ZOOLOGY

Chairman: M. R. Garner, Earlham College

S. Crowell, Indiana University, was elected chairman for 1950.

ABSTRACTS

Lateral loop chromosomes and the theory of the gene. Edward O. Dodson, University of Notre Dame.—Because of the facts of position effect, many geneticists have proposed modifications of the gene theory, with Goldschmidt proposing that the theory of the corpuscular gene must be abandoned, and substituting for it the theory that the chromosome is a continuum in which overlapping segments of varying lengths are the functional units. Observations on the lateral loop chromosomes of amphibian oocytes suggest that segments of the chromosomes far larger than estimated sizes for genes do function as a unit in the synthesis of lateral loops and nucleoli. While these facts do not prove Goldschmidt's theory, they are more easily interpreted in terms of it than they are in terms of the theory of the corpuscular gene.

The problems of making ecological observations in a tropical rain forest. Clarence J. Goodnight, Purdue University.—During this past summer an attempt was made to investigate the ecology of a tropical rain forest near Palenque, Chiapas. Studies were made of the soil fauna and of the various layers of the area. These studies indicated that the fauna of the tropical area had a greater variety of species than temperate areas; but without numerous individuals of any one species. Since the whole area presented equally good habitats, it was difficult to find any particular concentration of species.

The comparative toxicity of chloral hydrate and chloral alcoholate. Phillip V. Hammond, Donald E. Stullken and William A. Hiestand, Purdue University.—According to popular belief the mixing of chloral hydrate with an alcoholic beverage results in the formation of chloral alcoholate, a substance supposedly having greater hypnotic property than the hydrate, the mixture being popularly known as a "Mickey Finn". Chloral hydrate is used clinically as a somnifacient and anticonvulsant and to a greater degree in veterinary medicine as a narcotic. For this reason a comparative study of the toxicities of the two substances based on their LD_{50} values was undertaken.

Wistar rats and mice of the Hygienic and Swiss strains were used in the non-fasted state. Both sexes were employed and the animals standardized as much as possible by controlling weight, diet, and housing

conditions. All animals that survived the trial dosage were discarded and not used again to prevent any cumulative effect of the substances. The mice received injections subcutaneously while the rats were injected intraperitoneally. All dosages were computed on accurate weights of the animals.

In terms of grams per kilogram dosage in both rats and mice the toxicity of chloral hydrate proved greater than that of chloral alcoholate. The LD_{50} of chloral hydrate for rats by intraperitoneal injection was 0.628 g. per kilo; of chloral alcoholate 0.756 g. per kilo. The LD_{50} of chloral hydrate for mice by subcutaneous injection was 0.909 g. per kilo; of chloral alcoholate 0.945 g. per kilo.

Thus the hydrate is more toxic than the alcoholate.

Reactions of two closely related species of salamanders to certain environmental factors: A study in comparative behavior. C. P. HICKMAN and F. JOHN VERNBERG, DePauw University and Purdue University.[1]—In order to understand better a few of the environmental factors that determine an animal's choice of habitat, reactions to certain gradients were studied and compared in two species of salamanders, *Plethodon glutinosus glutinosus* and *Plethodon cinereus cinereus*. These factors were: reactions to light; reactions to soil-moisture gradient; reactions to hydrogen-ion concentration of soil, and the oxygen consumption of the two species.

Eight gradients of white light and colored light were used for their light reactions. Results showed that both salamanders were negatively phototropic. An increased intensity of white light excited *P. g. glutinosus* more than *P. c. cinereus*. Red and green lights stimulated *P. c. cinereus* more than blue light; in contrast blue light stimulated *P. g. glutinosus* more than the other two. *P. c. cinereus* avoided green light more than red or white light of one foot-candle. *P. g. glutinosus* preferred soil with a higher moisture content than did *P. c. cinereus*. Both species avoided soil of pH 5.8 but chose soil having a pH range from 6.2 to 7.2. The oxygen consumption of *P. g. glutinosus*, averaging 5.33 grams in weight, was 124.29 cubic millimeters of oxygen per gram per hour. *P. C. cinereus*, averaging .73 grams, consumed 149.92 cubic millimeters of oxygen per gram per hour. Results indicate that *P. c. cinereus* was the more active form.

Evaluation of criteria used for generic separation of North American freshwater Tetraonchinae. BENEDICT J. JASKOSKI.—Nine genera of North American Tetraonchinae which were proposed by Mueller[2] were

[1] Work completed at DePauw University.

[2] Mueller, Justus F. 1934. Parasites of Oneida Lake fishes. Part 4. Additional notes on parasites of Oneida Lake fishes, including descriptions of new species. Roosevelt Wild Life Annals **3**:335-464.

———. 1936. Studies on North American Gyrodactyloidea. Trans. Amer. Micros. Soc. **55**:335-373.

———. 1937. Further studies on North American Gyrodactyloidea. Amer. Midl. Nat. **18**:207-219.

reduced to three in number by Mizelle and Hughes[1] on the basis of insufficient morphological differences considered necessary for generic distinction. Since the discovery of additional species which possess the principal character for each of the old genera *Pterocleidus* and *Haploclidus*, it is thought timely to reconsider these as natural groups which may warrant subgeneric standing. *Haplocleidus* which was based principally on a discrepancy in size of the haptoral anchors, was found invalid by Seamster[2] since *Cleidodiscus pricei* belonging to a different genus was found to possess size variations in the anchors, equivalent to those in *Haplocleidus* species. This presently invalid genus if used as a subgenus should be redescribed on a morphological basis rather than on a size difference of structures.

Ecological observations on the helminths of some Wyoming voles (*Microtus* spp.). MERLE L. KUNS, Purdue University.—During the summer of 1948, eleven species of helminths were recovered from one hundred and three voles collected in the Jackson Hole region of Wyoming. Two parasites are reported for the first time from North America, viz., *Hymenolepis horrida* (Linstow, 1900) and *Heligmosomum costellatum* (Dujardin, 1845) and one of nematodes, *Nematospiroides sp.*, is apparently new.

In the Jackson Hole area, six rather well-defined habitats were studied. These ranged from the dry sage flats of the valley floor to the sub-alpine meadows at 11,000 feet altitude. A direct relationship between host density and incidences of infection is evident from the data obtained. No indications of host preference were noted for the parasites studied.

Only two parasites were generally distributed: these were *Paranoplocephala infrequens* and *Syphacia obvelata*, which occurred in all habitats except the sage flats. The trematode, *Quinqueserialis hassalli*, was limited to wet meadows at low altitudes, presumably because of the localized distribution of its molluscan intermediate host. One cestode and three nematode species were recovered only in highland habitats (above 9,200 feet altitude). Since an intermediate host is not known to be required for any of these species, an adequate explanation of their limited distribution is apparently lacking.

The effects of *Veratrum viride* on the blood sugar level of the albino rat. DAVID E. MANN, JR., ARTHUR G. ZUPKO, PHILLIP V. HAMMOND, WILLIAM T. ROCKHOLD and WILLIAM A. HIESTAND, Purdue University.—Veratrum viride acts as a cardiac depressant by stimulating the vagal centers of the medulla resulting in decreased pulse rate and blood pressure. Once used clinically to relieve hypertension, it has now been largely supplanted by drugs of lesser toxicity. Despite this fact, the pharmacology of V.v. is still being investigated.

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[1] Mizelle, John D. and R. Chester Hughes. 1938. The North American freshwater Tetraonchinae. Amer. Midl. Nat. **20**:341-353.

[2] Seamster, A. P. 1938. Studies on gill trematodes from Oklahoma fishes: Ibid. **20**:603-612.

The purpose of this experiment was to observe the effects, if any, of this drug on the blood sugar level of the albino rat. Twenty mature rats of both sexes were fasted for 12 hours prior to the withdrawal of blood from the tails. The 10 animals in Group I, ranging in weight from 169 to 340 grams, were injected intraperitoneally (immediately after the initial withdrawal) with a 0.1 mg/kg dose of a freshly prepared aqueous solution of V.v. (1 mg/cc). Twenty minutes after each injection, a second blood sample was obtained by decapitation. The 10 animals in Group 2 (247 to 390 grams) underwent the same procedure with the exception that they were injected ip. with an aqueous solution of V.v. that had been refrigerated for 3 days. Blood sugar determinations were made by the Folin-Wu micro method.

Freshly prepared aqueous solutions of V.v. caused hypoglycemia within 20 minutes in mature rats which had fasted for 12 hours. The average blood sugar decrease was 30.6mg%. Aqueous solutions of V.v. which had been refrigerated for 3 days caused hyperglycemia with an average blood sugar increase of 41.8mg%.

The use of monogenetic trematode parasites as an aid in the identification of fishes. JOHN D. MIZELLE.—Studies during the past ten years have shown that specificity between North American freshwater Tetraonchinae and their fish hosts is so marked in many cases that unmistakable identification of the host can be made on the basis of the parasites present. In several instances a single species of parasite occurs only on one species of fish. In other cases the same species of parasites may be common to two or more fish hosts but usually additional parasitic species occur, making taxonomic distinction clear. In several cases, notably in the Centrarchidae, differentiation between hosts cannot be made on the basis of Tetraonchinae present because the apparent host specificity is too broad, or the parasites harbored are too plastic to effect a taxonomic separation.

Experiments with muscle contraction. JOHN PAUL OVENS.—The purpose of the investigation was to determine the effect of various cations and anions on the irritability of a nerve muscle preparation. The preparations were immersed for thirty seconds in the solution to be tested and then arranged in the conventional manner of a nerve muscle preparation utilizing non-polarizable zinc electrodes. Solutions tested were distilled water, amphibian Ringer's solution, amphibian Ringer's with an excess of calcium, amphibian Ringer's with an excess of potassium, chlorides of sodium, potassium, calcium, barium, and magnesium, Anions tested were carbonate, sulfate, and phosphate. Two decalcifying acids, oxalic and citric, were also tested.

The intensity of the stimulation was governed by use of a dual range voltage divider and millivoltmeter.

The results of these experiments show that cations have a more marked effect on irritability than do the anions. With an excess of potassium or calcium in Ringer's solution there is a slight decrease in

the irritability, but when these are present as chlorides the decrease is much greater.

Magnesium slightly decreased irritability but the effect was peculiar insofar as the break contractions persisted for 150 millivolts and then disappeared for 100 millivolts and later reappeared.

Sodium decreased the irritability but to a lesser extent than did potassium.

Barium had no drastic effect on irritability but did alter the nature of the contraction insofar as the rate of relaxation was slower while the circuit remained closed.

Oxalic acid greatly reduced the irritability of the preparations while citric acid inhibited any response whatsoever.

The effect of carbonate ions was similar to that obtained with sodium chloride. It was concluded that the carbonate ion had little or no effect on irritability and that the effects shown were due to the presence of the sodium cations.

Phosphate ions increased the irritability considerably.

Sulfate caused peculiar reactions but by comparing its results with those obtained with sodium chloride, its effect is one of decreasing irritability.

Ecological observations on the spring and winter rotifer populations of a pond in west central Indiana. FRANCIS A. PRAY, Purdue University.—A study was made of the spring and winter rotifer populations of a fresh water pond located near Purdue University, West Lafayette, Indiana. Collections and observations were made weekly over a sixteen week period, beginning January 8, and ending April 30.

At the same time that the rotifer collections were made, chemical and physical data were also recorded. Readings for air and water temperatures, dissolved oxygen, pH, and alkalinity were regularly taken.

The most important rotifers present under winter conditions were *Polyarthra platyptera* and *Conochiloides natans*. As spring conditions became established, the importance of these two species diminished and *Keratella sp.*, *Synchaeta pectinata*, and *Asplanchna brightwelli* became the predominate forms. The significant factor in the change from winter to spring fauna was observed to be a change to a greater number of individual species, rather than a great increase of total individuals of all species. A total of thirty-nine species and thirty-two genera was recorded during the investigation.

The metabolic effect of the administration of Thiouracil on *Periplaneta americana*. ROBERT A. REHM, DePauw University.—Since the appearance of thiouracil within the last few years, there has been a great deal published concerning its effect on the vertebrates; but a relatively small amount of work has been directed toward the invertebrates.

For this work the metabolic index employed was that of the carbon dioxide output as determined by a modification of Lund's (1919) method.

The experimental animals were fed a mixture of powdered bread and thiouracil, consisting of 150 grams of bread and 0.150 grams of thiouracil. In the period of twenty-one days the metabolic rate of the experimental animals had been inhibited by forty-four per cent.

An effective method of demonstrating longitudinal binary fission of Euglena. ARTHUR LOUIS SCHIPPER.—Microcultures of *Euglena* are made by: (1.) ringing a microscope slide with melted petroleum jelly, (2.) placing a small drop of *Euglena* culture in the center of the ring, and (3.) affixing a coverslip to the petroleum jelly in such a way that an effective seal is made. These microcultures are then exposed to artificial light for a period of approximately twelve hours prior to use. Subsequent examinations will reveal the presence of numerous fissioning euglenae. Best results are obtained if the microcultures are used within twenty-four hours after preparation. Since locomotion is extremely limited during fission, this process can be observed for its entirety without necessitating the movement of the microscope slide.

Polyvitelliny in *Stagnicola reflexa* (Say). ARTHUR LOUIS SCHIPPER.—The presence of two or more embryos in an egg has been reported for other Lymnaeid snails. This condition has been noted to be of frequent occurrence upon examination of egg clutches of *Stagnicola reflexa*. In most instances not more than one egg of a clutch will contain multiple embryos. Normal development and hatching occurs if not more than two embryos are present. If the egg contains numerous embryos development continues until the egg becomes completely filled. Under such conditions hatching has not been observed.

Birds of the Sierra de Palenque Foothills, Chiapas, Mexico. RICHARD E. TASHIAN, Purdue University.—During the summer of 1949, a section of northeastern Chiapas, Mexico, in the vicinity of the Mayan ruins of Palenque, was visited for the purpose of gathering ecological, distributional, and taxonomic data on the ornithology of that region. The area studied was situated in tropical rain forest located in the foothills of the Sierra de Palenque at an elevation of 210 meters.

Eighty species of birds representing 31 families were observed or collected. This constituted a resident population with the exception of two specimens of a Louisiana Waterthrush *(Seiurus motacilla)* collected on July 21 and Aug. 2, and one specimen of a Least Flycatcher *(Empidonax minimus)* collected Aug. 6. Nesting data were obtained on the Mexican Royal Flycatcher *(Onychorhynchus mexicanus)* and the Guatemalan Spotted-breasted Wren *(Thryothorus rutilus)*. There was evidence of breeding in 27 species, and molting was evident in 30 species. Twenty-three per cent of the species examined were found to be infected with helminth parasites in the following percentages: Cestoda, 44%; Nematoda, 36%; Trematoda, 12%; and Acanthacephala, 8%. To the recorded forms known from the Palenque region 36 were added of

which 6 were new to the Gulf lowlands of southern Mexico, and two previously unrecorded from Chiapas.

Preneoplastic manifestations in mammalian thyroid glands. JOHN H. VAN DYKE, Indiana University School of Medicine.—During development an enigmatic epithelial structure (the ultimobranchial body), derived from the hind end of the embryonic pharynx, comes to lie within or near the center of each lateral lobe of the thyroid gland. Here, apparently, it becomes induced to transform into functional thyroid parenchyma (?).

However, in rats postnatal ultimobranchial tissue, which is normally indistinguishable from thyroid tissue, may be modified by feeding vitamin A deficient diet; or similarly altered by administration of estrogens or methylcholanthrene.

Following initial hyperplasia, this tissue usually transforms, through metaplasia, into multiple cysts lined by stratified squamous epithelium. The adjacent peripheral thyroid follicles undergo general atrophy. Normal old age rats frequently exhibit this metaplasia; often associated with spontaneous cystadenomata.

In rats the usual site of maximal mitoses appears to be in the center of each thyroid lobe, particularly during experimental hyperplasias. In yearling sheep, spontaneously activated thyroid glands containing ultimobranchial cysts exhibit little or no evidence of mitosis in general thyroid parenchyma. In contrast, however, there is a compensatory proliferation of masses of relatively undifferentiated cells from the bases of epithelial cysts of ultimobranchial tissue origin. These cells transform, presumably "on demand", into typical thyroid tissue in a manner to be described.

The evidence suggests that ultimobranchial tissue is plastic, normally indistinguishable from thyroid tissue, and may function after birth as a thyroid growth center, or, being labile, may undergo cyclic phenomena depending upon factors altering thyroid activity. Conditions augmenting thyroid hyperactivity in mammals (including man), particularly those with ultimobranchial lesions, may predispose individuals to certain compensatory neoplasms—especially during senility.

Plans for an experimental laboratory in the Biological Sciences now being conducted at the College of the University of Chicago. HOWARD H. VOGEL, JR., University of Chicago.—During the past year a committee of the staff of the Biological Sciences in the College of the University of Chicago has been planning a laboratory for the general introductory course. This is a course in general education which has been offered for the past eighteen years, usually with an enrollment of 500 to 800 students. The course was largely organized by Dr. Merle Coulter who was its chairman until July, 1948 when he resigned to become Associate Dean of the Division of Biological Sciences in the University.

The course is well known for a series of excellent laboratory demonstrations, but because of physical limitations of space and equipment, it has never before tried individual laboratory sections. During this year of 1949-50 the laboratory program will be carried out on an experimental basis.

A laboratory section will consist of 24 students. The laboratory program will be divided into three quarters. During the fall quarter the *dynamics of protoplasm* will be the general heading. The students will be confronted with a problem: "What are the broadest attributes which characterize protoplasm as a living substance?" The laboratory work of the winter quarter will center around the *dynamics of the organism* and will draw mainly from the fields of physiology and psychology. The spring quarter will deal with the *dynamics of the species* and will consist largely of genetic and ecological studies.

Several unique characteristics of this laboratory program should be pointed out:

(1) The material is all presented in the form of broad general questions to the students. Problems are broken up into several sub-problems, each of which is studied by a separate committee of from two to six students.

(2) After each main problem the various sub-committees convene in the laboratory as a "committee of the whole" to discuss their results and integrate these to the main problems formulated. In this way we plan a good deal of discussion to go on concurrently with the experimental portion of the laboratory program.

(3) There is no credit at present given for this laboratory. The program is optional and is added to the student's course work. There are no grades given for the laboratory.

An investigation in the natural history of spiders. GERTRUDE L. WARD, Earlham College.—Spiders were collected and observed over a period of four months, at Ann Arbor, Mich. Temperature and activity of the spider at the time of capture were correlated. During captivity, records were kept on molting, feeding habits, building of nests, egg laying, and death.

The effect of methyl folic acid on the alkaline phosphatase of the oviduct of chicks. M. X. ZARROW, Purdue University.—Histochemical studies were carried out on the alkaline phosphatase content of the oviduct of folic acid deficient chicks. At 19 days of age the oviducts of the untreated birds showed a high concentration of alkaline phosphatase while the oviducts of the birds treated with the folic acid antagonist were markedly depleted of the enzyme. Injection of stilboestrol in normal chicks caused an increase in the weight of the oviduct and a high concentration of the enzyme was observed. However, the effect of stilboestrol on the oviduct of the folic acid deficient chick was markedly inhibited with regard to both increase in weight and amount of alkaline phosphatase.