Actinomyces scabies (Thaxter) Guessow = *Oospora scabies,* Thaxter.

At the same time I shall rectify the genus and species as far as given by Saccardo under *Nocardia* as follows:

Actinomyces Harz 1878 = Streptothrix Cohn 1875; Rossi Doria 1891 = Bacterium Afanasiev 1888 = Oospora Sauvageau et Radis 1892; Thaxter 1891 = Discomyces Rivolta 1878; R. Blanchard 1900 = Nocardia de Toni et Trevisan 1889; R. Blanchard 1900 = Actinomyces Gasperini 1894 = Actinomyce Meyen 1827 = Cladothrix Macé 1897.

Actinomyces farcinica (Trev.) Guessow = *Nocardia farcinica* Trev.

Actinomyces bovis (Harz) Guessow = *Nocardia Actinomyces* Trev.

Actinomyces Foersteri (Cohn) Guessow = *Nocardia Foersteri* (Cohn) Trev.

Actinomyces arborescens (Edingt.) Guessow = *Nocardia arborescens* (Edingt.) Trev.

Actinomyces ferruginea (Trev.) Guessow = *Nocardia ferruginea* Trev.

H. T. Güssow

DIVISION OF BOTANY,
EXPERIMENTAL FARMS,
OTTAWA, CANADA

THE AMERICAN SOCIETY OF ZOOLOGISTS

THE Central and Eastern Branches of The American Society of Zoologists met in joint session at the University of Pennsylvania, Philadelphia, December 29, 1913, to January 1, 1914, inclusive, in conjunction with The American Society of Naturalists, The American Society of Anatomists and the Federation of American Societies for Experimental Biology.

At the meeting for business, held during the afternoon of December 30, the following persons were elected to membership in the society:

CENTRAL BRANCH

James Edward Ackert, Kansas State Agricultural College, Manhattan, Kan.
Robert Chambers, University of Cincinnati, Cincinnati, Ohio.
John Morton Elrod, Missoula, Montana.
E. H. Harper, Northwestern University, Evanston, Ill.
Frederick Isely, Central College, Fayette, Mo.
Ruth Marshall, Rockford College, Rockford, Ill.
H. L. Wieman, University of Cincinnati, Cincinnati, Ohio.

EASTERN BRANCH

Gardiner C. Bassett, Carnegie Station for Experimental Evolution, Long Island, N. Y.
Raymond Binford, Guilford College, North Carolina.
Maynie R. Curtis, Agricultural Experiment Station, Orono, Me.
Hubert Dana Goodale, Amherst College, Amherst, Mass.
B. H. Grave, Knox College, Galesburg, Ill.
Emily Ray Gregory, Buchtel College, Akron, Ohio.
Louise Hoyt Gregory, Barnard College, New York.
George Lester Kite, Wistar Institute, Philadelphia.
C. C. Little, Harvard College, Cambridge, Mass.
E. Carlton McDowell, Yale University, New Haven, Conn.
Norman Eugene McIndoo, Bureau of Entomology, Washington.
Edith M. Patch, University of Maine, Orono, Me.
Alice Robertson, Wellesley College, Wellesley, Mass.

The "committee on organization and policy," appointed at the meeting held at Princeton in 1911, submitted its report in the form of a new constitution, the text of which had been printed and distributed to all members of the society several days prior to the meeting. This proposed constitution was considered section by section and, with certain amendments, was unanimously adopted. In its adopted form, it is as follows:

THE AMERICAN SOCIETY OF ZOOLOGISTS' CONSTITUTION

Article I

Name and Object

Sec. 1. The society shall be called the American Society of Zoologists.

Sec. 2. The object of the society shall be the association of workers in the field of zoology for the presentation and discussion of new or important facts and problems in that science and for the adoption of such measures as shall tend to the advancement of zoological investigation in this country.

Article II

Membership

Sec. 1. Members of the society shall be elected from persons who are active workers in the field of zoology and who have contributed to the advancement of that science.

Sec. 2. Election to membership in the society shall be upon recommendation of the executive committee.

Sec. 3. Each member shall pay to the treasurer an annual assessment as determined by the society. This assessment shall be considered due at the annual meeting and the name of any member two years in arrears for annual assessments shall be erased from the list of members of the society; and no such persons shall be restored to membership unless his arrearages shall have been paid or he shall have been reelected.

Article III

Officers

Sec. 1. The officers of the society shall be a president, a vice-president, a secretary-treasurer, and the members at large of the executive committee.

Sec. 2. The executive committee shall consist of the president, the vice-president, the secretary-treasurer and five members elected from the society at large. Of these five members, one shall be elected each year to serve five years. If any member at large shall be elected to any other office, a member at large shall be elected at once to serve out the remainder of his term.

Sec. 3. These officers shall be elected by ballot at the annual meeting of the society, and their official terms shall commence with the close of the annual meeting, except that the secretary-treasurer shall be elected triennially and shall serve for three years.

Sec. 4. The officers named in section 1 shall discharge the duties usually assigned to their respective officers.

Sec. 5. Vacancies in the board of officers, occurring from any cause, may be filled by election by ballot at any meeting of the society. A vacancy in the secretary-treasurership occurring in the interval of the meetings of the society may be filled by appointment until the next annual meeting by the executive committee.

Sec. 6. At the annual meeting the president shall name a nominating committee of three members. This committee shall make its nominations to the secretary not less than one month before the next annual meeting. It shall be the duty of the secretary to mail the list of nominations to all members of the society at least two weeks before the annual meeting. Additional nominations for any office may be made in writing to the secretary by any five members at any time previous to balloting.

Article IV

Meetings of the Society

Sec. 1. Unless previously determined by the society the time and place of the annual meeting of the society shall be determined by its executive committee. Special meetings may be called and arranged for by the executive committee. Notices of such meetings shall be mailed to all members of the society at least two weeks before the date set for the meeting.

Sec. 2. Sections of the society may be organized in any locality by not less than ten members, for the purpose of holding meetings for the presentation of scientific papers. Such sections shall have the right to elect their own officers and also associate members; provided, however, that associate membership in any section shall not confer membership in the society.

Article V

Quorum

Twenty five members shall constitute a quorum of the society, and four a quorum of its executive committee.

Article VI

Changes in the Constitution

Amendments to this constitution may be adopted at any meeting of the society by a two thirds vote of the members present, upon the following conditions:

(*a*) The proposed amendment must be in writing and signed by at least five members of the society.

(*b*) This signed proposal must be in the hands of the secretary at least one month before the meeting of the society at which it is to be considered.

(*c*) The secretary shall mail copies of the proposed amendment to the members of the society at least two weeks before the meeting.

By-laws

A set of by-laws, for the guidance of officers of the society in the performance of their duties, was also adopted in substance, but the work of embodying the same in appropriate and clear phraseology was delegated to the executive committee.

Officers of the society for the year 1914, as provided by the new constitution, were elected as follows:

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

Vice-president—M. F. Guyer, University of Wisconsin.

Secretary-treasurer—Caswell Grave, Johns Hopkins University.

Additional Members, Executive Committee—To serve *one* year, H. E. Jordan, University of Virginia; to serve *two* years, H. F. Nachtrieb, University of Minnesota; to serve *three* years, H. V. Wilson, University of North Carolina; to serve *four* years, George Lefevre, University of Missouri; to serve *five* years, A. F. Shull, University of Michigan.

The treasurers of the Central and Eastern branches made financial statements, which were examined and found correct by an auditing committee consisting of Harold S. Colton and Wm. A. Kepner. These reports showed a total balance in current funds, December 30, 1913, of $597.22.

The custodian of the permanent fund, J. H. Gerould, reported the receipt of a 15 per cent. dividend on the claim of the society against the Industrial Savings and Loan Company of New York.

A finance committee consisting of Frank R. Lillie, chairman, Caswell Grave and E. G. Conklin, was created to have charge of the investment of the permanent fund and the executive committee was instructed to add to the permanent fund from current funds of the society whenever such action is deemed expedient.

A committee consisting of Henry B. Ward, chairman, G. H. Parker and C. E. McClung was appointed to confer with a committee of three from the American Society of Anatomists on the subject of premedical education.

The "Mathews Plan for the Organization of an American Biological Society" was referred to the executive committee for consideration and report to a future meeting.

The committee of delegates, on which the American Society of Zoologists was represented by G. H. Parker, recommended that the secretaries of the American Society of Zoologists and other affiliated societies consult with the secretary of the American Society of Naturalists as to the place of future meetings. This recommendation was approved by unanimous vote.

The recommendation of the executive committee that a list of members, and the new constitution and by-laws of the society be published this year by the secretary was also approved.

At meetings held on December 29, 30 and January 1, the following papers were read either in full or by title:

COMPARATIVE ANATOMY

The Intestinal Epithelium of Trematodes: HENRY S. PRATT.

A Contribution to the Evolution of the Cestode, Rostellum: FRANKLIN D. BARKER. (Illustrated with lantern slides.)

Barker and Adson have recently described a new genus and species of Cestode, *Proteorostellum sphærulum* from the intestine of softshell turtles.

This form differs from the other known genera of the *Proteocephalidæ* in having a well-defined apical organ on the head or scolex. Other morphological and histological differences also distinguish this form.

In order to arrive at the correct interpretation of this organ a careful comparative study of the various apical structures found in cestodes was made.

The comparative study shows that the apical organ of this new cestode from the turtle is neither end-organ, terminal sucker nor muscle-cone. The rostella of different cestodes vary greatly in their structural complexity so that several distinct grades may be recognized. Comparisons with these rostella clearly shows that the apical organ of the turtle cestode is a rostellum of a very simple type.

It seems then that we have in this rostellum the simplest and most primitive type of cestode rostellum yet described and one which possibly represents the prototype from which the more complex types have evolved. A well-defined series of rostella, developing in complexity, can be established, beginning with this very simple type found in the turtle cestode.

On the basis of this series of cestode rostella we would define the cestode rostellum as an organ varying in size, shape and complexity; having a definite individual musculature, intrinsic, extrinsic or both; more or less retractile; armed or unarmed; situated on the apex and equidistant from the acetabula of the cestode scolex. A more detailed discussion of this question will appear in a paper soon to be published from this laboratory by Geo. M. Covey on "The Microscopic Anatomy of *Proteorostellum sphærulum* Barker and Adson."

Further Notes on the Embryonic Skull of Eumeces: EDWARD L. RICE.

A. Secondary Tympanic Membrane.—Gaupp emphasizes the contrast in position of the secondary tympanic membrane of the mammals and the physiologically similar membrane stretched between the rim of the fenestra cochleæ and the lateral margin of the basal plate in *Lacerta.* Observations on *Eumeces* largely bridge this gap and indicate a real homology not recognized by Gaupp. Early stages agree with *Lacerta;* in later embryos the membrane is clearly a part of the wall of the otic capsule.

B. Exit of Glossopharyngeal Nerve.—The above interpretation helps to harmonize the seemingly contradictory data concerning the course of the ninth nerve in the reptiles, described as "Extracapsular" in *Lacerta, Hatteria* and the *Crocodilia,* and as "intra-capsular" in *Chelone, Eruys* and *Tropidonotus.* The cause in both cases may be interpreted as intra-capsular, the penetration of cartilage or connective tissue depending on the relative extent of these tissues in this part of the otic capsule, *i. e.,* upon the size of the fenestra cochleæ. Observations on *Eumeces* confirm this view. Some specimens agree fully with *Lacerta;* in others the nerve clearly penetrates the cartilage of the median walls of the capsule, although no lateral penetration of the cartilage has been observed. These variations are not correlated with age.

Observations on Sympathetic Ganglion Cells: F. W. CARPENTER.

The Vascular System of the Florida Alligator: A. M. REESE.

The Morphology of the Pectoral Spine and Gland in Certain Catfishes: H. D. Reed. (With demonstration.)

The Innervation of the Integument of Chiroptera: J. E. Ackert. (With lantern slides.) (Introduced by Robert K. Nabours.)

The integument of *Myotis lucifugus* (LeConte) and *M. sublatus* (Say), stained *intra vitam* with methylene blue, reveals a number of nervous structures. Among them are free nerve terminations which can be seen most readily in the flying and interfemoral membranes, and which, so far as the writer has been able to ascertain, have not been reported heretofore in these organs.

Nerves end on pelage hairs at three levels and in three different sheaths of the follicles. These endings are: (1) a superficial nerve ring situated ectad of the orifices of the sebaceous glands, and giving off nerve threads in the connective tissue sheath; (2) fine, varicose or flattened nerve fibrils lying immediately entad of the openings of the sebaceous glands, and terminating on the hyaline membrane parallel to the long axis of the hair; (3) nerve fibrils at the level of the lower third of the follicle, usually taking a horizontal position in the outer root sheath. Apparently, nerve endings similar to the last type have not been described previously in the hair of the bat.

The skin contains two kinds of special sensory end-organs: (1) a small, elongate *end-bulb* into which a single medullated nerve fiber enters, extends approximately to the opposite end, and terminates in a slight enlargement; (2) a large, round, cellular *terminal corpuscle* innervated by a single fiber which disappears among the cells of the organ. Terminal varicosities are abundant in the region of the hairs outside of the follicles.

In the skin of the face, especially, there are well-developed striated muscles which bear motor end-plates. While some of these plates appear to be beneath the sarcolemma in the integument, they are unquestionably so placed in the muscles of the tongue.

Of interest are the large, modified sweat glands, some of which have numerous fibrils running about them. In the absence of definite observations on the innervation of sudoriparous glands, it seems possible that these fibrils, which resemble sympathetic post-ganglionic neurites, may form plexuses about the glands similar to intracapsular plexuses around cell bodies of sympathetic neurones.

Blinded bats when on the wing probably perceive obstacles through the sense of touch by the effect of condensations of the atmosphere (produced on approaching the object) upon the free nerve terminations in the epidermis and the superficial nerve rings of the hair follicles.

EMBRYOLOGY

On the Parallelism Between Increase in Permeability and Abnormal Development of Fish Eggs: J. F. McClendon.

The morphology of abnormal *Fundulus* embryos has been studied by Dr. Stockard. My work has been merely an attempt to find the cause of the abnormalities.

I found that distilled or sea-water solutions of nicotine and the salts of Na, Li, K, Ca and Mg all produced the same abnormalities in the embryos. In other words, any one of the above substances produced all of the types of abnormalities when applied to eggs in early cleavage stages.

If the eggs are placed in distilled water or "balanced" salt solutions no salts diffuse out of them. Only the kations have to be balanced; for example, if eggs are placed in a solution containing nitrates of Na, K, Ca and Mg, no chlorides diffuse out of them.

But if the eggs are placed in distilled-water solutions of any one of these substances, the salts contained in the eggs diffuse out into the solutions and may be detected by ordinary chemical analysis. It is thus shown that solutions which cause abnormalities also increase the permeability of the eggs to salts (and perhaps to other substances).

Solutions that were too weak or had acted for too short a time to produce abnormalities, had increased the permeability of the eggs to a slight degree. Therefore, the increase in permeability seems to be the cause and not an effect of the abnormal development.

The Effect of X-rays on the Rate of Cell Division in the Early Cleavage of Planorbis: A. Richards.

An Experimental Study of Concrescence in the Embryo of Cryptobranchus allegheniensis: Bertram G. Smith. (Illustrated with lantern slides.)

By the method of vital staining the following facts concerning the formation of the embryo of *Cryptobranchus* were established: (1) A band of cells occupying the lateral and ventral parts of the equatorial region of the late blastula, during gastrulation comes to occupy the corresponding parts of the margin of the yolk plug, and converges on

the site of the closing blastopore. (2) During gastrulation there is a confluence of material lying in the region of the dorsal lip of the blastopore; in connection with the process of overgrowth and in turning of the dorsal lip of the blastopore this material shifts from either side toward the median line. (3) The movement of the neural folds is a movement of translation, not a wave movement. The neural folds include material originally situated at least 90 degrees apart, which is thus brought into apposition in the median line.

The bearing of these facts on the theory of concrescence will be discussed when the paper is published in full.

The Behavior of the Skeletons in Experimentally Fused Larvæ: A. J. GOLDFARB.

On the Behavior of Sea-urchin Embryos When Incorporated in Sea-urchin Lymph Plasmodia: H. V. WILSON.

Segmenting eggs included in lymph plasmodia, eventually in wound membranes, continued to develop for a time. Many reached through radial elongation of the blastula cells and subsequent delamination a solid (sterroblastula) stage, after which the cells became dissociated, lying scattered or in amorphous masses in the midst of the general plasmodium. A large amount of the embryonic tissue underwent degeneration. On the other hand, groups of small dissociated blastomere cells established connection with one another and the general lymph plasmodium through the development of protoplasmic processes. They thus went so far as to become a part of the syncytium which constitutes the regenerative tissue. Their further fate could not be traced, and the evidence as to their permanency is thus negative.

In some of the experiments a considerable number of segmenting eggs remained adherent to the surface of the plasmodium. The development of these was near the normal. About the time when the cells acquire cilia, instances of fusion between the blastulæ were common. While the further development of these giant blastulæ was not followed, it would seem that the combination of lymph plasmodium and giant embryos is something essentially like the "syrphoplasmic" masses described by Janssens (1904).

A Pair of Tracheal Invaginations on the Second Maxillary Segment of the Embryo of the Honey Bee: J. A. NELSON.

At a period shortly after the completion of the germ layers, and contemporaneous with the appearance of the rudiments of the appendages and of the stomodæum, a pair of tracheal invaginations appears on each of the ten segments caudad of (but not including) the prothoracic segment. These invaginations by branching give rise to the tracheal system. At the same time a pair of invaginations appears on each side of the second maxillary segment. These occupy a position on this segment similar to those of the tracheal invaginations of the trunk segments, and are also similar to them in size and general appearance. Each of the tracheal invaginations of the second maxillary segment is directed somewhat caudad, and develops with great rapidity into a sac with four diverticula and a constricted external opening. One of the diverticula is directed caudad, one dorsal and the other two cephalad.

The external opening of the tracheal invagination now closes completely, the branched sac thus formed being cut off completely from the hypodermis. The caudad diverticulum of the sac now extends further caudad to meet and unite with the cephalad diverticulum from the tracheal invagination of the second thoracic segment. The dorsal diverticulum extends toward the dorsal mid line, where it meets and fuses with the corresponding diverticulum of the opposite side, forming the anterior tracheal loop or commissure of the main tracheal trunks. The two cephalad diverticula form tracheal branches supplying the brain and the muscles of the cephalic appendages. The tracheal invaginations on the second maxillary segment, therefore, produce a portion of the anterior end of each of the main tracheal trunks, in addition to the tracheæ found in the head.

Tracheal invaginations were described by Hatschek in 1877 in the gnathal segments of a lepidopterous larva. Examination of Hatschek's figures show that these invaginations were those forming the tentorium and mandibular apodemes, and they have generally been so regarded. Tracheal invaginations have not since been described in the head of any insect embryo.

Further Studies on the Development of the Cranial Sympathetic Ganglia in Vertebrates: ALBERT KUNTZ.

The Early Cleavage of Cirratulus Grandis, Verrill: JOHN W. SCOTT. (Illustrated with lantern slides.)

In common with most annelids the cleavage is unequal. It differs from other marine annelids in that cleavage becomes very irregular after the 8-celled stage. The egg is further characterized by the peculiar and important behavior of the yolk

lobe. The egg shows a high degree of organization at an early stage. Whatever may be the significance of the yolk lobe, it is an adaptation associated with early cleavage, apparently correlated with the karyokinetic figure; it aids in producing unequal cleavage; it isolates cell materials, so that they are unaffected by early transformations of the nucleus; and, in *Cirratulus*, it appears to aid in the arrangement of the cell pattern. Conklin's theory ('12), that the yolk lobe is due to a weak spot in the protoplasmic pellicle, through which the lobe is forced out by "mitotic pressure," is inadequate. For this theory would not explain the non-appearance of the lobe in *Cirratulus* at the third cleavage, though it appears in both earlier and later stages.

A Solution of the Problem of Yolk Manipulation by Ophiura: CASWELL GRAVE.

The egg of the brittle-star, *Ophiura brevispina*, contains a very large amount of yolk and in its cleavage and early development this yolk, in the form of minute spherules, is equally distributed to all of the cells.

In its yolk distribution it, therefore, does not differ from the eggs of other Echinoderms but does differ greatly from those eggs of Arthropods, Molluscs and Vertebrates which are rich in yolk. In the latter, the yolk is early segregated either into a few inert cells or into a portion of the egg from which the active cells withdraw during development.

In consequence of the large amount of yolk in the egg of *Ophiura* and of its equal distribution to every cell during segmentation and early development, a comparatively large amount of the energy of the egg is expended in the manipulation of its yolk content. For example: the resting cells of the blastula have the form of slender prisms, their length being to their breadth as nine is to one. During its mitosis, however, each cell becomes approximately spherical in shape. Connected with this enormous change in shape and position of a dividing cell, there takes place a very considerable readjustment of adjacent cells and their contents and especially an entirely new arrangement of the yolk spherules of the dividing cell.

The interesting observation herein reported is that this expenditure of energy in juggling with yolk spherules ceases when a stage in larval development is reached in which the gut and cœlom are differentiated. At this stage the cells extrude practically all of their supply of yolk into the blastocœle cavity. The redistribution of this mass of yolk to the tissues of the organism is a function of amœboid mesenchyme cells.

CYTOLOGY

The Nerve Centers of the Electric Organ in Raja Punctata: ULRICH DAHLGREN. (Illustrated with lantern slides.)

The X-element of Plymouth Rock Fowls: M. F. GUYER. (With demonstrations.)

Chromosomal Variations in the European Earwig, Forficula Auricularia: F. PAYNE.

Spermatogensis in Chrysemys marginata and Cistudo carolina: H. E. JORDAN.

Chromidia appear to originate in the spermatogonia by a process of extrusion of chromatic particles from the nuclear recticulum. In *Chrysemys* the chromosomes during early growth stages are aggregated in or upon the nucleus; from here they disperse as small paired granules or rods; subsequently the chromosomes enlarge; the typical synapsis figure is absent. The nucleolar residue persists in part as a compact oval or paired-rod element, suggesting an accessory chromosome. The haploid number of chromosomes is 17, including one larger U-shaped element which passes apparently undivided (frequently as a pair of rods) and in advance of the other chromosomes to one pole of the first maturation spindle. In *Cistudo* a typical synapsis figure appears; the haploid number of chromosomes is 16; and there is no evidence similar to that in *Chrysemys* suggesting an X-element. Numbers of the secondary spermatocytes apparently divide amitotically, perhaps an abnormal condition.

A Microscopical Investigation of Tissues From Dogs Which Fasted Extremely Long Periods of Time: S. MORGULIS, P. E. HOWE AND P. B. HAWK.

The Germ-cell Cycle in Animals: R. W. HEGNER.

Of the nine periods into which the germ cell cycle in animals may be divided, two were discussed: (1) Cyst-formation in the testis of the potato beetle, *Leptinotarsa decemlineata*, and (2) the localization of the germ-cell substance in the unsegmented egg. At a certain stage in the multiplication period the spermatogonia of the potato beetle become each surrounded by epithelial cells. Each spermatogonium divides by mitosis and the daughter cells can be identified because of connecting strands—the remains of the spindle. These spindle-remains enable one to prove conclusively

that all of the spermatozoa in a single cyst arise from a single spermatogonium. These divisions constitute a period which parallels that in *Dytiscus* during which one oogonium produces fifteen nurse cells and one oocyte. The germ cell substance in many animals is localized in the unsegmented egg and can be distinguished by the presence of stainable inclusions which may be named keimbahn-determinants.

The Orientation of the Nuclear Organs in the Electric Motor Cells of Tetronaree and Other Torpedoes: ULRICH DAHLGREN. (Illustrated with lantern slides.)

Chromosomes in Opalina: M. M. METCALF.

The Physical Changes in Marine Eggs in Fertilization: G. L. KITE. (Illustrated with lantern slides.) (Introduced by C. E. McClung.)

The Molar Structure of Protoplasm: G. L. KITE. (Introduced by C. E. McClung.)

The conclusions presented in this paper are founded on the dissection of representative cells of widely different types of animals and plants. A detailed investigation of the principal kinds of cells of the frog and rabbit has been made.

Protoplasm has been found to be composed of gels and sols. With few exceptions resting nuclei are rather rigid gels which contain denser areas. Such areas are frequently arranged in the form of imperfect networks. The cytoplasm is usually in the gel state and may contain globules, granules and fibrils. The globules are completely separated from the imbedding gel, while granules and fibrils grade into the contiguous substance.

Dividing cells have proved to be of special interest. Chromosomes and spindle fibers seem to be incomplete separation products. The changes which result in the separations are at least partially reversible. Experiments on different kinds of dividing cells point unmistakably to the fact that the chromosomes and spindle fibers play a secondary rôle in indirect cell-division. The optically undifferentiated protoplasm, lying around and between the chromosomes and spindle fibers and in the plane of cleavage, is the portion that is the seat of the active changes that result in cell-division.

The chief general conclusion from this study is that protoplasm is a one-phased system in molar structure. Dissections of cells under quite satisfactory optical conditions have failed to reveal the contiguous solid and liquid phases that are generally held to be the essential elements of protoplasm.

GENETICS

A Male Gynandromorph of Colias (Eurymus) Eurytheme Showing Dimorphism in the Female Color Pattern: JOHN H. GEROULD. (Illustrated with lantern slides.)

Inheritance in Orthoptera: ROBERT K. NABOURS.

During five years many types with complex color patterns of *Paratettix* Bolivar, of the Orthopteran subfamily Tetriginæ, have been captured and bred in the greenhouse, for two years at the University of Chicago and three years at the Kansas Agricultural College, Manhattan. From these have been segregated through Mendelian analyses about fifteen true breeding types. These true breeding forms have been recombined to make all the original hybrid types and many others which have not as yet been found in nature. Ten true breeding types have been tried, and, with one exception, each has been found to pair with each of the others, making as many allelomorphic pairs as there are possible combinations. Some of the cultures have been carried to the F_6 generation, and some of the forms have been bred, in one combination or another, for sixteen generations. The results throughout have been typically Mendelian, except that one form, *P. melanothorax* (*G*), when crossed with any other form, produces F_1 progeny that do not always give gametes alternatively, but seem to give some gametes that represent both parents. For instance a *melanothorax* (*G*)—*leuconotus* (*B*) hybrid mated with a *leucothorax* (*C*) homozygous form gives *CG*, *BC* and *BCG* progeny. Reciprocal crosses have invariably given identical results.

The Effect of Selection Upon Egg Characters in Parthenogenetic Lines of Hydatina: A. FRANKLIN SHULL.

Fifty Generations of Selection in Parthenogenetic Pure Lines of Daphnids: A. M. BANTA.

Selection experiments in pure parthenogenetic lines of daphnids were reported on. In all eighteen lines were continued under selection for eight generations or longer and eleven for from thirty to fifty generations. The daphnids belong to three species and were originally taken from several different ponds near Cold Spring Harbor. Fourteen of these lines are *Daphnia pulex*, two belong to another species of *Daphnia* and two are *Simocephalus*.

The character used as the basis for selection was purely a physiological one, the daphnids' reaction to light. In the beginning of the experiment the

first brood from a young mother was placed in the experimental tank under carefully controlled conditions and while still only a few hours old. The first one of these young to reach the positive end of the tank was selected for the beginning of the + stain and the one last reaching the positive end, or failing to reach it within a given time, for the beginning of the — strain. In a similar manner the selections were made in later generations. To August first for the whole period during which selection had been continued the mean reaction time of the + strains of four of the lines was greater than the mean reaction time of the corresponding — strains, this indicating presumably a greater responsiveness to light on the part of the + strains in spite of the selection for the reverse effect. Two of these differences are statistically significant, as they are more than two and one half times the probable error. In fourteen of the eighteen lines the — strains have a higher reaction time than the corresponding + strains and in eight of these the differences are statistically significant. Of the lines selected for from thirty to fifty generations two have a higher mean reaction time in the + strain and nine in the — strain. The two former and six of the latter differences are statistically significant.

Size Differences in the Spermatozoa from Single Testes: Charles Zelenya and E. C. Faust.

Measurements were made of the length of the head in five hundred or more spermatozoa of each of twelve species of animals. The variation curves plotted from these measurements were used in determining the probable presence or absence of size dimorphism.

In *Anasa, Lygæus, Alydus, Musca, Melanoplus femur-rubrum, Melanoplus differentialis* and *Phytonomus* among insects and *Pseudomys* and *Bos* among vertebrates the curves are distinctly bimodal and indicate the presence of two size groups. The inference is made that the group of larger spermatozoa is the one with an *X* chromosome and the group of smaller spermatozoa the one without an *X* chromosome.

Segregation of Traits in a Pennsylvania Family: Wilhemine E. Key.

Some Reactions of the Shell of the Pond Snail, Lymnæa, to External Conditions: Harold S. Colton.

A Quantitative Basis of Sex as Indicated by the Sex Behavior of Doves From a Sex Controlled Series: Oscar Riddle.

By his method of controlling sex in pigeons Whitman showed (1) that the first young of the season (spring and early summer) were nearly all males, and young hatched from the later eggs of the season were nearly all females; (2) that if the two sexes arise from the two eggs of any one clutch, that it is in nearly all cases the first egg which produces the male, and the second egg of the clutch that produces a female; (3) that birds kept thus mated and overworked at egg-production tend to produce in succeeding years fewer and fewer males before the appearance of females.

A study of the sex behavior of the females of one such series (reciprocal cross of *T. orientalis* × *S. Alba*) has shown (1) that the females (dark in color) of the *alba* × *orientalis* cross are more masculine in their sex behavior (*i. e.,* function more times as males in copulation) than the females (white in color) of the reciprocal cross; (2) *that females of either cross hatched early in the season, i. e., closest to male-producing conditions, are more masculine in their sex behavior than their own sisters hatched late in the season from eggs produced under strongest female-producing conditions;* (3) that two full sisters hatched from the two eggs of a single clutch most strongly contrast with each other. *The bird from the first or male-producing egg of the clutch usually taking the part of the male to a full 100 per cent.*

The injection (over a period of one month) of extracts and suspensions of ovarian tissue into the more masculine of these females, with simultaneous injections of testicular extract and suspension into the more feminine of the pair, *has succeeded in some cases in very strongly reversing the sex behavior of the pair.* The effect persists more than 25 days after the last injection.

The behavior itself, and the effects of the extracts, have been recorded on moving picture films.

These two results together with our very abundant data on the storage metabolism of the ova of these forms, and the initial fact of sex control itself, strongly indicate that the basis of sex is a fluid, reversible process; that the basis of adult sexual difference is a *quantitative* rather than a *qualitative* thing.

Size Inheritance in Rabbits: E. C. MacDowell. (Introduced by W. E. Castle.)

To test the hypothesis that the apparent blending inheritance shown by Castle's work on the ear length of rabbits may be interpreted by the multiple factor hypothesis established by Nillson-Elbe,

these experiments were planned and started by Professor Castle. They were handed over to the writer in the fall of 1909. Crosses were made between rabbits of large and small body size; the offspring were crossed back to the parents to produce a back-cross generation. Based upon the statistical study of bone measurements and body weight as estimated from growth curves, it was found that the back-cross was more variable in size than the first generation. This was shown by standard deviations as well as by classifications of the actual measurements in relation to the parents. Certain measurements from the back-cross rabbits reached and exceeded the parental extremes. The means of both generations were very close to the mid-parentals in both generations. All these facts would be expected if the multiple-factor hypothesis be used to construct a mechanism to account for size inheritance. The increased variability would be due to a segregation of size factors.

CASWELL GRAVE,
Secretary

(To be continued)

THE ENTOMOLOGICAL SOCIETY OF AMERICA

THE eighth annual meeting of the Entomological Society of America was held at the Atlanta Medical College, Atlanta, Ga., December 30 and 31, in affiliation with the American Association for the Advancement of Science. In the absence of President Bethune, the meetings were presided over by Dr. Philip P. Calvert. The meetings were all well attended, there were about fifty members and fellows in attendance.

The following papers were presented:

"The Structure of the Hind Intestine of *Corydalis*," by J. T. Lloyd.

"Observations on the Habits and Life-history of *Hydromyza confluens* Loew.," by Paul S. Welch. (Read by title.)

"New Characters in the Classification of Microlepidopterous Larvæ," by Stanley B. Fracker.

"The Poison Glands of *Euproctis chrysorrhœa* Linn.," by Cornelia F. Kephart. (Presented by W. A. Riley.)

"The Tracheation of the Anal Area of the Wings of the Lepidoptera and the Homology of the Veins," by N. L. Partridge. (Read by title.)

"The Box-elder Bug in Ohio," by Herbert Osborn.

"The Elytral Tracheation of the Subfamilies and Genera of Cicindelidæ," by V. E. Shelford.

"Some Interesting Structures in the Pupæ of Lepidoptera," by Edna Mosher.

"Some Sources of Error in the Interpretation of Insect Tissue," by W. A. Riley.

"*Conventzia hageni* Banks, Life-history Notes and Variations in Wing Venation," by J. S. Houser.

"Notes on the Head Structures of Thysanoptera," by Alvah Peterson. (Read by title.)

"The Desirability of a Biographical Dictionary of Entomologists," by Philip P. Calvert.

The afternoon of the thirtieth was devoted to a joint session of Section F of the American Association for the Advancement of Science and the Entomological Society of America, at which the following papers were presented:

"Note on the Present Status of the Gipsy Moth Parasites in New England," by L. O. Howard.

"Some Notes Regarding the Natural History of the Mole Cricket," by E. L. Worsham.

"Notes on Some Old European Collections," by H. T. Fernald.

"Studies on the Snowy Tree-cricket, *Œcanthus niveus*, with References to Apple Bark Diseases," by P. J. Parrott, W. O. Gloyer and B. B. Fulton. (Presented by P. J. Parrott.)

"Collecting Insects in the Okefenoke Swamp," by J. Chester Bradley. (Presented by J. G. Needham.)

"Studies on the Geographical Distribution of Leaf-hoppers, Especially of Maine," by Herbert Osborn.

"The Fauna of Epiphytic Bromeliads in Costa Rica," by Philip P. Calvert.

The morning of the thirty-first was devoted to the presentation of the report of the executive committee, at which was reported the election of fifty-four new members and the election of Dr. C. Gordon Hewitt and Dr. William Barnes as fellows; the presentation of the reports of standing committees; the election of officers; the adoption of the report of the committee to hold a summer meeting in 1915 on the Pacific coast; the appointment of a committee to consider the desirability of starting the publication of a series of special works on entomology like that of the Ray Society, and the reading of the following papers:

"The Dispersal of *Musca domestica*," by James Zetek. (Presented by S. B. Fracker.)

"A Comparison of the Enemies of *Toxoptera graminium* in South Africa and the United States," by William Moore. (Presented by F. L. Washburn.)