P a large glass prism (a 60° prism 3 inches high and 4 inches on the slant face works well, though one half this size would do, particularly if very short-focus lenses were used). M is the plate glass rectangle $FGHI$ mounted vertically at the principal focus of the lens h_2 so that the colored images of the Nernst filament are parallel to the band AB.

It is well to mount the prism so that it may be gradually rotated about the vertical axis through O. If large lenses and a large prism are available it is well to use the long 220-volt Nernst filament and to choose the rubber band so that the length AB is about equal to the length of the Nernst glower used.

As the prism is rotated and the spectrum moves across the band the deviation of the beam of light from the mirror E increases and reaches a maximum and it is easy for the audience to see that this maximum is reached when no visible light is falling on the band AB.

By setting the prism so that the red of the spectrum falls on the band, and noting the change in the deviation of the beam of light from the mirror E as various substances are placed in front of the Nernst glower, and then noting the changes produced by the same substances when they are introduced under the condition that invisible long wave-length energy falls on the band, it can be readily shown that not all substances which are transparent are diathermanous.

AUGUSTUS TROWBRIDGE
PRINCETON UNIVERSITY

THE AMERICAN SOCIETY OF ZOOLOGISTS

THE Central Branch of the American Society of Zoologists met at the University of Illinois, Urbana, Ill., April 5 and 6, 1912.

The following officers of this branch were elected for the ensuing year:

President—H. B. Ward, University of Illinois, Urbana, Ill.

Vice-president—C. M. Child, University of Chicago, Chicago, Ill.

Secretary-treasurer—W. C. Curtis, University of Missouri, Columbia, Mo.

Additional Members of the Executive Committee—C. E. McClung, University of Kansas, Lawrence, Kans. (for three years); H. F. Nachtrieb, University of Minnesota, Minneapolis, Minn. (for two years).

At the business meetings, on April 5, action was taken as follows:

Resolutions upon the death of Professor C. O. Whitman as spread upon the minutes of the society were read.

By vote of the society the committee on the form of presenting papers for publication, Dr. C. E. McClung, chairman, was continued. No report was made.

The following report of the committee on nomenclature, Professor C. C. Nutting, chairman, was read and unanimously adopted:

The Committee on Nomenclature appointed at the Iowa City meeting of the Central Branch of the American Society of Zoologists reported last year a plan whereby various zoological organizations in America might unite in an effort to influence the International Commission on Nomenclature in the direction of securing greater flexibility in the interpretation of the rules. The committee begs to report that after extended correspondence it has reached the unanimous conclusion that it is impossible to secure any modification of the present practise through the International Commission itself, and that the officers of that commission maintain that its hands have been tied through action recently taken by the International Congress. It appears consequently that recourse to the International Congress itself offers the only remedy for the adjustment of the difficulties. That these are increasingly apparent becomes evident by the protests and appeals which are finding expression in various form from individuals, from groups of workers and from societies not only in this country, but in various other parts of the world, as a result of which several propositions have already been formulated for presentation to the meeting of the International Congress at Monaco in August, 1913.

The Committee on Nomenclature reports to the American Society of Zoologists, Central Branch, requesting at this time:

1. Authority to ask from the membership of the Central Branch an expression of opinion on the following question: Do you favor the strict (inflexible) application of the priority rule as the latter is now interpreted by the International Commission on Nomenclature?

2. The adoption of the following resolution for transmission to the International Zoological Con-

gress at Monaco in 1913: All propositions for amendments to rules on nomenclature which are approved by a majority of the International Commission on Nomenclature shall be submitted to the International Congress for final decision by vote in open meeting. In case it appears that any legislation to the contrary has been adopted by a previous International Congress, the International Congress at Monaco is respectfully urged to reconsider and repeal such action.

Signed, S. W. Williston
H. B. Ward
C. C. Nutting (*chairman*)

The treasurer of the society was authorized to allow the committee on nomenclature funds sufficient to obtain a census of opinion regarding the question of priority in nomenclature.

Professors Lillie, Lefevre and Patterson were appointed a committee to draw up resolutions upon the death of Professor Montgomery.

The following papers were presented at the meeting, either in full or by title:

Fertilizing Power of Portions of the Spermatozoon: Frank R. Lillie, University of Chicago. (Published in Science, March 22, as part of the report of the proceedings of the Eastern Branch.)

On the Presence of Independent Mesenchymal Lymph Spaces in Turtle Embryos as Determined by the Study of Injections and Sections: Frank A. Stromsten, University of Iowa.

The results set forth in this paper were based on the study of embryos of the loggerhead turtle. The blood-vascular system had been injected through the vitelline vessels. The lymphatics were injected through the jugular lymph-sacs, using the methods of Knower and Sabin. Serial sections of these embryos show that the peri-aortic lymph plexus is always preceded by a series of independent spaces which can neither be injected from the lymphatic nor the blood-vascular systems. Proofs, based on a series of photomicrographs and wax reconstructions, were given to show that these independent spaces are derived directly from the original intercellular mesenchymal spaces, and that they finally become part and parcel of the lymphatic plexus.

(1) *A Curious Reproductive Habit among Waterbugs.* (2) *Asymmetry in Coricidæ with an Hypothesis as to its Possible Significance.* (3) *The Reactions of Fiddler Crabs to Various Solutions with Especial Reference to the Problem of Permeability and the Theory of Balanced Solutions:* J. F. Abbott, Washington University.

More Trouble for the Systematist: C. C. Nutting, University of Iowa.

Note on the Embryonic Development of the External and Internal Carotids of the Chick: Wm. A. Locy, Northwestern University.

The Morphology of the Sympathetic Neurones in the Myenteric and Submucous Plexuses: Albert Kuntz, University of Iowa.

In the myenteric and the submucous plexus in the small intestine of the cat and the dog sympathetic neurones of several distinct types may be observed. The two types which are most evident may be characterized as follows: (*a*) neurones which are irregular and more or less angular in outline possessing numerous varicose dendrites which vary greatly in length and in diameter and usually show numerous short branches; (*b*) neurones which are more regular in outline, possessing fewer dendrites which are usually long and slender and show only few branches. Neurones of both these types are present in considerable numbers in the myenteric plexus. In the submucous plexus the neurones of the second type preponderate.

The ganglia of these plexuses are variously connected by commissures in which may be traced both axones and dendrites. Fibrous commissures also connect the two plexuses with each other, while from the submucous plexus fibers may be traced into the plexuses surrounding the digestive glands and into the intestinal villi, where many of them, doubtless, terminate on cells of the digestive epithelium. Such terminations could frequently be observed, but in no case could an individual fiber be traced from its termination on the digestive epithelium back to the cell-body from which it arose.

The fibers terminating on the digestive epithelium, doubtless, subserve a receptive function. They are probably the dendrites of neurones of the second type above described. These neurones would, therefore, be sensory in character. The axones of some of the neurones of the first type above described terminate directly on smooth muscle-fibers. These neurones are obviously motor in character. The distribution and the orientation of the neurones in these plexuses is obviously such as would be required by a system of local reflex arcs. That such a system of reflex arcs is present in the walls of the digestive tube has already been suggested by Dogiel, Müller and others. Indeed,

it is highly probable that the normal nervous control of the digestive functions is exercised primarily by the local sympathetic mechanism.

Amphimixis, Variability and Death; Some Facts and a Theory: L. B. WALTON, Kenyon College.

In connection with some studies on the variability of zygospores in *Spirogyra inflata* (Vauch.) formed by scalariform (amphimixis) and by lateral (quasi parthenogenesis) conjugation, certain facts are presented which allow an interpretation of the cause of death among organisms from a different standpoint than the generally accepted theory.

In 200 zygospores produced through the conjugation of cells of different filaments—sexual reproduction—the coefficient of variation is 9.5093 for length and 5.7471 for diameter. In the same number of zygospores produced by the fusion of adjacent cells of the same filament—comparable to asexual reproduction—the coefficient of variation is 11.9364 for length and 7.5376 for diameter, indicating for the given conditions that the cross-bred or sexually-produced zygospores, in themselves the young individuals from which the mature filaments arise, are relatively 20 per cent. less variable in length and 23 per cent. less variable in diameter.

Thus if amphimixis decreases variability, there is presented an interesting condition bearing not only on the problem of the origin of sex, but also on the origin of death, for the theory is equally applicable to the individual cell, whether isolated, as in the Protista, or associated in colonies, as in the higher animals and plants. The development of the body in multicellular organisms represents merely the development by asexual reproduction of an infinite series of cell individuals. Consequently the evidence suggests that *death occurs as the result of the continually forming body cells becoming so variable through the absence of control by amphimixis, that eventually some one group fails to meet the limits imposed by the environment, and these together with the remainder of the colony—the individual—perish.*

With a single exception, the available evidence is directly in accord with such a theory, although in general merely demonstrating that amphimixis does not increase variability (Warren, '99; Castell and Phillips, '03; Kellogg, '06; Wright, Lee and Pearson, '07). The investigations of Jennings, '11, on *Paramecium* seem to indicate that here conjugation increases variability. The evidence, however, was not altogether in harmony, in consequence of which the subject was reserved for a future paper based upon additional investigations. Even granting that such is the case in *Paramecium,* where conjugation consists of a temporary union of gametes (conjugants), it would not necessarily follow that a similar condition would be found in organisms where a total and permanent fusion of gametes (copulants) occurred.

While it would seem that such a theory as here outlined is in advance of the earlier theories as to the cause of death which are purely speculative, there is need of additional data, and it is hoped that the several investigations now in progress may throw additional light on the subject.

On the Autonomic Nervous System of the Rabbit: F. W. CARPENTER, University of Illinois.

The Variation and Ecological Distribution of the Shells of the Genus Io: C. C. ADAMS, University of Illinois.

Antero-posterior Dominance in Planaria: C. M. CHILD, University of Chicago.

In high concentrations of KCN, alcohol, ether and various other agents, which kill the animals within a few hours, the resistance of animals and pieces varies inversely as their rates of metabolism. In low concentrations, to which the animals become acclimated, the length of life varies directly as the rate of metabolism, because the animals or pieces with higher rate become more completely acclimated.

By means of these and other experimental methods the following conclusions have been reached concerning the dynamics of morphogenesis in *Planaria:* the anterior region has the highest rate of metabolism, at least during development, and from this a gradient in rate extends posteriorly; each zooid has a similar gradient of its own; because it has the highest rate of metabolism, the anterior region is dominant, both in morphogenesis and function, over the regions within a certain distance limit and in general any level is dominant over levels posterior to it and within a certain distance limit: the axial gradient in rate of reactions is the basis of organic polarity; by decreasing or eliminating this gradient heteromorphosis can be induced experimentally: the reaction-complex which gives rise to a head is the fundamental reaction-complex of the specific protoplasm.

The formation of a new head in the regulation of pieces of *Planaria* is not a restitution of a missing part, but the formation of a new individual head first and the new head region induces

the reorganization of the remainder of the piece. The head forms "in spite of" other old parts of the piece and not in correlation with them, but the new posterior end is the product of correlation with more anterior parts. In a series of similar pieces the frequency of head-formation and the character of the heads can be altered in either direction by agents which influence the rate of metabolism.

Observations on the Breeding Behavior of the Herring Gull: R. M. Strong, University of Chicago.

Studies were made of the breeding behavior of the herring gull from the standpoint of modifiability, and especial attention was given to the voice of this bird. The report was illustrated by lantern slides. (To be published elsewhere.)

(1) *Maturation and Fertilization of the Armadillo Ovum.* (2) *Crucial Evidence of Parthenogenetic Cleavage of Ova during Follicular Atresia in the Armadillo:* H. H. Newman, University of Chicago.

(1) The armadillo ovum is probably the most primitive Eutherian ovum known, in the sense that it shows a condition practically like that of the Marsupial Dasyurus. In the full-grown ovocyte there is a cortex of formative protoplasm and a central deutoplasmic mass. During the process of maturation a radical change of polarity takes place, resulting in "telolecithal" condition upside-down. The deutoplasmic mass occupies the animal pole and the formative protoplasm lies at the vegetative pole in the form of a cap partially overlapping the deutoplasm. The maturation spindle is found in an equatorial position, *i. e.*, as near the animal pole as possible without leaving the formative protoplasm. In other respects the maturation processes are essentially like those of other mammals. Only one fertilized egg was found, but this is very typical and is accepted as the norm for the species. There is but one male and but one female pronucleus and there are the usual two polar bodies. This furnished additional proof of the reality of polyembryony in the species.

The present investigation is the first study of maturation or fertilization processes in the Edentates. (To appear in *Biological Bulletin.*)

2. All previous observations concerning the alleged occurrence of parthenogenetic development in the mammalia have met with scant attention on the part of biologists. It is hoped that the present observations will meet a better fate. The following phenomena have been observed in ovarian ova that have reached maturity but have been robbed of their chances of ovulation by the occurrence of pregnancy. The mature ovum, which has the condition described in the previous abstract, gets rid of its deutoplasmic mass by abstriction. The formative protoplasm then rounds itself up into a ball within which lies the large resting nucleus, probably the female pronucleus; the latter then forms a perfect cleavage spindle whose aster radiations invade the entire cell, and the first cleavage occurs. Equally unequivocal cleavage spindles occur in each of the first two blastomeres. Stages have been found with as many as four spindles visible at one time. In others two or three spindles and one or two resting nuclei occur in the same egg. The fate of the deutoplasmic material is peculiar and probably quite different from that in normal development. It fragments into a large number of cell-like bodies, with nucleus-like corpuscles composed of deutoplasmic granules, and at first forms a sheath around the formative cells. Subsequently these fragments are crowded between the blastomeres and bring about a condition of isolation of blastomeres. Evidently cleavage goes on considerably further, but, since there is at this time a tendency for stroma cells to enter the egg through breaks in the zona pellucida, it is impossible to be sure as to how much of the observed conditions are due to the development of the egg and how much is to be attributed to the activities of invading cells. The first few cleavages, however, are certainly the result of parthenogenetic development of the ovum. (To appear in *Journal of Morphology.*)

Preliminary Chemical Studies on Male and Female-producing Eggs of Pigeons. A Study of the Eggs of Forms in which the Dominance of Male and Female Sex and of White and Dark Color was Experimentally Determined by Professor C. O. Whitman: Oscar Riddle, Carnegie Institution.

(Abstract published in Science, March 21, 1912, p. 462.)

Indications Regarding Differentiation from Tissue Culture Experiments: Marian L. Shorey, Milwaukee Downer College.

Tissues of dogfish embryos from five to fourteen millimeters in length were found to grow equally well in saline solutions that contained, and those that did not contain, nutrient substances. As there seems to be no evidence that the embryonic cells of animals in which there is a distinct separation between the germ plasm and the yolk, as is

found in the dogfish, contain sufficient stored food to account for the amount of growth that occurs, the conclusion seems to be justified that the growing tissues receive their food supply from other tissues transplanted with them. Even when the culture medium contained both proteins and carbohydrates there was much more growth than when more than one kind of tissue was present.

In both my own experiments and in the published accounts of the work of others many tissues differentiate abnormally in the medium used, and in many other cases their identification with normal body cells seems at least to be doubtful. In other instances tissues which can be identified have been observed, but so far as I know these have never been found except when plasma was used or when more than one kind of tissue was present. The effect, therefore, either of the activity of these other tissues, or of their specific decomposition products, has not been excluded. This fact, taken in consideration with the instances of abnormal differentiation, while it does not demonstrate, seems to indicate that the differentiation of a cell depends not only on its own inherent properties, but also on the nature of its environment.

Some Recent Discoveries in Paleozoic Vertebrates: S. W. WILLISTON, University of Chicago.

Some Early Embryonic Stages that Conclusively Demonstrate Polyembryonic Development in the Armadillo: J. T. PATTERSON, University of Texas.

The investigation reported in this paper had as an object the demonstration of polyembryonic development in the North American armadillo. It was shown that from late cleavage stages until after the two primary germ layers are laid down the differentiation of this egg represents a typical mammalian development. Upon becoming attached at the animal pole to the placental region of the mucosa the vesicle undergoes the process of "germ layer inversion," producing two secondary, incomplete vesicles, one lying within the other. The innermost of these soon becomes completed and may be called the ectodermic vesicle; the outermost remains incomplete on the placental side and is the entodermic vesicle. The region of the trophoblast which is in contact with the mucosa forms the Träger, while the distal or free part sooner or later sloughs off, leaving the entodermic vesicle directly exposed to the uterine cavity. The mesoderm arises as two pouches, situated at the right and left sides of the ectodermic vesicle. These expand and fuse together to form a characteristic extra-embryonic body cavity, which occupies the space lying between the Träger and the proximal side of the ectodermic vesicle. The rudiments of the embryos arise from the ectodermic vesicle, and at first appear as two blunt outgrowths (the primary buds), arising from the right and left sides of the vesicle. Each primary bud, which lies directly above a mesodermic pouch, grows laterally and ventrally along the inner surface of the entodermic vesicle, and soon bifurcates at its distal end to produce two secondary buds, each of which represents the rudiment of an embryo. The secondary buds of the right side produce the pair of embryos previously designated the "dorsal" (III.) and "right-lateral" (IV.), while those of the left side form the "ventral" (I.) and "left-lateral" (II.). As a result of the failure of the primary buds immediately to complete division at their proximal ends, the two secondary buds of each side remain connected at these points. The further differentiation of each secondary bud to produce an embryo consists in its rapid extension as a finger-like process along the inner side of the entoderm towards the Träger, with which a placental connection is eventually established. The cavity of each secondary bud forms the amniotic cavity for the embryo, and the four cavities communicate in pairs with the original cavity of the ectodermic vesicle. This latter space remains small, and has been named the common amniotic cavity.

From these facts it is concluded that polyembryony in the armadillo is the result of a precocious budding, which apparently can not be correlated with the formation of the blastomeres of the four-celled stage.

Factors Controlling the Rate of Regeneration in the Frog Tadpole: C. ZELENY, University of Illinois.

(1) *Spermatogenesis in the Gryllidæ.* (2) *The Puget Sound Marine Station:* W. J. BAUMGARTNER, University of Kansas.

(1) The germ cells of the male cricket show division figures which do not bear much resemblance to the illustrations shown by Vom Roth. There is no circle of four balls as he shows them, although he is correct in interpreting the tetrad as dividing longitudinally and transversely. The number of chromosomes is 23 and is reduced to 12 and never to 6 as Vom Roth has it.

One other important observation was made. One of the tetrads divides *unequally in the first division and the larger half always goes with the*

prominent accessory. This means that the accessory does not bear all the material which differentiates sex. It may further indicate that a second accessory chromosome is in the process of formation.

(2) The Puget Sound Marine Station was started as a seaside summer school of biology by the Washington State University. Later the other institutions of the state joined in the endeavor. In 1910 the educational institutions of other states were asked to cooperate in the work of the station. At present the following states have some of their institutions participating: Washington, Oregon, Idaho, Nebraska and Kansas. There is now provided a good laboratory, furnished with running fresh and salt water and electric lights. A large dining hall and 50 walled tents provide the living quarters. A dredge boat and many small boats with nets give abundant means for visiting the various islands and collecting the desired material. The climate is dry, cool and pleasant for summer work. But the station's greatest attraction is the almost inexhaustible supply of animal and plant life. The number and variety of species is unusually great and the numbers of many species are countless. (One hundred and ten slides, made from photographs of the animals, were shown, giving a glimpse of the life of the islands of Puget Sound.)

Observations on Protozoan Fauna of High Mountain Lakes of Colorado: C. H. EDMONDSON, Washburn College.

During July and August, 1911, twenty-one lakes, situated along the Colorado divide in Boulder, Grand, Gilpin and Clear Creek counties were visited and collections made from them with a view of studying the protozoan fauna of high altitudes.

Of these twenty-one lakes, eighteen are 10,000 feet or more in altitude, the highest being Summit Lake, 12,740 feet elevation. Collections were made on James Peak at 12,500 feet and on Mt. Evans at 13,000 feet.

Silver Lake and Lake Eldora were sounded and dredged for bottom fauna.

The lakes are shallow, Silver Lake, at its present height, is about fifty feet in depth; Lake Eldora about forty feet in depth.

During the summer the temperature of these high lakes ranges from 40 degrees to 50 degrees F.

Two species of *Difflugia*, found among others in the bottom of Lake Eldora, *Difflugia lebes* Penard and *Difflugia curvicaulis* Penard, are characteristic species of the deep lakes of Switzerland. Dr. Penard has suggested that species common to the deep Swiss lakes and high elevations where conditions resulting from glaciers exist may represent a remnant of a glacial protozoan fauna.

Of the altitudinal range of the species observed the following is a summary:

Ciliates—over 11,500 feet altitude	23 species.
Ciliates—over 12,000 feet altitude	9 species.
Flagellates—over 11,500 feet altitude .	13 species.
Flagellates—over 12,000 feet altitude .	2 species.
Sarcodina—over 11,500 feet altitude ..	54 species.
Sarcodina—over 12,000 feet altitude ..	39 species.
Sarcodina—at 13,000 feet altitude	2 species.

The great altitudinal, as well as latitudinal range, of some of our common species of protozoa is shown by the fact that twenty-nine of the species found in the high lakes of Colorado have been reported from sea level in the oceanic island of Tahiti in the southern hemisphere. A classified list of protozoa of the lakes of Colorado will appear in the University of Colorado Studies.

The Cerebrum of Necturus and the Problem of the Evolution of the Cortex: C. T. HERRICK, University of Chicago.

The Asymmetrical Distribution of the Polian Vesicles and their Correlation with the Retractor Muscles of Thyone: J. W. SCOTT, Kansas State Agricultural College.

As is well known, echinoderms have remarkable powers of regeneration. Under certain conditions Thyone eviscerates itself, throwing off the tentacles, esophagus, stomach, intestine, the calcareous ring, the ring canal with attached polian vesicles, the nerve ring, and the muscles which retract the esophageal ring. It was found that regeneration of all lost parts takes place after evisceration. However, to determine this fact it was necessary to study individual differences. For example, the number of polian vesicles varies from one to four, usually one, commonly two, occasionally three, rarely four. Both in size and number the polian vesicles show a strong tendency to occur on the left side. This asymmetrical distribution does not appear to have any present functional significance, and so must be referred to ancestral conditions. The additional fact was brought out that the number of retractor muscles varies with the number of polian vesicles. The average number of retractor muscles per individual increases as the number of polian vesicles increases; this is true in particular for the left side. Even after regeneration the same correlation holds true. The original asymmetry of each individual was re-

stored in all except one case; in this animal there was a change from single to multiple parts which included both polian vesicles and retractor muscles.

A full account with discussion of these results will be given in the *Journal of Experimental Zoology.*

The Distribution of North American Earthworms: F. SMITH, University of Illinois.

In North America north of Mexico, scarcely fifty species of earthworms are known, which is less than five per cent. of the known species of the world. This small number is due in part to lack of study, but also to an actual lack of the variety usually found in territories of similar extent.

The genus *Diplocardia* is very characteristic of the region and includes species from Illinois, Nebraska, North Carolina, Georgia, Florida and Mexico. Other parts of the United States east of the Rocky Mountains doubtless have species. *Diplocardia* is a very primitive type of the family Megascolecidæ and probably originated in North America as early as the Jurassic.

West of the Rocky Mountains are found a few species of *Plutellus* and *Megascolides,* of which genera the remaining species are found in Australia and India. These are primitive forms of Megascolecidæ which presumably originated in Australia and representatives migrated from there during the Jurassic and Cretaceous by way of Siberia and Alaska into the Pacific region of North America.

The family Glossoscolecidæ is represented by the primitive aquatic genus *Sparganophilus,* of which species are known from Florida, the Mississippi Valley, California and Mexico. This genus probably originated on this continent as early as the late Jurassic.

The family Lumbricidæ includes the majority of the North American earthworm species. The most of them are also known in the Eurasian region, where they probably originated. The few endemic Lumbricid species of the United States are found chiefly in the states of the Atlantic region.

A few peregrine species of the Megascolecid genera *Microscolex* and *Pontodrilus* are found in the coastal regions.

Probably few if any species will be found endemic in the glaciated parts of the continent.

Studies upon the Migratory Movements of the Pacific Coast Lobster: BENNETT M. ALLEN, University of Wisconsin.

Brass tags were affixed to 346 specimens of *Panulirus interruptus,* that were released at different times, at Santa Barbara, California, also at various points on the coasts of Santa Cruz and Anacapa Islands.

In all, 26 were caught and reported by the fishermen. The greatest distance traversed was $9\frac{3}{4}$ miles in 28 days. The most rapid average rate of migration was .43 mile per day in the case of a specimen that traveled six miles in fourteen days. Eleven traveled less than one mile in an average of eighteen days. Eight traveled more than one mile in an average of twenty-seven days. The total average of distances traveled was $1\frac{4}{10}$ miles in an average time of twenty-two days. The movements were haphazard.

Of the twenty-six caught, most of which were again released according to request, 5 were caught again—a third time in all. This investigation was financed by the Californian Fish and Game Commission.

The Chiasma of the Trochlearis Nerve: H. V. NEAL, Knox College.

The Habits of Fiddler-crabs: A. S. PEARSE, St. Louis University.

(To appear in the *Philippine Journal of Science.*)

Some Glimpses of Biological Conditions in Western Nebraska: R. H. WOLCOTT, Nebraska University.

(1) *Notes on the Rate of Growth of Freshwater Mussels.* (2) *The Fairport Biological Station:* R. E. COKER, Bureau of Fisheries.

(1) *Karyosomes in the Ova of Passer domesticus.* (2) *Magnetic Control of the Movements of Paramœcia which have Ingested Iron:* E. H. HARPER, Northwestern University.

(1) In the ovary of the sparrow in the winter the nuclei, particularly of the smaller ova, show an aggregation of the chromatin into karyosomes and absence of the chromatin net. These bodies have so definite an appearance as to suggest the possibility of definiteness in number. The count showed the probable number to be twenty-two, harmonizing with known results from the spermatogenesis which indicate the haploid number of chromosomes as eleven. On this basis, these bodies in the ova may be called the prochromosomes. Stages in the breakdown of the nucleoli to form the chromatin net were also shown.

(2) The question is raised whether the normal position of stable equilibrium with antero-posterior

axis vertical may have a directive influence in the negative geotaxis of these animals.

Paramœcium in its ordinary movements overcomes the effect of the slight difference of specific gravity that may exist between its ends, but as the negative geotropism is a delicate reaction elicited best in the absence of other stimuli it is possible that it may be a passive orientation due to a tendency of quietly swimming animals to fall into a direction affording stable equilibrium.

The specific gravity factor may be accentuated by ingestion of iron which lodges at first in the posterior end. In a control experiment with an electro-magnet acting at right angles to gravity overweighted animals which normally aggregate at the bottom are brought into circulation, swimming upward in the strong magnetic field, past the pole of the magnet and dispersing at some point above, causing a counter circulation to the bottom in the weaker portion of the field.

In such experiments with overweighted animals we have an example of obedience to the passive orienting tendency in the region where they are buoyed up by the magnet and of resistance to it in the region where they are not so supported. Internal stimuli induced by fatigue from swimming upward cause the change to the downward path. The downward movement may be broken up by recurring compensatory movements to make up for any passive deflections brought about by the action of gravity. In the upward movement, on the other hand, there is unbroken continuity unless interrupted by extraneous causes. It may be called a passive or mechanical tropism.

(To appear in the May number of the *Journal of Animal Behavior.*)

The Land Planarians of North America, with a Note on a New Species: L. B. Walton, Kenyon College.

Since calling attention to the rediscovery of *Rhynchodemus sylvaticus* described by Leidy in 1851[1] the species has been found in abundance not only in Gambier but also at Urbana, O., and Meadville, Pa. The material from which the species was originally described was placed at the disposal of Girard by Leidy for study in connection with the former's paper on the planarians of North America.[2] Inasmuch as the specimens were in the possession of Girard at the time of the death of Leidy[3] and were given him for use as he deemed best, it is quite probable they are in the possession of some of the European museums, if in existence. Thus far it has been impossible to locate them, however.

Two specimens of a much larger species approximating 20 mm. in length and uniformly dark blue in color have also been taken in Gambier. For this the name *Rhynchodemus atrocyaneus* is proposed.

The land planarians of North America and the adjacent islands may be tabulated as follows: *Geoplana nigrofusca* (Darwin), Mexico and South America (common). *Geoplana stolli* Graff, Guatemala (a single specimen known). *Placocephalus kewense* (Mosley), cosmopolitan in hothouses, original habitat unknown (common). *Rhynchodemus sylvaticus* Leidy, East. U. S. (common). *Rhynchodemus atrocyaneus* Walton, Ohio, central U. S. (?) (two specimens known). *Amblyplana cockerelli* Graff, Jamaica (a single representative).

Land planarians occur under slightly decayed pieces of board, sticks, etc., particularly in grassy plots of old orchards, or lawns, usually in association with snails, the young of which they superficially resemble. The anatomical structure of the Ohio forms is being studied.

(1) *The Sense of Taste in Birds.* (2) *The Breeding Behavior of the Herring Gull:* R. M. Strong, The University of Chicago.

(1) Chicks, doves, ducks and gulls were studied. The methods employed involved soaking the food which was given to the birds in various solutions. Chicks and ducks showed a dislike for food which had been treated with weak acids, sweets, table-salt and bitters. Quantitative experiments have been conducted for several months with gulls kept in captivity. These birds show a dislike for sour and salty solutions even when they are weak to the taste of the experimenter. The work with sweets and bitters is not yet finished for the gulls.

(To be published elsewhere.)

(2) Studies were made of the breeding behavior of the herring gull from the standpoint of modifiability, and especial attention was given to the voice of this bird. The report was illustrated by lantern slides.

(To published elsewhere.)

Peri-cellular End-nets in the Autonomic Cranial Ganglia of the Sheep: F. W. Carpenter, University of Illinois. (Demonstration.)

W. C. Curtis,
Secretary

[1] *Ohio Nat.*, p. 254, 1904.

[2] *Ann. Sci. Nat. Hist. Zool.*, p. 145, 1894.

[3] *L. c.*, p. 153.