Werner has given a sufficiently elastic idea of the action of atoms upon one another to account for many of the facts which at present are anomalies. The chapters on isomerism and steroisomerism too are suggestive and a number of interesting new relations have been presented. It is unfortunate, however, that the direct evidence for his theory is given in this book in so unsatisfactory a manner. His use of physico-chemical arguments is frequently very careless, his proofs for the constitution of compounds are often unconvincing, and the great mass of material is presented in no very clear and orderly fashion. The result is that the reader, if not previously acquainted with Werner's ideas and work, finds that the book leaves merely a confused impression. For a clear, brief presentation of the subject the reviewer recommends the reading of a lecture delivered by Werner before the *Deutsche chemische Gesellschaft* (Ber., **40**, 15). The book will then be valuable as an amplification of his paper.

HERMAN SCHLESINGER
UNIVERSITY OF CHICAGO

A Manual of Biological Projection and Anesthesia of Animals. By AARON HODGMAN COLE, A.M., Instructor in Biology and Projection in the Chicago Normal School. Chicago, Neeves Stationery Company. Pp. 200. $1.50.

The author of this little volume is to be congratulated on having produced a very useful and timely manual on the technique of projection. The scope of the work will be seen from the following partial table of contents: outline of methods and comments of educators on results obtained; available lights and their limitations; solar projection apparatus and its management, methods of darkening rooms, different types of screens; artificial lights and their management; methods of anesthetizing typical animals and plants; how to collect a large variety of species of animals and plants suitable for micro-projection and keep them alive in aquaria; directions for making different types of glass cells in which live animals and plants are mounted for projection; the knack of mounting and projecting various microscopical preparations, including live plants and animals; the projection of pictures and other opaque objects by the use of reflected light.

From the viewpoint of composition, with the possible exception of a few involved and somewhat obscure sentences, the book is clearly written and the subject-matter well arranged, although, in a few instances, there is a tendency toward what appears to be unnecessary repetition. However, the author doubtless feels—and justly so—that this may be forgiven in the interest of clearness. There seems to be no possible contingency in method or material that the author has not anticipated and given explicit directions for obviating, from which it is evident that the book is the outcome on his part of years of practical experience in projection work. The "ready reference table" (p. 180) for mounting and projecting a large number of objects, ranging from bacteria to living chick embryos, should prove of great convenience to the manipulator. The text is farther elucidated by the aid of twenty-eight figures and diagrammatic sketches.

In the words of the author, "every method described is the outgrowth of a need felt in teaching in some grade in grammar and high school, college and popular educational work, and each one has been tested in practise." This statement in itself is indicative of the wide range of uses to which the projection microscope may be put to-day.

M. F. GUYER

SOCIETIES AND ACADEMIES

THE NEW YORK ACADEMY OF SCIENCES

THE New York Academy of Sciences held its annual meeting on Monday evening, December 16, at the Hotel Endicott, about seventy members and their friends being in attendance.

The report of the corresponding secretary showed that during the last year the academy had lost, by death, one honorary member, Professor Asaph Hall, and three corresponding members, Professor George Chapman Caldwell, Professor W. H. Chandler and Dr. Charles B. Warring. The names of two honorary members and twelve corresponding members have been removed from the rolls through failure to reply to communications for five years or more. At the meeting three honorary members were elected, viz.: Dr. James Ward, professor of mental philosophy in the University of Cambridge, England; Professor J. D. Hooker, late director of the Royal Botanical Gardens, Kew, England, and Professor William Bateson, professor of zoology in the University of Cambridge, England. There are now forty-nine honorary members and one hundred and forty-six corresponding members upon the rolls.

The recording secretary reported that there were now five hundred active members of the academy, nineteen of whom were associate active members. Of the active members one hundred and twenty-two are fellows.

The chief features in the history of the academy during the past fiscal year were the exhibition of the progress of science which was held at the American Museum of Natural History, December 28 and 29, 1906, and the celebration of the two hundredth anniversary of the birth of the naturalist Linnæus on May 23, 1907.

After the reading of the reports was finished the academy elected the following list of fellows from among the active members: William Campbell, A. H. Elliott, L. P. Gratacap, Robert T. Hill, Isaac Adler, Emerson McMillin, Herman Knapp, John B. Smith, Ernest E. Smith and Horace White.

The treasurer's report showed that the financial condition of the society was flourishing. One feature of the report upon which emphasis should be laid is the fact that the academy has in its keeping two important funds, the income of which is available for the encouragement of scientific research. These are the Esther Herrman Building Fund and the John Strong Newberry Fund. Grants from the income of these funds are made to members of the academy or of the affiliated societies upon application and endorsement by the society of which the applicant is a member.

The librarian's report showed a large increase in the library and an enhancement of value through the filling of some important vacancies in our sets of books. Members and the public in general should bear in mind that the library, which is cared for by the American Museum of Natural History, may be freely used any week day between the hours of nine and five, and that such users are very welcome.

According to the editor's report, part 3 of Volume XVII. of the *Annals* is nearly ready for distribution, and the printing of Volume XVIII. has been begun.

The annual election resulted in the choice of the following officers for the year 1908:

President—Charles F. Cox.

Vice-Presidents—A. W. Grabau, Frank M. Chapman, D. W. Hering, Adolf Meyer.

Recording Secretary—Edmund Otis Hovey.

Corresponding Secretary—Henry E. Crampton.

Treasurer—Emerson McMillin.

Librarian—Ralph W. Tower.

Editor—Edmund Otis Hovey.

Councilors (three years)—Charles Lane Poor, William J. Gies.

Finance Committee—Charles F. Cox, George F. Kunz, Frederic S. Lee.

After the business meeting the members of the academy and their friends sat down together at dinner, at the conclusion of which the retiring president, Professor Nathaniel L. Britton gave an address upon "The New York Botanical Garden: Its Organization and Construction" which was illustrated with stereopticon views.

E. O. HOVEY,
Recording Secretary

THE NEW YORK ACADEMY OF SCIENCES. SECTION OF BIOLOGY

THE section met on December 9, 1907, at the American Museum of Natural History. The following program was presented:

The Effect of Centrifuging the Eggs of the Mollusc Cumingia: Professor T. H. MORGAN.

Experiments were carried out in order to discover whether the cleavage pattern in a type with "determinate cleavage" is governed by the distribution of the visible substances of the egg, and also to discover whether the formation of the embryo is possible when the visible inclusions ("organ forming substances") of the protoplasm are artificially shifted.

The eggs of *Cumingia* when laid contain the first polar spindle in the center of the egg. The centrifugal force drives the scattered yolk granules to one pole, the pinkish pigment to the opposite pole. Between these two there remains the perfectly clear kinetoplasm, in which the spindle lies, forming any angle with the induced stratification. Its original position has, in fact, been little affected by the movement of the other substances through the egg, although its polar rays may suffer to some extent by prolonged centrifuging. Under the pink cap and concealed by it in the living egg is a vesicular material that is the nuclear sap of the ovarian egg. The polar bodies may appear at any point of the surface of the egg, so far as the location of the three zones is concerned. It is probable that the spindle comes to the same pole as in the normal egg. Since the eggs are not oriented as they fall any one of the three kinds of materials may lie at the "animal pole."

The cleavage always begins beneath the polar bodies, as in the normal egg, and the cleavage pattern, the size of the cells, and their tempo of division are exactly that of the normal. All of the yolk, for example, may be contained in the small cell of the first two, yet the size of this cell and its rate of division are not thereby affected.

It follows that in this egg *the determinate type of cleavage is not caused by the distribution of the visible substances of the egg.* Sections show that between the time of centrifuging and the appearance of the cleavage planes the induced distribution is to a large extent retained, the amount of disturbance depending on the length of time elapsing and on the location of the polar spindle, etc. The results confirm observations on the living egg, and show that the yolk or the pigment may go largely or entirely to one of the first formed cells.

The centrifuged eggs produce swimming embryos, and in some cultures a large percentage of such embryos. Until isolation experiments have been successfully carried out it is necessary to speak with some reserve concerning the percentage of normal embryos.

In the sea urchin egg Lyon has shown that the cleavage follows the induced stratification while in *Cumingia* this is not the case. The difference is due to the shifting of the nucleus in the egg of the sea urchin, while the spindle in *Cumingia* retains its original orientation.

The Replacement of an Eye by an Antenna in an Insect: DR. RAYMOND C. OSBURN.

The specimen in question is a male of *Syrphus arcuatus* Fallén (Diptera), a common and widely distributed species, and was collected at Montreal, Canada, by Mr. G. Chagnon who noted nothing unusual in its behavior. The right side of the head is normal, but on the left side the large compound eye is entirely wanting. A third antenna appears on this side of the head posterior to the normal left antenna and entirely separated from it, occupying a fossa of its own. It is normal in structure except that the arista, or dorsal bristle, is undeveloped, and it is slightly smaller than the normal ones. This condition calls to mind Herbst's experiments in Crustacea (*Palæmon, Sicyonia*) where an antenna developed in regeneration after the excision of the eye, but no similar case is known among insects as far as the writer is aware. It is possible that the eye may have been suppressed owing to some accident during metamorphosis and that the antenna was produced in place of it. A second vertical triangle also appears in this specimen alongside of the normal one. This supernumerary triangle is similar to the normal in pilosity and in the arrangement of the ocelli, but the anterior median ocellus has no cornea and is represented merely by a small prominence.

A fuller description with figures will appear elsewhere.

Lantern slides were also exhibited showing views of a two-headed turtle with many abnormalities in the carapace and plastron.

A Naturalist in British East Africa: MR. HERBERT LANG.

The Tjäder Expedition to British East Africa was undertaken for the purpose of collecting material representing the fauna of that region. From Mombasa, the expedition (which consisted of Mr. Richard Tjäder and Mr. Lang, accompanied by 100 negro porters) proceeded 327 miles inland by the Uganda Railroad to Nairobi. A strip of territory one mile on either side of the railroad is set aside as a government game preserve, and is a place of refuge for mixed herds of antelopes, zebras and ostriches.

After spending a month collecting with great success on the Athi Plains, the expedition moved northwest into the Rift Valley, encamping at Kijabe and at various points in the lake country.

Thence the course was southeast over the Laikipia Plateau to Mount Kenia (18,000 feet), which the party ascended to a height of 14,000 feet. Lack of provisions, however, compelled a return to the railroad, whence the party proceeded to the coast, stopping to collect at intervals.

Four and a half months' collecting netted the expedition a total of about 500 skins of birds and mammals. The most noteworthy of the latter was the skin and skeleton of a fine bull elephant carrying 160 pounds of ivory, 4 rhinoceroses, 1 buffalo, 2 giraffes, one of which is unusually large, 8 zebras representing different districts, and a fine series of antelopes. Lions, spotted hyenas, aard-wolves and other carnivores were also taken. Mr. Lang also secured a remarkable series of photographs illustrating the flora, fauna and ethnology of the region. The talk was well illustrated with colored lantern views.

Roy Waldo Miner,
Secretary

THE GEOLOGICAL SOCIETY OF WASHINGTON

At the 194th meeting of the society on October 30, 1907, Mr. F. E. Wright exhibited a model for use in the study of crystal optics and also described a new method for measuring extinction angles of minerals in the thin section.

Regular Program

A Visit to the Alps: Mr. Bailey Willis.

Mr. Willis gave an account of a trip in the Alps during August and September. He stated that he had investigated the geological structure of the northern or front Alps and of a part of the Bernese Oberland with reference to the character of the great overthrust faults. He outlined his results in a broad way, but reserved more definite discussion for future presentation to the society. An especially pleasing feature of the trip was the cordial and generous assistance rendered by Swiss geologists.

A Comparison of some Paleozoic and Pre-Cambrian Sections in Arizona: Mr. F. L. Ransome.

The Paleozoic rocks of the Grand Canyon of the Colorado south of the Kaibab Plateau rest with conspicuous unconformity upon the Algonkian sediments and upon the basal crystalline rocks. Between the Algonkian sediments (Unkar and Chuar terranes) and the crystalline rocks is another great unconformity. Considerable confusion has arisen in the literature of the pre-Unkar crystalline rocks which Walcott called the Vishnu series and described as metamorphosed sediments. These crystallines, from the point where they emerge from beneath the Unkar south of Vishnu's Temple to the foot of the Bright Angel trail and west of that point, are dark, fine-grained gneisses cut by red granite and are probably all Archean. There appears to be no ground for describing the Vishnu as "bedding quartzite" or as metamorphosed sediments, and the vertical bedding referred to by Powell and Walcott is gneissic banding or foliation.

On the basis of Powell's and Walcott's characterization of the "Grand Canyon schists," or Vishnu, as metamorphosed slates and quartzites, certain crystalline schists in the Bradshaw Mountains, and in the Globe, Clifton and Bisbee districts, which are clearly metamorphosed sediments, and which are unconformably beneath the Cambrian (Tonto), have been tentatively correlated with the Vishnu. There is, however, little real warrant for this correlation if the Vishnu is not an altered sedimentary series. It is suggested that the Pinal schist of Globe, Clifton and Bisbee and the Yavapai schist of the Bradshaw Mountains may be equivalent in age to the Unkar and Chuar groups in the Grand Canyon. In that case, the great unconformity found at the base of the Paleozoic rocks in the Range Region of Arizona is the pre-Tonto, and not the pre-Unkar, unconformity of the Grand Canyon.

The Tonto sandstone (Cambrian) of the Grand Canyon is probably the equivalent of the Apache group in the Globe District, of the Colorado quartzite in the Clifton District, and, without much question, of the Bolsa quartzite of the Bisbee District. The Tonto shale of the Grand Canyon section apparently becomes more calcareous to the south and is correlated with the Abrigo limestone of Bisbee. Both carry middle Cambrian faunas, according to Mr. Walcott. Neither Ordovician nor Silurian is known in the Grand Canyon, nor at Globe nor Bisbee. Mr. Lindgren, however, has found Ordovician at Clifton and some beds of this period may possibly occur in the lower part of the Globe limestone, which is chiefly Devonian and Pennsylvanian. The persistence of. the comparatively thin Devonian from the northern to the southern boundary of Arizona is rather remarkable in view of the fact that in the Grand Canyon the Devonian Temple Butte limestone is seldom over 100 feet thick, is lacking in some places and is bounded above and below by unconformities. At Bisbee, the Devonian Martin limestone is about 350 feet thick. The Mississippian and Pennsylvanian limestones are both strongly developed at the Grand Canyon and at Bisbee, but the Pennsylvanian has not been found at Clifton. At Globe only Pennsylvanian fossils have been found but between the Devonian and Pennsylvanian horizons are a few hundred feet of apparently conformable limestones which may in future yield Mississippian fossils.

FRED E. WRIGHT,
Secretary

DISCUSSION AND CORRESPONDENCE

A BETTER METHOD OF PREPARING HERBARIUM SPECIMENS

MODERN critical study and exacting taxonomic methods require to-day more abundant and better-prepared herbarium specimens. These must be made by specialists for specialists. The private herbarium can no longer be maintained, and the training we give students must be such as will fit them to do the work the well-organized educational or research institutions demand.

Mere illustrative material in elementary botany beginners should collect in great abundance—the profit of their course of instruction depending largely on their assiduity manifest in getting and studying judiciously selected specimens, including, of course, careful observation of the environment and the conditions under which the plants occur. This work, in fact, serves well as a preparation or training for collecting and preparing good herbarium specimens. The better knowledge one possesses the better collector he may be. Supposing, however, that the collecting has been properly done and the specimens ready to go in press, we will now concern ourselves with the modus operandi of drying.

The old method of using "dryers" to take up the moisture, substituting dry sheets of the absorbent paper for the moist ones after ten to twenty-four hours, repeating the operation continuously for at least the larger part of a week, is unsatisfactory for two distinct reasons. First, too much labor is required and too much time is consumed; second, many of the specimens do not become dry quickly enough and therefore lose the fresh life-like appearance and natural color which quick drying generally secures. A better method will reduce the labor, shorten the time, and almost or quite invariably ensure better results.

Such a method is dependent on an altogether different principle, namely, removing the moisture by a current of dry warm air instead of absorbing it by bibulous paper and then promptly removing the latter. It is extremely easy of execution. The ordinary slat press may be used—the sides, however, may be plane boards, or stiff cloth-board, if that is preferred. The pressure is secured by straps or cords in the usual way.

In place of the "dryers," or rather alternating with these, *corrugated straw boards* are used. The rolls of such paper, usually found