was further observed that even in the case of the functional mother cells, that the tetrads frequently produced but one normal pollen grain, the other three persisting as mere vestiges, attached to the germination pores of the completely formed grains. In normal *B. pumila* abnormalities of this nature were not found. Another interesting feature of the development of the microsporangium in the material from the Arnold Arboretum was the abortion of the mechanical or fibroid layer of the anther wall, which in normally developed spore sacks is responsible for the dehiscence of the anthers. Both these features of the stamens of the specimens under discussion, viz., the abortive pollen and the degenerate anther wall, point unmistakably to their hybrid origin.

Professor Jack has been good enough to supply the history of the plants of *B. pumila,* growing in the Arnold Arboretum. They were derived from seed obtained from plants propagated at the Arboretum from wild seed of the species, secured by Professor Sargent in Vermont. A few of the group of individuals thus obtained were clearly hybrids between *B. pumila* and near growing large trees of *B. lenta.* The peculiarities of ray-structure referred to above, namely the aggregation phenomena, are found in neither *B. pumila* nor *B. lenta,* and are doubtless the result of the increased vigor of heterozygosis, as has been noted by Professor East and others. It appears quite obvious, from the various data described here, that the plants of *B. pumila* at the Arboretum, although resembling that species absolutely in external form, are in reality hybrids, as inferred from their more important anatomical features.

The next illustration of the value of anatomical data in the diagnosis of hybrids is taken from the genus *Equisetum.* The species of this genus known as *E. littorale* has long been recognized in Europe and this continent as a hybrid between *E. arvense* and *E. limosum.* It presents transitional features in its external form and internal anatomy between these two species and moreover is characterized by the production of large numbers of abortive spores, which are generally without the "elaters" attached to normal *Equisetum* spores. The genus *Equisetum* is characterized both in this continent and in Europe by the large number of varieties of its species, which occur spontaneously (these would probably be designated by mutationists of the De Vriesian school as "elementary species"). One of these numerous varieties is here taken as an illustration of the value of anatomy in genetical work. Professor Jeffrey observed in material of *E. variegatum* var. *Jesupi,* gathered on Toronto island, that a large number of the spores were abortive and without elaters. A detailed anatomical investigation of this material and of other specimens, including the type, kindly supplied for this purpose by the Gray Herbarium of Harvard University, showed that not only are the spores largely abortive in *E. variegatum* var. *Jesupi,* but that the sporangium wall is also degenerate, lacking the mechanical or fibrous layer. The aerial and subterranean stem further showed a condition of organization intermediate between that found in *E. hiemale* and *E. variegatum. E. variegatum* var. *Jesupi,* is consequently not to be regarded at all as a variety or "elementary species," but as a clear hybrid, in all probability between *E. hiemale* and *E. variegatum.* The writer hopes later to publish extended observations on a number of the "varieties" of species of *Equisetum.*

In conclusion it may be pointed out that the investigation of the anatomy of recognized or crypthybrids is likely to be of great value from the genetical standpoint and will in all probability lay bare the real foundation in fact of the so-called mutation hypothesis of De Vries.

R. HOLDEN
LABORATORIES OF PLANT MORPHOLOGY,
HARVARD UNIVERSITY

THE OHIO ACADEMY OF SCIENCE

THE twenty-third annual meeting of the Ohio Academy of Science was held at Oberlin College, Oberlin, Ohio, on November 27, 28 and 29, under the presidency of Professor L. B. Walton, of Kenyon College.

The address of the President was delivered Friday afternoon, on the subject "The Evolutionary Control of Organisms, and its Significance"; and on Friday evening Professor Dayton C. Miller, of Case School of Applied Science, gave an illustrated lecture on "Sound."

There was an informal gathering of members in the Park Hotel on Thursday evening, and a reception in the Men's Building Friday evening, following the lecture. At the dinner Friday evening, held in the Park Hotel, the Academy was welcomed by President Henry C. King, of Oberlin College.

The arrangements of the local committee were very complete, and the meeting was in every way a very successful one.

The trustees of the research fund announced a further gift of $250 from Mr. Emerson E. McMillin, of New York City, for the encouragement of the research work of the academy. During the past year grants from the research fund have been paid to Clara G. Mark, Alfred Dachnowski, Charles Brookover, Freda Detmers and Stephen R. Williams.

Thirty-five members were elected, making the total membership of the Academy 239.

Officers for the ensuing year were elected as follows:

President—Professor T. C. Mendenhall, Ravenna.

Vice-presidents—(Zoology) Professor Stephen R. Williams, Miami University, Oxford; (Botany) Professor E. L. Fullmer, Baldwin-Wallace College, Berea; (Geology) Professor N. M. Fenneman, University of Cincinnati, Cincinnati; (Physics) Professor A. D. Cole, Ohio State University, Columbus.

Secretary—Professor Edward L. Rice, Ohio Wesleyan University, Delaware.

Treasurer—Professor J. S. Hine, Ohio State University, Columbus.

Librarian—Professor W. C. Mills, Ohio State University, Columbus.

Executive Committee—Professor Frank Carney, Denison University, Granville, and Professor L. B. Walton, Kenyon College, Gambier, to serve with the president, secretary and treasurer, members *ex-officio*.

Publication Committee—Professor Charles H. Lake, Hamilton, to serve with the hold-over members: Professor J. H. Schaffner, Ohio State University, Columbus, and Professor C. G. Shatzer, Wittenberg College, Springfield.

Trustees of Research Fund—Professor M. M. Metcalf, Oberlin College, Oberlin, to serve with the hold-over members: Professor William R. Lazenby, Ohio State University, Columbus, and Professor Edward L. Rice, Ohio Wesleyan University, Delaware.

The complete program follows:

"Plum Creek as a Glacial Chronometer," by G. Frederick Wright.

"Hybridization, Variability and Size," by L. B. Walton.

"Marengo Cave," by W. N. Speckman.

"A Statistical Study of the Physical Measurements of a Class of Students," by Carl J. West.

"The Effect of the Eruption of Katmi on Vegetation," by Robert F. Griggs.

"The Structure of a Fossil Starfish from the Upper Richmond," by Stephen R. Williams.

"With the International Phytogeographic Excursion in America," by A. Dachnowski.

"Comparison of the Mollusk Faunas of the Palæarctic and Nearctic Provinces," by V. Sterki.

"Flood and Drainage Conditions in Vicinity of Bellevue, Ohio," by George D. Hubbard.

"The Species Concept as Applied to the Genus *Pyrosoma*," by Maynard M. Metcalf.

"Geographic Influences in the History of Milan, Ohio," by C. G. Shatzer.

"The Acclimatization of Trees and Shrubs," by William R. Lazenby.

"The Life History of *Euglena*," by Charles G. Rogers.

"Botanical Observations in Alaska," by Robert F. Griggs.

"Conjugation in *Amœba*," by Ralph E. Hedges.

"Variation in *Scirpus atrovirens* and *S. georgianus*," by F. O. Grover.

"Notes on the Metamorphosis of Two Ascidians," by R. A. Budington.

"The Effect of Variation of Intensity and Duration of Stimuli to Reaction Time," by G. R. Wells.

"Pressure Sensation and the Hair Follicle," by R. H. Stetson.

"Further Notes on Embryonic Skull of *Eumeces*," by Edward L. Rice.

"An Addition to the Odonata of Ohio," by Rees Philpott.

"The Box-Elder Bug, *Leptocoris trivittatus*, in Ohio," by W. J. Kostir.

"An Occurrence of *Atypus milberti* Walck, in Ohio," by Carl J. Drake.

"Remarks on the Distribution of Certain Species of Jassidæ," by Herbert Osborn.

"Observations on the Action of the Heart in Mollusca," by V. Sterki.

"Chromosomes in *Opalina*," by Maynard M. Metcalf.

"The Cerebral Ganglia of an Embryo Salamander, *Plethodon glutinosus*," by W. J. Kostir.

"Report on the Work done with the Mollusk Fauna of Ohio," by V. Sterki.

"Some Additional Records for Ohio Mammals," by James S. Hine.

"Notes on the Cheese Skipper, *Piophila casei*," by Don C. Mote.

"The Distribution and Abundance of Some Animal Parasites of Ohio Live Stock," by Don C. Mote.

"The Ecology of Fishing Point, Pelee Island," by Lynds Jones.

"Migration Phenomena in the Sandusky Region," by Lynds Jones.

"The California Tarweed Industry," by Charles P. Fox.

"A Provisional Arrangement of the Ascomycetes of Ohio," by Bruce Fink.

"The Sprouting of the Two Seeds of a Cocklebur," by John H. Schaffner.

"Additions to the State Flora, presenting Two Species of Isoetaceæ from Portage County," by L. S. Hopkins.

"Notes on a Typical Ohio Woodlot," by William R. Lazenby.

"Ecological Varieties as illustrated by *Salix interior*," by John H. Schaffner.

"Certain Peculiarities of the *Botrychia*," by L. S. Hopkins.

"A New Variety of *Carex tribuloides*, with Notes on the Variability of the Species," by F. O. Grover.

"The Behavior of Some Species on the Edges of their Ranges," by Robert F. Griggs.

"The Catalog of Ohio Vascular Plants," by John H. Schaffner.

"A New Method in Lichen Taxonomy," by Bruce Fink.

"Additional Information on the Ohio Devonian," by C. R. Stauffer.

"Some Geological Features in the Newark and Frazeysburg Quadrangles," by G. F. Lamb.

"The Stratigraphy of the Upper Richmond Beds of the Cincinnati," by W. H. Shideler.

"Metamorphism in the Ordovician System of Giles County, Va.," by E. P. Rothrock.

"Evidence of Basining and Folding during the Eopaleozoic of the Southern Appalachians," by P. H. Cary.

"An Ancient Finger Lake in Ohio with Tilted Shorelines," by George D. Hubbard.

"Unconformity and Basal Conglomerates of the Mississipian Age in the Wooster Quadrangle," by G. F. Lamb.

"Methods of Mapping the Shorelines of Pro-Glacial Lakes," by Frank Carney.

"An Eroded Channel in the Cleveland Formation," by W. G. Burroughs.

"The Transparency of Various Substances for Infra-Red Radiation obtained by Focal Isolation," by Alfred D. Cole.

"Note on the Electrical Conductivity of Glass," by Robert F. Earhart.

"The Villari Reversal Effect in Ferro-Magnetic Substances,' by S. R. Williams.

"On the Longitudinal Thermo-Magnetic Potential Difference," by A. W. Smith.

"The Spectrum of Silicon in the Carbon Arc," by C. D. Coons.

"On the Vibrations of a Lecher System using a Lecher Oscillator," by F. C. Blake and Charles Sheard.

"The Wiedemann Effect in Monel and Nichrome Wires," by H. H. Reighley.

Symposium: The Quantum Theory of Matter and Energy.

I. "The Quantum Theory applied to Black Body Radiation," by E. J. Moore.

II. "The Quantum Theory applied to the Determination of the Specific Heat of Solid Bodies," by Charles Sheard.

III. "The Quantum Theory applied to Photo-electric and Thermionic Emission," by S. J. M. Allen.

IV. Title to be announced, by Clark W. Chamberlain.

V. General Discussion.

DEMONSTRATIONS

Rare Minerals from Rhodesia, by George D. Hubbard.

Alaskan Plants, by Robert F. Griggs.

Specimens illustrating California Tarweed Industry, by Charles P. Fox.

Specimens of Mollusca, by V. Sterki.

Ohio Odonata, by Rees Philpott.

Chromosomes of *Opalina*, by Maynard M. Metcalf.

Herbarium Specimens of *Scirpus* and *Carex*, by F. O. Grover.

Model of Embryonic Skull of *Eumeces*, by Edward L. Rice.

EDWARD L. RICE,
OHIO WESLEYAN UNIVERSITY, *Secretary*
DELAWARE, OHIO,
December 3, 1913