library of Congress, with bibliographical notes. Compiled under the direction of Philip Lee Phillips, F.R.G.S., Chief Division of Maps and Charts. In two volumes, cloth: Vol. I., Atlases, pp. xiv + 1,208, Vol. II., Author List, Index, pp. 1,209–1,659. Washington, Government Printing Office. 1909. $2.35.

In the publication of these volumes a very commendable service has been done for geography and for students in all lines making use of maps. For it is strictly true as the editor says in his preface, "atlases have not received the consideration in bibliography due to their importance in literature and as contributions to knowledge." There are few works on the subject and these are fragmentary.

The present contribution is merely a list of the geographical atlases in the Library of Congress, a total of over thirty-four hundred titles in addition to seventy lettered titles. The editor modestly disclaims it as a bibliography.

The arrangement is good. It starts with general atlases of special subjects, the subject headings in alphabetical order. Then follow the general atlases in chronological order, and then follow America, Europe, Asia, Africa and Oceanica in similar order. This classification includes under each general heading the atlases of cities, of voyages of circumnavigation, historical works, scientific explorations, and the atlas material accompanying the reports on boundary disputes between nations.

Bibliographical notes and tables of contents have been given in case of the rare and more important volumes. This brings out numerous inserted maps, so frequently hidden away in such material.

In the second volume the general index is preceded by an author index of abridged titles, in which the author's full name is

given, and dates of birth and death, where known. The importance of the latter is evident, as a clue to the dates of publication, for it has been the custom among most map publishers to omit the date. For obviously, since people as a rule are not very particular about maps, and know very little about them, it has always been a temptation to the publisher to make an old plate do in a new publication.

As no other library "has published a complete description of its atlas material it is impossible to state authoritatively how the collection in the Library of Congress compares in size and importance with others." But these two volumes certainly attest to long and assiduous collecting. To start at the beginning, of the forty known editions of Ptolemy, all but three are in this collection. In cartographic material relating to America the collection is especially rich and complete.

To all students in geography and history, these volumes will come as a welcome instrument of research. It will be of the highest value to be able to turn to the index for a place name, and to find there listed every atlas in the collection pertaining to the region, and in the more important publications to find even the description of every map in the atlas of the region. It will save endless search and will settle in a minute at your own desk, whether or not you have all the available material bearing on your particular quest.

Yet a hasty scanning of the collection seems to show a shortage of the most recent published material. And it raises the question, whether or not the appropriations for this division are generous enough to permit the acquisition of such fine atlas material as is available from the working presses of the day in the various lands. These two volumes at once will turn the attention of all the country to this collection, and it will be looked to whenever a map or atlas is desired. It is likely to raise uncomfortable questions when some of the best modern material from various lands is not found listed.

J. PAUL GOODE

UNIVERSITY OF CHICAGO,
May 23, 1910

SCIENTIFIC JOURNALS AND ARTICLES

THE April number (volume 11, number 2) of the *Transactions of the American Mathematical Society* contains the following papers:

Edward Kasner: "The theorem of Thomson and Tait and natural families of trajectories."

F. W. Owens: "The introduction of ideal elements and a new definition of projective n space."

Arthur Ranum: "The groups of congruent quadratic integers with respect to a composite ideal modulus."

G. D. Birkhoff: "A simplified treatment of the regular singular point."

L. M. Hoskins: "The strain of a gravitating, compressible elastic sphere."

THE May number (volume 16, number 8) of the *Bulletin of the American Mathematical Society* contains: Report of the February meeting of the Society, by F. N. Cole; Report of the February meeting of the San Francisco Section, by C. A. Noble; "An application of the notions of general analysis to a problem of the calculus of variations," by Oskar Bolza; "The infinitesimal contact transformations of mechanics," by Edward Kasner; "On an integral equation with an adjoined condition," by Anna J. Pell; "The unification of vectorial notations" (review of Burali-Forti and Marcolongo's Calcolo vettoriale and Omografie vettoriali), by E. B. Wilson; Shorter notice of Meyer's Allgemeine Formen- und Invariantentheorie, volume 1, Binäre Formen, by Virgil Snyder; "Notes"; "New Publications."

THE June number of the *Bulletin* contains: Report of the April meeting of the society, by F. N. Cole; Report of the April meeting of the Chicago Section, by H. E. Slaught; "Groups generated by two operators each of which is transformed into a power of itself by the square of the other," by G. A. Miller; "The solution of an integral equation occurring in the theory of radiation," by W. H. Jackson; Review of Grassmann's Projective Geometrie der Ebene, by L. W. Dowling; Review of Schlesinger's Lineare Differentialgleichungen, by E. J. Wilczynski; "Shorter notices": Bonola's