	Feet
6. Pleistocene—white, red and yellow sands, with phosphatic pebbles and vertebrate fragments at the base	64
5. Miocene—compact, yellow, fossiliferous marl (Duplin horizon)	6
4. Miocene—grayish, fossiliferous marl (Marks Head marl)	29
3. Fine-grained, laminated shale with sandy partings, a line of rounded pebbles at the base	14
2. Oligocene—fossiliferous marl (Alum Bluff formation)	½
1. Laminated, drab shale with arenaceous partings	8
Total	111½

Recent collections made at Porters Landing have rendered possible definite correlation of the two Miocene horizons with those of the areas further north. From bed no. 5 of the section 34 identified species were obtained, 30 of which also occur in the Duplin marl of North Carolina. The four species which have not as yet been reported from there occur in other localities in horizons the stratigraphic equivalent of the Duplin, or in deposits of later age. Bed no. 5, therefore, can be definitely correlated with the Duplin marl of North Carolina and the fossiliferous Miocene marls of Darlington and Mayesville, South Carolina.

The Marks Head marl, which was first named by Sloan, and is represented by bed No. 4 of the section, contains specimens of the genus *Carolia* which suggests an Oligocene age, but every other identifiable species may be Miocene, and only three of them range downward into the Oligocene. Nine of the species are not known below the Miocene, and of these nine, six are confined to the Miocene. The horizon is, therefore, Miocene, while the presence of *Turritella æquistriata* Conrad, *Calliostoma aphelium* Dall, *Ostrea mauricensis* Gabb, and *Pecten marylandicus* Wagner, definitely point to a horizon low in the series, approximately equivalent to the Calvert formation of Maryland.

The recognition of the stratigraphic position of this horizon is of importance, as it is the only low Miocene horizon known south of Virginia. Further south in Florida, along the western extension, on the Ocklockonee and Apalachicola rivers, the Miocene rests upon the eroded surface of the upper Oligocene. The Miocene deposits of these localities represent a horizon high in the series. Therefore, the Marks Head Miocene is the equivalent in part to the erosion interval between the upper Oligocene and the Miocene of western Florida.

Bed no. 2 of the section at Porters Landing contains fossils indicative of an upper Oligocene age. Bed no. 3 is very likely of Miocene age, and the line of rounded pebbles at the base suggests that the Miocene may rest upon the eroded surface of the upper Oligocene. It seems probable that along the Savannah River an erosion interval occurred between Oligocene and Miocene depositions, but the interval was of shorter duration than in western Florida.

T. Wayland Vaughan

THE AMERICAN SOCIETY OF ZOOLOGISTS CENTRAL BRANCH

The annual meeting of the American Society of Zoologists, Central Branch, was held in the splendid new Natural Science Hall of the University of Iowa, Iowa City, on April 7, 8 and 9, 1910, Dean Edward A. Birge, of the University of Wisconsin, presiding. Thirty zoologists of the central states registered.

Resolutions relating to the International Commission on Nomenclature similar to those adopted by the Eastern Branch at the December meeting were passed, and the following zoologists were appointed as a committee to cooperate with the International Commission: C. C. Nutting, C. H. Eigenmann, C. A. Kofoid, H. B. Ward, S. W. Williston.

Officers for the ensuing year were chosen as follows:

President—C. E. McClung, University of Kansas.

Vice-president—H. F. Nachtrieb, University of Minnesota.

Secretary-Treasurer—H. V. Neal, Knox College.

Executive Committee—R. H. Walcott, University of Nebraska, W. C. Curtis, University of Missouri, Oscar Riddle, University of Chicago.

The following, having received the votes of the

executive committees of both branches were elected to membership in the Central Branch: J. T. Patterson, University of Texas; Robert T. Young, University of North Dakota; John W. Scott, Kansas City High School; F. D. Barker, University of Nebraska; Albert Kuntz, University of Iowa; Chancey Juday, Wisconsin Geological and Natural History Survey; H. W. Norris, Grinnell College.

The following are titles and abstracts of papers presented at the meeting:

Some Personal Peculiarities of Lakes (president's address): EDW. A. BIRGE, University of Wisconsin.

The paper dealt with certain unusual, but regularly recurrent phenomena in the temperature, dissolved gases and carbonates of several inland lakes, and with the biological meaning of such phenomena. On the annual rhythm of physico-chemical changes in a lake, produced by the march of the seasons, there is superimposed another annual series of similar changes, due to biological causes. These last are in large measure regular and determined by general laws; but in part, and especially in their details, are peculiar and "personal" to the several lakes. They result from the establishment of habitual interactions between the members of the plankton and between plankton and environment.

Inland lakes contain a complex and practically closed assemblage of plants and animals, which have lived together for centuries, in an environment substantially unaltered from year to year and whose exchanges with the outer world are minimal. Thus the lake with its plankton has come to be a sort of organism of a higher order, showing definite and regular internal changes and reactions not unlike those of an organism—changes not so definitely expressed or so definitely dependent on biological causes in any other assemblages of organisms. In certain lakes we find habitual reactions, unexpected *a priori*, and in this respect not unlike reactions of higher organisms.

Inland lakes, therefore, offer to the student definite and varied ecological problems of much interest and complexity. These concern the relation to each other of members of the plankton, the effects of plankton on environment and the resulting influence on plankton of environmental changes. Such problems are by no means wholly general, to be solved by the study of a single lake, but they offer many features which are special and personal to individual lakes.

Feeding Reactions of the Rose Coral (Isophyllia): F. W. CARPENTER, University of Illinois.

When the rose coral polyp is stimulated by meat juice the oral disk is drawn downward by the contraction of the retractor muscles of the mesenteries, and the margin of the oral surface is folded inward over the disk by the action of a well-developed sphincter muscle. Meanwhile, the stomodæum is everted, and the mesenterial filaments are extruded both through the mouth and through temporary apertures in the oral disk. Carmine particles dropped on the oral surface of an expanded polyp are transferred by ciliary action to the periphery. When the carmine grams have previously been soaked in meat juice the cilia usually continue to beat in an outward direction; occasionally, however, they reverse their effective strokes. The tentacles react quickly to contact stimulation, and affix the touching object to their knob-like distal ends, which are heavily loaded with nematocysts.

In normal feeding, which occurs after dark, small organisms in the plankton are affixed by the tentacles, the oral disk sinks, and the marginal zone of the polyp folds inward until it completely roofs over the tentacles and the depressed oral disk. Into the superficial chamber thus formed the stomodæum and mesenterial filaments project, and here the mesenterial filaments, which are the digestive organs of the polyp, probably digest and ingest or absorb the captured plankton, little of which finds its way into the reduced gastro-cœlomic cavity. Extra-cœlenteric digestion appears, therefore, to take place in rose coral polyps.

The Factors which Control the Leaping of the Pacific Salmon: HENRY B. WARD, University of Illinois.

Open water jumping was observed best among salmon swimming about in a pound net or trap. The same fish does not execute a series of leaps, but only a single jump. Features in the position and movements of body and fins show that it is neither an effort to escape capture nor preparation for the ascent of the stream later. It must be regarded as a type of play which, however, finds expression only as the reproductive period approaches. It occurs first at the time when the reproductive organs are entering upon their final growth period.

Jumping at falls manifests in several particulars of position and movements of body and fins a definite relation to the purpose of surmounting the obstacle. In a large per cent. of cases the

effort is unsuccessful and displays apparent lack of accuracy in direction as well as distance of height. Since the fish jump for the most part in parallel lines perpendicular to the face of the fall, one would expect to find some definite disturbing influence to explain the apparently erratic leaps. Such an influence is present in the confused water currents at the base of the fall. The sudden and irregular changes in the whirlpools and swirls where the fish lie waiting for an opportunity to jump no doubt act to modify the direction of the leap and cause the fish at times to execute apparently aimless jumps. The jumping was most regular at the point where the current was most constant.

Reproduction and Parasitism in the Unionidæ: George Lefevre and W. C. Curtis, University of Missouri.

Further Experiments on the Egg-laying Habits of Amphitrite: John W. Scott, Kansas City High School.

Experiments on the Control of Asymmetry in the Development of the Serpulid, Hydroides dianthus: Charles Zeleny, University of Illinois.

A Statistical Study of the Sex-cells in the Early Stages of Amia and Lepidosteus: B. M. Allen, University of Wisconsin.

Function of the Spermatozoon in Fertilization, from Observations on Nereis: Frank R. Lillie, University of Chicago.

The author succeeded in destroying the sperm nucleus within the egg at stages as much as twenty minutes apart shortly after the time of its entrance, and found that while such eggs, which had formed the fertilization membrane and started in development, continued until the formation of the second polar body, they did not form a complete cleavage spindle and the egg remained unsegmented. The female pronucleus of such eggs formed the chromosomes but no definite segmentation spindle, and asters were practically absent. This was true even when one of the maturation divisions had formed the polar nucleus inside the egg, as sometimes happened, so that the quantity of maternal chromatin equaled that of the fertilized egg. It follows, therefore, that fertilization is incomplete for some time after the entrance of the spermatozoon into the egg, in the case of *Nereis*, and that its completion is not merely a quantitative chromatin factor.

The result was obtained by centrifuging eggs at regular intervals from the moment of fertilization on. There was found a certain period soon after the entrance of the spermatozoon when the mechanical shock destroyed the sperm nucleus in large proportions of the eggs. This was determined by a cytological study of these eggs and their controls in the maturation and fertilization stages. The percentage of eggs thus studied and found to be devoid of a sperm nucleus corresponded quite accurately with the percentage of eggs observed to remain unsegmented in the living eggs of the same series. At the critical stage selected for comparison, the determination of the presence or absence of the sperm nucleus is a simple matter. Stimulation of the unfertilized egg with potassium chloride, or a mechanical shock, will suffice to cause the formation of the fertilization membrane and of the polar bodies, thus producing exactly the same effect as the first penetration of the spermatozoon, and no more, for these eggs also did not segment.

Fertilization can not, therefore, be regarded as exclusively a surface phenomenon. It must be interpreted as, in some sense, a continuous process, lasting for some time after the penetration of the spermatozoon, possibly until the union of the germ nuclei. As one of the first effects of penetration is demonstrably increase of permeability, it may be that the later function of the spermatozoon is essentially similar throughout the entire thickness of the protoplasm, by overcoming, so to speak, a certain resistance to permeability in successive strata and creating a consequent free oxidation in the interior of the egg. The mass of the egg cell is obviously in excess of the functional optimum for oxidation, and increased permeability of only the surface would hardly be expected to bring about free oxidation throughout the whole.

It is practically certain that the destruction of the sperm nucleus by centrifuging did not mean its expulsion from the egg in these experiments, but merely suppression of its power of growth, or dissipation of its substance. Its material remains within the egg; but, existing only as so much chemical matter, it does not exercise a fertilizing effect. Its fertilizing power is in some way bound up with its organization and growth.

The Chromosomes of Anasa tristis: C. E. McClung, University of Kansas.

Generic Definitions: C. C. Nutting, University of Iowa.

Some Parasites of the Sleeper Shark in Icy Straits, Alaska: Henry B. Ward, University of Illinois.

Somniosus microcephalus Le Seur is common in Icy Straits. Its range extends through the Arctic waters to the North Atlantic. Specimens examined in Europe are regularly infested with a gill parasite, *Squalonchocotyle borealis*. This ectoparasitic trematode undergoes, no doubt, direct development. It occurs abundantly on Alaskan specimens of the same host. Four other internal parasites are recorded from this host in the Atlantic. These undergo probably indirect development and hence need one or more intermediate hosts. The sleeper shark in Alaska harbors species from the same genera as those in the Atlantic, but they are related rather than identical parasites. As in the case of land animals, so in this marine host, the species of parasites which infest it vary in different portions of its range.

Some New Cases of Trihedral Tænia: F. D. BARKER, University of Nebraska.

The examination of 37 dogs at the University of Nebraska from November, 1903, to April, 1910, yielded 601 *Tænia serrata* and 450 *Tænia serialis* in addition to a large number of other species of *Tæniæ*. Among the *T. serrata* were four trihedral or prismatic tæniæ and among the *T. serialis* were three trihedral forms. This increases the number of reported trihedral tæniæ to thirty cases and adds two new species to the list. The specimens resemble two tapeworms, the one fused along its side to the face of the other. Each scolex has six suckers arranged in three groups of two each. The rostella are armed with two rows of hooks, but the number of hooks in each row is less than the normal. One or two genital pores occur in each mature proglottid, one pore to a crest. The trihedral condition affects the musculature, the nerve trunks, the excretory canals and the reproductive organs. The onchospheres have six to twelve hooks.

These trihedral forms probably arise from a double embryo produced by the partial separation of the first two or early blastomeres and not by a fusion of two normal embryos.

A Comparative Study of the Development of the Sympathetic Nervous System in Birds and Mammals: ALBERT KUNTZ, University of Iowa.

Medullary cells migrate from the neural tube into the ventral nerve-roots. With similar cells which wander out from the spinal ganglia, these cells migrate peripherally along the spinal nerves. Some of these cells deviate from the course of the spinal nerves and give rise to the sympathetic trunks and the prevertebral plexuses. The vagal sympathetic plexuses, viz., the cardiac plexus and the sympathetic plexuses in the walls of the visceral organs, arise from cells which migrate from the hind-brain and the vagus ganglia along the vagi.

The great majority of the cells which migrate peripherally from the neural tube and the cerebrospinal ganglia are the "indifferent" cells of Schaper. Among these are found a few "neuroblasts" of Schaper. Therefore, the sympathetic neurones are homologous with the efferent and the afferent components of the other functional divisions of the peripheral nervous system. Mitotic figures occur occasionally along the course of migration and in the sympathetic anlagen. We are not to suppose, therefore, that all the cells taking part in the development of the sympathetic system actually migrate as such from their sources in the cerebrospinal system. Doubtless, a goodly number arises by the mitotic division of "indifferent" cells along the course of migration.

Certain morphogenetic differences occur in the development of the sympathetic system in birds and mammals which, doubtless, indicate that the sympathetic system has departed more widely from the original type in birds than in mammals.

The sympathetic system may be looked upon as an accession to the nervous system which has arisen comparatively late in the evolution of vertebrates in response to the conditions of the vegetative life.

The Histology of the Nasal Mucous Membrane in Mammals: WM. A. LOCY, Northwestern University.

An illustrated account of the structure and of the histogenesis of the nervous elements in the sensory epithelium of the nose of the pig and rabbit with some remarks on the question of the direction of growth of nerve fiber.

The Lymphatic System of Turtles: FRANK A. STROMSTEN, University of Iowa.

The points considered in this paper were the anatomy of the lymphatic system of *Chrysemys marginata* and the development of the lymph hearts of the loggerhead turtle. A preliminary paper with figures giving the results of this investigation is to be published at once elsewhere.

The Bermuda Biological Station for Research: F. W. CARPENTER, University of Illinois.

The Work of the Illinois Biological Station: STEPHEN A. FORBES, director, Illinois State Laboratory of Natural History.

This station differs from most American fresh-water stations, in the fact that its equipment is all afloat, and readily movable from place to place; that it is devoted to investigation only, and not to teaching; that it is in operation throughout the year instead of being limited to the vacation season; that it is devoted to a study of the biology of a river system instead of a lake; and that it is supported directly by appropriations from the treasury of the state.

Opened in April, 1894, it remained at Havana, Ill., for five years; was then transferred forty-five miles down the Illinois to Meredosia, where it continued for two years and two months; thence up the Illinois a hundred and sixty-five miles to Ottawa, where it remained for a year and a half; and then to Henry, forty miles below. Here it was laid up to permit the preparation and publication of papers and reports setting forth the main results of its work; but it became active again, at Havana, July 1, 1909.

During the first two years its field work was comprehensive of all aquatic forms and situations, the next three years were devoted mainly to plankton work in the Havana district, and the following four to work on the fishes of the Illinois system. Of the 6,000 collections made during this period, about 500 were fishes, 2,000 were plankton collections, and 3,500 contained a general variety of aquatic and subaquatic forms. Six hundred and forty of the plankton collections were made at Havana by strictly quantitative methods, and are available for a comparative study of the product of various waters at all times of several successive years. Weekly samples of the waters were examined by chemical methods for three and a half years. Besides these local studies, steamboat trips were made for considerable distances, with continuous plankton collections throughout each trip. Longitudinal biological sections of the stream were thus made, aggregating four hundred and fifty miles on the Illinois River and three hundred and sixteen miles on the Mississippi between St. Louis and Quincy.

The main object of the station operations for the coming two or three years will be to complete a comparison of present conditions with those of the former time; to study the river as a unit with special reference to its economic and hygienic protection and improvement; to work out the details of its biological regimen, by a separate study of special problems; and to carry on comparative studies between the Illinois, the Mississippi and the Missouri, all readily accessible from the station field. Its most recent work has been directed to a comparison of present conditions with those before the opening of the Chicago drainage canal and to a collection of materials for further studies of the food of fishes, and for physical and chemical studies of the bottom in selected situations as related to differences in biological production. From weekly collections continuing for four months it appears that the plankton of the main stream is now approximately double the amount per cubic meter that it was before the opening of the drainage canal, notwithstanding the fact that the water averages about three feet higher than it did before that event.

The Indiana University Biological Station: Fernandus Payne, Indiana University.

Hydroids from the Illinois River: Frank Smith, University of Illinois.

A Report on the Fresh-water Protozoa of Tahiti: C. H. Edmondson, Washburn University.

Some New Species of Cretaceous Fish from Kansas: C. E. McClung, University of Kansas, (Read by title.)

Investigations on some Lakes in Guatemala and Salvador: Chancey Juday, University of Wisconsin.

Restoration of Cacops aspidephirus, a remarkable new rhachitomous Amphibian from the Texas Permian: S. W. Williston, University of Chicago. (Read by title.)

The Fairport Biological Station:[1] Robert E. Coker, director.

A biological station has been established by the United States Bureau of Fisheries at Fairport, Iowa. The immediate work of the station will be in the cultivation of fresh-water mussels, experiments and investigations relating to the propagation and natural history of the forms important in relation to the pearl button industry and the pearl fishery. The ultimate scope of the station is broad: it is expected as soon as possible to have all facilities of a station thoroughly equipped for the investigation of problems of fresh-water biology. During the present year operations will be conducted with a preliminary equipment, consisting of gasoline pumps, a series of small ponds with reservoir, and a temporary laboratory.

Are Muscle and Nerve primarily connected? H. V. Neal, Knox College.

[1] By permission of the United States Commissioner of Fisheries.

The "Plasmodesmata" of Held and Paton, connecting myotome and neural tube, are not primary intercellular bridges, but are secondary connections of medullary origin. The "neurofibrillæ" are intracellular differentiations of the neuraxon processes of medullary cells. The methods used in the study of the histogenesis of the neurofibrillæ do not seem suited to the study of the development of the "plasmodesmata."

The Teaching of Zoology and some Suggestions for its Improvement: W. J. BAUMGARTNER, University of Kansas.

The paper showed that many more students take botany than zoology in the secondary schools. Some reasons were cited for this. Universities can help the teaching of zoology by furnishing some material. The teaching of zoology can be improved by assigning the student a special animal to report on to the rest of the class.

Cestode Cytology: R. T. YOUNG, University of North Dakota.

Both in larva and adult new nuclei in many cases arise *de novo* in masses of cytogenic protoplasm. The evidence of this is the appearance of small, densely staining chromatin bodies in these masses. These later surround themselves with membranes (or the membrane may arise first and the chromatin body later) and are then constricted off from the cytogenic mass, together with a small amount of cytoplasm to form new "cells." Some nuclei are typical, consisting of membranes surrounding distinct chromatin nucleoli; while in others the entire "cell" body is filled with diffuse chromatin, as is shown by micro-chemical tests. A count of some 34,000 nuclei showed only fifty cases of possible mitosis. Amitotic division of preexistent nuclei also occurs. It is probable that mitosis is degenerating in the cestodes, corresponding to their general degenerate condition.

Fifty-one Generations in the Dark: F. PAYNE, Indiana University. (Read by title.)

DEMONSTRATIONS

Sections showing the Early Sex-cells of Amia and Lepidosteus: B. M. ALLEN.

Some Parasites of the Sleeper Shark: H. B. WARD.

Hydroids from the Illinois River: FRANK SMITH.

Sections showing the "Plasmodesmata" connecting Myotome and Neural Tube in Squalus: H. V. NEAL.

H. V. NEAL,
Secretary

KNOX COLLEGE

SOCIETIES AND ACADEMIES

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

THE 446th regular meeting of the Anthropological Society, held April 12, 1910, was devoted to the retirement address of the president, Dr. J. Walter Fewkes, on "Cave Dwellers of the Old and New World." The full text of this address will be published later.

The unity of the human mind, said the speaker, has come to be one of the most fruitful working hypotheses in the science of culture history. Identities in human culture, under similar climatic and other environmental influences are among the strongest evidences that can be adduced in support of this theory. As human habitations, the most characteristic of racial artefacts, reflect better than all others the effect of environment, the object of the address was to indicate the bearing of a comparative study of cave dwellings from different geographical localities on the theory of mental unity.

A people of nomadic life whose habitations from their mode of life are perishable has little stimulus to construct lasting monuments. Sedentary people, on the other hand, construct habitations of material that will endure; caves when available naturally first afforded shelter for races seeking permanent dwellings.

It is difficult to find a primitive race where human culture has reached any considerable architectural development that has not, at an early cultural period, lived in caves or holes in the ground. Life in caves leads to buildings made of stone or other lasting materials. Permanence of building perpetuates racial traditions, serving as constant incentives to the construction of architectural monuments.

A study of the distribution of prehistoric cave habitations reveals a marked uniformity of cave dwellings in regions of the earth geographically far apart. Prehistoric cave dwellings of similar form may be traced from China across Asia and on both shores of the Mediterranean, in Mexico, Peru and the southwestern part of the United States. This distribution corresponds in a measure with that of great prehistoric monuments and follows closely that of the arid regions.

Caves as habitations are divided into two types, natural and artificial. The address treated more particularly of the latter, but views of both from the old and new world were shown.

The European natural cave as a shelter is prehistoric, having been abandoned in very early times. The natural caves of Cuba, Hayti and