U. S. Work in the Ohio, Allegheny and Monongahela Rivers near Pittsburgh: Thomas P. Roberts.

C. A. Waldo,
Secretary.

SECTION F—ZOOLOGY.

At the first morning session on Monday, June 30, 1902, in the absence of Vice-President Charles C. Nutting, of the State University of Iowa, the meeting was called to order by Professor Henry B. Ward, and Professor Carl H. Eigenmann was elected temporary chairman.

In the regular order of business, the following elections were made to the positions mentioned:

Member of the Council: Dr. W. J. Holland, Pittsburgh, Pa.

Members of the Sectional Committee: Professor Charles W. Hargitt, Syracuse University; Professor Henry F. Osborn, Columbia University; Professor F. M. Webster, Wooster, Ohio.

Member of the General Committee: Professor Herbert Osborn, Ohio State University.

Press Secretary: Dr. Ch. Wardell Stiles, U. S. Dept. of Agriculture.

At the afternoon session the meeting was called to order by the Secretary.

In the absence of President David Starr Jordan, his vice-presidential address was presented by Professor Carl H. Eigenmann. The secretary announced that the Sectional Committee had elected Professor E. L. Mark, Harvard University, to serve as vice-president during the Pittsburgh meeting.

At the morning session, on July 1, Professor E. L. Mark in the chair, the following papers were presented:

A New Microscopical Cabinet, Made of Metal: Charles Sedgwick Minot, Harvard Medical School.

A metal cabinet containing metal trays for microscopical specimens was exhibited. It has the advantage of being relatively safe from fire, and much more compact than wooden cabinets, and is therefore recommended especially for permanent and valuable microscopical collections. The case is made of tin japanned, and the trays also. Each tray is made with a double bottom to prevent warping and has space for twenty-four 3x1 slides. Each cabinet, having thirty trays, will take 720 slides. The cabinets cost $12.50 each and may be obtained from Peter Gray and Son, 11 Marshall Street, Boston. (Discussed by E. L. Mark.)

Insect Enemies: A Matter of Taste: Francis M. Webster, Wooster, Ohio. (Will appear in *Entomological News.*)

The speaker gave an account of experiments in feeding living insects to mice, and called attention to the fact that distasteful insects are not always rejected by all individuals of the same species of bird.

Remarks on the Finding of Bones of the Great Auk in Florida: Oliver Perry Hay, American Museum of Natural History. (Will appear in full in *The Auk.*)

The speaker stated that bones of the great auk were found in a shell-mound at Ormond, Fla. He described the situation and character of the mound and discussed the probability of the bird's having lived in that region. (Discussed by L. L. Dyche.)

Variation Among Hydromedusæ: Charles W. Hargitt, Syracuse University.

A continuation of earlier observations on this subject confirms the conclusions published elsewhere by Dr. Hargitt and extends them to other genera and species. An examination of several hundred specimens of *Coryne mirabilis* confirms the statements of Bateson relative to the remarkable constancy of this medusa, since not the slightest variation was noticed in any essential organ. The trachomedusa, *Trachynema digitale,* showed the comparatively low ratio of eight per cent. in total

variations, chiefly in radial canals and gonads. *Rhegmatodes tenuis,* a leptomedusa, presents a much higher ratio of variation, no less than twenty per cent. showing more or less marked variation in character and size of radial canals. In this species a rather prominent variation was that of the bifurcation, looping and anastomosing of the canals, suggesting a probable means by which the large number of canals may have arisen. The speaker has already called attention to a similar condition in *Gonionema* as has Mayer in *Pseudoclytia pentata.* Variation of the gonads followed a similar range, but in view of the comparatively immature condition of many of the specimens, no attempt was made to go into details upon this point.

The Sense of Taste in Fishes: C. JUDSON HERRICK, Denison University.

Sense organs known as terminal buds, which resemble taste buds in structure and are wholly independent of the lateral line system of sense organs, are found freely scattered over the entire body surface of the catfishes. Like the taste buds in the mouth, they are innervated by communis nerves and presumably they serve the gustatory function. To test this hypothesis experiments were performed to determine how the siluroid fishes perceive their food. It appears that the sense of sight plays very little part, the sense of smell and the sense of touch considerable parts, but the sense of taste clearly the chief part in their detection of food. These fishes appear to taste not only in the mouth, but by contact with sapid substances by the barblets or the skin of the body at any point as far back as the root of the tail fin. Gustatory and tactile sensations arising in these cutaneous areas commonly cooperate in evoking the reflex of seizing food, but by training the fishes can be taught to discriminate between the gustatory and the tactile elements in the stimulus and to respond only when both are present, ignoring simple tactile contacts. Some other fishes with large eyes and having these terminal buds less generally distributed over the body surface feed in a wholly different way, by snapping up a moving bait (visual stimulus), as every fisherman knows. (Discussed by Messsrs. Dyche, Eigenmann and Surface.)

On the Value of an Apparently Fixed Food-Habit in Scale Insects as Determining Species: CHARLES LESTER MARLATT, U. S. Dept. of Agriculture.

The speaker detailed striking variability in the food habits of certain species of scale insects; food plants of the same species in different districts may be multiple or single, and may change from year to year or after a series of years, the plants once attacked becoming practically exempt and new host plants being assumed. A fixed food habit could not, in the opinion of the speaker, be considered as necessarily of value in determining species. (Discussed by Messrs. Webster and Hopkins.)

Statistical Study of Variation in the Periodical Cicada: HERBERT OSBORN, Ohio State University.

A distinct variation from the typical form of *Cicada (Tibicen) septendecim* has been recognized since 1829, and was described in 1851 as a distinct species, *cassini.* Riley, however, and later Marlatt have concluded it should be ranked simply as a dimorphic variety. In the occurrence of the present year this form has been so very abundant that a statistical comparison of the two forms was naturally suggested. Measurements of 800 specimens show a very decided constancy of each variety and for each sex of each variety. This constancy can best be shown in curves of frequency. Color variation is also very constant and is believed to be as constant as the other fea-

tures which can be represented in actual measurement. A very distinct difference in the note is observable and has been frequently mentioned in previous records; a fact that must be borne in mind as not only meaning some difference in morphology of sound-producing organ, but in controlling the selection of mates.

Special effort was made to observe the copulations and determine whether any efforts were made at crossing between the two forms. In all the specimens taken in coitus and which have been reported by others not a single instance of such crossing has been observed.

This has been the uniform instance of previous observers who have made observations on this point, and is evidently very uniform and shows distinct sexual selection; that is, we have here a very evident case of isolation due to sexual selection, and it would appear on this basis every opportunity for perpetuation of the variety.

No evidence of 'dimorphism,' as Professor Osborn understands the term, seems to be available from any source. It is certainly not seasonal or sexual, and if, possibly, a depauperate form, we would not term it dimorphic unless it can be proved that it may alternate with normal forms.

It may be said in summary that: (1) There is a very constant color difference; (2) measurements show very close adherence to two entirely different averages for length of body, length of wing and width of wing. This is best shown in curves. (3) There is a totally different note characteristic of each form, which must be considered as representing different morphology of sound-producing organs as well as basis for selection of mates. (4) No *cassini* forms have been found paired with normal forms and none have been recorded or have been reported. (5) There is a difference in genitalia though perhaps not enough to exclude the possibility of mating and Riley says the differences are not constant.

The fact that the two forms appear simultaneously or practically so in the seventeen-year period and have so many points of resemblance is certainly good evidence of very close relationship, and it would seem safe to say that they have sprung from a common and rather recent ancestral form or very likely that one is a derivation of the other which still represents the ancestral form for both, and taking data now available it appears more likely that *cassini* is the derived form.

The *cassini* form appears especially prominent in the brood XXII. so widely distributed the present year and, in my own experience, has been very rare in broods V. and XIII.

A variation possibly indicating another type is noted, though represented by only two specimens. (Discussed by Messrs. Marlatt, Hargitt, Hopkins, Webster and Ortmann.)

The Animal Ecology of Cold Spring Beach, with Remarks on the Theory of Adaptation: Charles B. Davenport, University of Chicago. (In absence of author, read by title.)

Cold Spring Beach is a sandspit near the head of Cold Spring Harbor, L. I. An outer harbor of strong erosive currents and an inner quiet harbor of deposition are separated by it. In the submerged beach is a shallow water fauna of sessile lamellibranchs, burrowing molluscs and worms, crawling and burrowing crustaceans and molluscs, and swimming predaceous animals, chiefly fish. The struggle here is so keen that certain marine forms (*Orchestia, Littorina*) have been forced to the terrestrial beach. The outer lower terrestrial beach is covered with microscopic débris and occasional decaying molluscs. Collembola cover its stony surface, chiefly arctic forms

of *Isotoma* and *Xenylla*. They burrow as the tide rises. In the outer middle beach is found the débris left at high tide, and this is feasted upon by scavengers, these scavengers in turn by predaceous forms of various orders of strength and swiftness. The tip of the sandspit is a region of currents where lamellibranchs thrive, attached to and protecting masses of *Spartina*. The inner beach supports numerous fiddler crabs. The animals form a society, the members of which are all there for some assignable purpose. The paper closed with a discussion of an auxiliary theory of adaptation, called segregation in the fittest environment.

Observations on the Mouth Structure of Scale Insects: JOHN B. SMITH, Rutgers College. (Will appear in full in Bull. 159, N. J. Experiment Station.)

The mouth parts of scale insects have been figured as three slender bristles or lancets for the adult and as a looped structure for the larva. The three bristles are regarded as mandibles and united maxillæ; but the nature or use of the larval loop has not been explained so far as the author's literature could inform him. The author regards all the bristles as maxillary and finds that the loop is used as a reserve length of tubing to keep the insect at all times in touch with its food. The bristles pass beneath the galear remnant and, forming a loop, return through a chitinous tube in the galea and are then forced into the plant tissue. The specimens studied were mostly prepared and mounted by Mr. E. L. Dickerson in securing material for a graduation thesis. (Discussed by Messrs. Marlatt, Mark, Webster, Osborn and Needham.)

Early Development of the Rock Barnacle, Balanus: M. A. and ANNA N. BIGELOW, Columbia University. (In the absence of authors, read by title.)

The authors described the early development of rock-barnacle, *Balanus*, dealing primarily with the subject from a standpoint of cell-lineage. Contrary to previous accounts, they maintain that the cleavage is regular and determinate. The germ-layers are traced from the early stages of the cleavage, and the development is shown to be closely similar to that of barnacles of the genus *Lepas*.

AFTERNOON SESSION, JULY 1. PROFESSOR E. L. MARK IN THE CHAIR.

Wind and Storms as Agents in the Diffusion of Insects: FRANCIS M. WEBSTER, Wooster, O. (Will appear in full in the *American Naturalist*.)

The speaker called attention to the several influences of winds on the diffusion of insects both independently of and in connection with thunder-storms. (Discussed by Messrs. J. B. Smith, Surface, Minot, Dyche and Bowlus.)

The Blind Fish of Cuba (with lantern slides): CARL H. EIGENMANN.

There are two species of blind fish found in the sink holes leading down to the underground streams draining to the south between Artemisa, Province Pinar del Rio and Alacranes, Province Matanzas. These fish are immigrants from the sea. They are viviparous; the young are about an inch long and four in number per gestation. The unborn young and the recently born individuals are colorless and possess well-developed but small eyes. The fish acquire color with age and the eyes very probably degenerate; at least they become covered with a thick layer of tissue. (Discussed by Professor Surface.)

The Problem of Getting Air, and How it is Solved by Aquatic Insects (with lantern slides): JAMES G. NEEDHAM, Lake Forest College.

The primitive terrestrial insect, with its

impervious cuticle, its spiracles and its system of internal air tubes, would seem, of all animals, the least likely to be able to take to aquatic life. Yet the adaptation has been successfully carried out on many different lines.

This paper set forth the diverse types of devices that have enabled insects to reinvade the water—the primitive home of animal life—and to become in shallow fresh waters a chief part of its fauna. Aquatic insects fall naturally into the following ecological groups:

A. Forms breathing air directly.
  a. Living on the surface; water striders, spring tails, etc.
  b. Resting beneath the surface; foraging down below, carrying down a reserve supply of air, diving beetles, back swimmers.
  c. Remaining down below, but in communication with the surface; *Ranatra*, rat-tail larvæ, etc.
B. Forms breathing the air dissolved in the water (strictly aquatic).
  a. Free swimming—*Corethra* larvæ, etc.
  b. Ambulatory.
    1. Climbing and clinging forms.
    2. Sprawling forms.
    3. Burrowing forms.

Of the strictly aquatic insects there are:

1. Gill-less forms (living in well aerated water: size small).
2. Forms with lamellate tracheal gills. May fly and damsel fly nymphs.
3. Forms with filamentous tracheal gills, stone fly nymphs, etc.
4. Forms with blood gills, and hæmoglobin in the blood.
5. Forms with tube gills. *Simulium* pupæ.

(Discusssed by Messrs. Osborn and Surface.)

The Habits of Fresh-water Lampreys (with lantern slides): Harvey Adam Surface, Pennsylvania State College.

The speaker presented numerous lantern slides illustrating his paper 'Removal of Lampreys from Interior Waters of New York,' published in the fourth Annual Report, Commissioner Fisheries, Game and Forests of New York. (Discussed by Dr. O. P. Hay.)

The Significance of the Recent American Cases of Hookworm Disease (uncinariasis or anchylostomiasis) in Man: Ch. Wardell Stiles, U. S. Dept. of Agriculture. (Will appear in full in the Annual Report, Bureau of Animal Industry for 1902.)

The speaker maintained that hookworm disease in man in this country is due to two different organisms; one of these, known as *Uncinaria duodenalis*, has been imported from Europe and Africa, and is now being imported by the troops who are returning from the Philippines; the other organism, however, is distinctly American, and is known as *Uncinaria americana*. This parasite has thus far been found in Virginia, Texas, Cuba and Porto Rico, and the indications are that it is more or less widespread in the southern states. The evidence at his disposal leads to the well-grounded suspicion that a number of cases of anemia in the southern states, which have heretofore been attributed to malaria and which have not responded to the regular treatment for malaria, are in reality cases of hookworm disease. He further exhibited specimens of allied parasites which cause similar diseases in other animals, such as dogs, cats, sheep, cattle, wolves, seals, the blue fox, etc. The so-called typhoid fever of cats, for instance, has been traced to one of these parasites, and is totally distinct from typhoid fever in man. One of these parasites also produces a very serious and often fatal disease among dogs, another is responsible for the death of many sheep in the southern states, and still another is responsible for the death of many young seals. The paper in question formed an illustration of the important relation which zoology bears to modern medicine. (Dis-

cussed by Messrs. Webster, Ward, Eigenmann and Hay.)

A Remarkable Turtle from the Loup Fork Beds of Kansas: OLIVER PERRY HAY, American Museum Natural History. (Will appear in full in *Bulletin Amer. Mus. Nat. Hist.*)

The turtle in question was one of Cope's species, *Testudo orthopygia,* which possesses an armor of bony plates in the skin of the legs, tail, etc. (Discussed by Professor Ortmann.)

MORNING SESSION, JULY 2. PROFESSOR E. L. MARK IN THE CHAIR.

The Harvard Embryological Collection: CHARLES SEDGWICK MINOT, Harvard Medical School.

The speaker described the methods used in the formation of the Harvard Embryological Collection, the general plan for which was laid before the Association at its Detroit meeting. The collection since then has grown steadily, until it now contains 527 series, representing carefully chosen stages of embryos of nineteen typical vertebrates. It has already served as the basis of a series of investigations, and it is hoped that workers from other institutions will also use the material for their special researches. The collection is being added to at present with considerable rapidity. The two types, of which the series at present are most complete, are the dog-fish, *Squalus acanthias* and the chick. (Discussed by Dr. H. B. Ward.)

Effects of Altitude on Snails of the Species Pyramidula strigosa Gould: MORTON JOHN ELROD, University of Montana.

The shells belonging to this species are air-breathing and land forms. The species is widely distributed west of the Rocky Mountains, as yet found in only a few places east of the main range. It shows very great variation. Formerly many species were recognized, but these have lately been reduced to varieties. The paper is based on specimens collected in western Montana. These were taken at altitudes varying from 2,300 to 9,000 feet. The total number examined was nearly 550.

The measurements included the greatest width, least width, depth, number of whorls, weight, volume and markings. The results show that the shells have even greater variation than was at first supposed. The extremes in greatest width are 6 and 25 mm.; in least width, 5 and 22 mm.; in depth, 3 and 17 mm.; in whorls, 3.5 and 6.5; in weight, .1 and 1.2 g.; in volume, .1 and 1.7 c.c. The greatest variation was found at lower altitudes, the high altitude forms showing a more fixed condition, with least tendency to deviate from the typical form. All the lines of variation shown in the tables for lower altitude shells show a tendency to vary from the typical form at a given place. From a study of the specimens secured it seems evident that the species has crossed the range and is now descending on the eastern slope. Specimens collected from the eastern or Atlantic side of the range are quite different in appearance from those on the Pacific side, being noticeably of greater depth, and with characteristic shell appearance and markings.

Structure of the Pelvic Girdle in the Sauropoda: JOHN BELL HATCHER, Carnegie Museum.

The speaker discussed the various elements of the pelvis of *Diplodocus, Brontosaurus* and *Morosaurus,* the three most common and characteristic genera of sauropod dinosaurs. The distinctive characters shown in the pelvic girdles of these three genera were illustrated and the view maintained that many supposed generic characters exhibited in the pelvis of the Sauropoda are in reality due entirely to differences of age, hence are of little value

for purposes of classification. The speaker also discussed the structure of the pelvis of the Sauropoda with relation to the theory as to the origin of the group from bipedal dinosaurs. (Discussed by Dr. C. S. Minot.)

A Record of the Occurrence of Filaria loa, a Human Parasite new to the United States: Henry Baldwin Ward, University of Nebraska.

The speaker cited a case of the occurrence of this thread worm, giving an account of the clinical history, the wanderings of the parasite, etc. (Discussed by Messrs. McMillan, Marlatt and Stiles.)

Notes on Some Cretaceous Fish from Kansas: Oliver Perry Hay, American Museum Natural History. (Will appear in full in *Bulletin Amer. Mus. Nat. Hist.*)

The speaker discussed especially the genera *Protorphyræna* and *Anogmius,* mentioning new features in their structure and presenting conclusions concerning the relationships of the organisms in question.

Morphology of Insect-galls: Melville T. Cook, Greencastle, Ind.

The speaker stated that the morphological character of a gall depends upon the insect producing it, and not upon the host plant. Galls produced by insects of the same family show a resemblance, and those produced by insects of the same genus show a decided resemblance. In some cases galls similar in character are produced by insects of widely separated genera. This is probably due to the fact that the insects affect corresponding tissues of the host plant. The insects always affect the active growing parts of the plant. It was stated further that many of the so-called 'stem-galls' are in reality bud-galls. In these cases also it seems probable that the insects affect corresponding tissues of the host plant. The Cecidomyid galls show the greatest variation, both in external characters and in histology. The Cynipidid galls show the highest development, both in external characters and in histology. (Discussed by Mr. Marlatt.)

In the absence of the authors the following papers were read by title:

Plankton Pulses: Charles Atwood Kofoid, University of California. (No abstract presented.)

Fish Remains of Oriskany Sandstone, Chapman Plantation, Aroostook County, Maine: Olof O. Nylander, Caribou, Maine.

A New Fresh-water Isopod of the Genus Mancasellus, from Indiana: Harriet Richardson, Smithsonian Institution. (Will appear in full in *Proc. U. S. Nat. Museum,* v. 25, pp. 505–507.)

The genus *Mancasellus* was established by Harger from the form *brachyurus.* There are, up to the present time, but four known species; *M. brachyurus* Harger, *M. macrourus* Garman, *M. lineatus* (Say) and *M. tenax* Harger, and one subspecies *M. tenax dilata* Harger. The genus is not represented outside of North America. This paper contains a description of *Mancasellus danielsi,* which comes from Lily Lake, Indiana, and was collected by Mr. L. E. Daniels.

A New Terrestrial Isopod of the Genus Pseudarmadillo, from Cuba: Harriet Richardson, Smithsonian Institution. (Will appear in full in *Proc. U. S. Nat. Museum,* v. 25, pp. 509–511.)

The type and only species of the genus *Pseudarmadillo, P. carinulatus,* was described by Saussure. The new species, *P. gittianus,* described in this paper was collected by Messrs. Palmer and Riley at Neuva Verona, Isla de Pinos, Cuba. The description is from a single specimen.

The Axial Skeleton of the Enteropneusta, Considered from a Functional Point of View: WILLIAM EMERSON RITTER, University of California. (Will appear in full in 'Scientific Results, Harriman Alaska Expedition.')

(1) The notochord is not restricted to the pouch-like organ present in the adults of all species and hitherto regarded as constituting the entire organ, but in reality extends back to the posterior end of the collar (fully developed in the adult of the Harrimaniidæ and rudimentary in other species). The collar notochord is mainly in the form of a broad, deep trough on the dorsal side of the esophagus, though histologically and functionally portions of the esophageal wall adjacent to the trough must be reckoned as belonging to the notochord. (2) The combined notochord and chondroid skeletal elements constitute a structural unit, this unit being a true *axial skeleton.* (3) This axial skeleton has a twofold function; (*a*) to serve as a firm rod for giving rigidity and strength to the peduncle of the animal, and to support, at its anterior end, the heart and glomerulus which are situated in the base of the proboscis; (*b*) to serve as the origin of the great radio-longitudinal muscles of the collar. (4) The important muscles above mentioned are attached to the sides of the axial skeleton along its entire length from the mid-peduncle to near the posterior end of the collar. They have an extensive insertion into the connective tissue of the collar, the septum between the collar and abdominal cœlom, and the collar ectoderm. These muscles are practically the only ones in the collar by which the boring and locomotor movements of the animal are effected there being in this region no body-wall muscles at all in some of the species. They are consequently true *skeletal muscles* acting on an *internal skeleton,* and *hence having no counterpart in any invertebrate,* but are comparable with the *axial skeletal musculature* of *vertebrates.* The functional significance of the axial skeleton as above defined has not been recognized heretofore, probably on account of the rudimentary condition of its esophageal portion in most species. In particular, its relation to the skeletal musculature has escaped adequate recognition. In the facts here briefly set forth we have evidence *as strong as that furnished by the branchial apparatus* in favor of the chordate affinities of the enteropneusta.

Evolution and Distribution of the Mastodons and Elephants in North America: HENRY FAIRFIELD OSBORN, Columbia University. (Will appear in full in *American Naturalist.*)

CH. WARDELL STILES,
Secretary.

SCIENTIFIC BOOKS.

The Elements of Insect Anatomy, an outline for the use of students in entomological laboratories. By JOHN HENRY COMSTOCK and VERNON L. KELLOGG. Third edition, revised. Ithaca, N. Y., Comstock Publishing Co. 1901.

Teachers of entomology will certainly welcome this revised edition of an excellent laboratory guide. In their selection of easily accessible types the authors have had in mind the convenience of instructors and classes throughout the country. The outlines are carefully constructed with a view to insuring accuracy of observation and include, perhaps, as much material as can be worked over during the time usually allotted to the subject in our colleges and universities. The work suffers somewhat from lack of symmetry. Thus before introducing the student to the maze of sclerites and other anatomical details, with which the outlines begin, it would have been desirable to insert a chapter on general morphology for the purpose of elucidating the important principles of metamerism, cephalization, etc. This could have been accomplished by constructing a number of brief comparative outlines of several insects repre-