The Virginia
Journal of Science

Vol. I NOVEMBER, 1940 No. 7

Virginia Academy of Science

Proceedings for the Year 1939-40

Minutes of the Eighteenth Annual Meeting
Virginia Military Institute
May 2-4, 1940

Results of investigations with thirteen collections of spores of *Physcomitrium turbinatum* (Michx.) Brid., dating from 1868, and nineteen collections of spores of *Funaria hygrometrica* (L.) Sibth., dating from 1828, are presented. A physiological basis for the retention of viability by moss spores under herbarium conditions is suggested.

9. Physiological Studies on Mosses. III. The Influence of the Moisture Factor on the Development of Leafy Moss Plants in Liquid Media.

Samuel L. Meyer; *Miller School of Biology, University of Virginia.* (Lantern, 15 min.)

The development of leafy moss plants from primary protonemata submerged in water cultures is a complex process which may be influenced by such factors as light intensity, hydrogen ion concentration, concentration of the nutrient solution, and oxygen supply, as well as by the liquid medium. Results of investigations with liquid and solid substrate cultures of *Physcomitrium turbinatum* (Michx.) Brid. and *Funaria hygrometrica* (L.) Sibth. indicate that the moisture factor exerts a marked influence on both the rate of leafy plant differentiation and the number of plants formed while those morphological modifications observed in plants grown from protonemata submerged in water cultures are due to the liquid medium in which the plants develop.

10. Coprophilous Ascomycetes from Charlottesville and Vicinity.

Edwin M. Betts and Samuel L. Meyer; *Miller School of Biology, University of Virginia.* (Lantern, 10 min.)

A preliminary list is given of the coprophilous Ascomycetes from Charlottesville and vicinity, with special reference to the Ascobolaceae.

11. Three Unpublished Letters of Raffinesque to Jefferson.

Edwin M. Betts; *Miller School of Biology, University of Virginia.* (10 min.)

These letters give additional information about Jefferson's relations to a botanist of his time.

Zoology Division

SATURDAY, MAY 4—9:00 A. M.

1. Elk in Virginia.

Roy Wood; *Virginia Cooperative Wildlife Research Unit, Virginia Polytechnic Institute.* (Introduced by C. O. Handley.) (Lantern, 10 min.)

The presence of the American elk or wapiti (*Cervis canadensis*) in Virginia was first recorded by Capt. George Weymouth in 1606 in his "Voyage to Virginia". The distribution and abundance of elk during the early days of colonization is commemorated by numerous old settlements and locations to be found in various parts of Virginia which still retain "elk" incorporated within their name. Opening up the land for agriculture and relentless hunting on the part of settlers exterminated the elk from Virginia, the last record of an elk that we possess is that of one killed in Clarke County, 1855.

For 62 years the elk was extinct in this state until 1917, when the

Department of Game and Inland Fisheries imported 150 of these noble animals from the Yellowstone National Park and released them in various parts of the State. No preliminary study was made of those regions into which the elk were to be stocked, and failing to make an adjustment with their new environment, they were exterminated by 1926 in all but two areas, the range in Giles and Bland Counties, and one of lesser importance in Botetourt. In 1935 another shipment of elk was secured, 6 of which were introduced in the Botetourt Range, and the remainder in the Giles-Bland Range.

A recent census in the Giles-Bland Area shows that there is a population of about 100 elk in this range. Since the first open season in 1922 they have offered considerable sport each year to over 250 hunters of big game from many parts of the country, but as the elk cause a great deal of damage to agricultural crops, their establishment in this State is questionable. However, since their value to the State and to the sportsman cannot be evaluated in actual dollars and cents, we should strive to maintain these herds. The Cooperative Wildlife Research Unit at Blacksburg is studying the "Ecology of the Elk in Virginia" in an attempt to work out a satisfactory method of management that will cope with present and future problems.

2. The Correlation of Bird Migration and Wind Direction.

Ruskin S. Freer and John Mahan; *Lynchburg College.*

This paper is a report of an attempt at correlation between wind direction and bird migration conducted at Lynchburg in the Spring and Fall of 1939 and the Spring of 1940. The belief back of the experiment is that birds pick a time for migration in which the wind blows in the direction in which the birds wish to travel. The report is as yet inconclusive but the correlation found has been high enough to justify the belief that wind direction *is* a factor in migration.

3. Some Observations on the Spadefoot Toad, *Scaphiopus halbrookii.*

Hazel Poff and Paul R. Burch; *State Teachers College, Radford, Virginia.* (5 min.)

This is a brief report on the natural history of the spadefoot, a toad of nocturnal habits.

4. The Heart of *Cryptobranchus allegheniensis* Daubin.

William B. Atkinson; *University of Virginia.* (Introduced by Chauncey McLean Gilbert.) (Lantern, 10 min.)

The morphology of the heart of *Cryptobranchus* has been reviewed, with notes on the histology added. The neuro-muscular atrio-ventricular connection has been found and described.

5. A Description of the Venous System of *Cryptobranchus allegheniensis* Daubin.

William Sangster, Jr.; *University of Virginia.* (Introduced by Chauncey McLean Gilbert.) (Lantern, 15 min.)

This report is a description of the venous system of *C. allegheniensis*, with especial reference to the cutaneous system. A description of the veins within the cranium, the vertebral column, and the liver will be included.

6. Banding Chimney Swifts.

C. O. Handley; *U. S. Biological Survey and Virginia Polytechnic Institute.* (Lantern, 10 min.)

The development of the funnel type chimney swift trap. Experiences in banding some 14,000 chimney swifts. The distribution of chimney swifts as shown by returns from birds banded in Southern Georgia.

7. A Synopsis of the Genus *Mesostoma* Ehrenberg 1837.

Frederick F. Ferguson; *College of William and Mary-Virginia Polytechnic Institute, Norfolk Division,* and W. J. Hayes, Jr.; *University of Wisconsin.* (Read by title.)

This paper, nearing completion, is a taxonomic summary of the work upon *Mesostoma.* Stress is placed upon ecology, distribution, general anatomy, diagnoses of valid species, species dubiae and an extensive bibliography.

8. Studies on the Turbellarian Fauna of the Norfolk Area.

I. *Macrostomum ruebushi* var. *kepneri* new variety.

Frederick F. Ferguson and E. Ruffin Jones, Jr.; *College of William and Mary-Virginia Polytechnic Institute, Norfolk Division.* (Opaque projector, 10 min.)

This paper describes the anatomy of a new flat-worm of the genus *Macrostomum* which attains an intense morphological variation in the eastern United States. While it presents the general structure of a *Macrostomum* it has many unique features, the most singular of which being the absence of rhabdites in part of the epidermis and the presence of a male gonopore which is almost terminal in position.

9. Studies on the Turbellarian Fauna of the Norfolk Area.

II. *Jensenia lewisi* n. sp.

E. Ruffin Jones, Jr. and Frederick F. Ferguson; *College of William and Mary-Virginia Polytechnic Institute, Norfolk Division.* (Opaque projector, 10 min.)

This is a preliminary report on a new species of the genus *Jensenia* (Dalyelliidae). Only two species have previously been described and both of these are European. The present form, which has been collected in the vicinity of Norfolk, Virginia, differs in a number of ways from the European animals.

10. Studies on the Turbellarian Fauna of the Norfolk Area.

III. Ecology and Distribution.

Frederick F. Ferguson and E. Ruffin Jones, Jr.; *College of William and Mary-Virginia Polytechnic Institute, Norfolk Division.* (Read by title.)

This paper gives a list of the Turbellarian species of the region, thirty of which have been identified; many others await identification. Distribution charts, ecological data, photographs, and drawings of representative forms are included in the work.

11. Studies on the Turbellarian Fauna of the Norfolk Area. IV. *Macrostomum norfolkensis* n. sp.

E. Ruffin Jones, Jr. and Frederick F. Ferguson; *College of William and Mary-Virginia Polytechnic Institute, Norfolk Division.* (Opaque projector, 10 min.)

This paper describes the morphology and ecology of a new species of *Macrostomum* (Rhabdocoela) which possesses several unique features of classifactory value. The anatomy of the excretory system is unusual.

12. A Synopsis of the American Turbellaria.

Part I. American Acoela, Rhabdocoela and Alloeocoela with notes on Distribution and Ecology and a diagnostic key to families and genera.

M. A. Stirewalt, F. F. Ferguson and W. J. Hayes, Jr.; *Miller School of Biology, University of Virginia.* (Demonstration.) (Read by title.)

I. Preface.
II. Table of Contents.
III. Introduction.
IV. Classification with characterizations of the families of the group and of the American genera.
V. Alphabetical list of American genera with included species (82 genera, 256 species) with ecological notes.
VI. Key to families and American genera.
VII. Distribution of American species by stations. Distribution map.
VIII. Bibliography of 195 papers on American forms from 1821-1940.
IX. Index.

13. The Effect of High Frequency Radio Waves upon *Microstomum lineare* (Mull) O. Schmidt 1848.

W. A. Kepner, M. A. Stirewalt and C. I. Malis; *Miller School of Biology, University of Virginia.* (Lantern, 15 min.)

This is an investigation of a possible specific effect of short wave radiations upon animal tissue. The microstomas were irradiated at 9.5 meters (30,00 K. C.) in the condensor field of a 100 watt oscillator. A cooling method was used which made the heat effect of the waves extremely small, and reasonably accurately measurable.

Gross and histological studies of the irradiated animals as compared with controls and heat treated animals indicate a definite specific effect of the irradiations. These histological and physiological effects were discussed.

14. The Elaboration and Transportation of Yolk in *Microstomum lineare* (Mull.) O. Schmidt 1848 (rhabdocoele Turbellarian).

M. A. Stirewalt; *Miller School of Biology, University of Virginia.* (To be read by title.)

The yolk has been found to be produced in the assimilatory cells of the endoderm where it may be found in large globules after osmic acid fixation (medium Fleming's). These yolk globules are broken into smaller bodies and passed through the basal membrane of the endoderm where they lie within the meshes of the parenchymal net. Here they are ingested by

amoebocytes similar to those concerned with the manipulation of metabolic wastes and nematocysts. Metabolic waste materials and nematocysts are carried to the epidermis to be eventually discharged. The yolk, on the other hand, is carried by these amoebocytes to the young oocytes in which it is deposited. Amoebocytes and their enclosed yolk may be considered, therefore, to take part in the nutrition of the oocyte.

15. A New Turbellarian Worm (Alloeocoele) from Beaufort, N. C.

M. A. Stirewalt, W. A. Kepner and F. F. Ferguson; *Miller School of Biology, University of Virginia,* and *U. S. B. F., Beaufort, N. C.* (Read by title.)

A third species is described for the genus *Archiloa,* to be named in honor of the late Dr. E. V. Wilson of the University of North Carolina who showed great interest in the biological developments at the U. S. B. F. at Beaufort. The new species differs from Beauchamp's *A. rivularis* and Maristo's *A. spinosa* in not having a "vagina"; in body shape and size; in the structure of the statocyst; in the position of the mouth; in the size of the vesicula granulorum; and in the morphology and relationship of the ducts of the female reproductive system.

An homology between the accessory male duct of *Otoplana intermedia* and the posterior region of the female genital canal of the new species may be indicated. Homologies between anatomical features of the new species and the triclads are also suggested.

16. An Outline of the Development of the Ovum of *Chlorohydra viridissima.*

William A. Kepner, Bruce A. Perry, W. B. Atkinson and J. R. Meyer; *University of Virginia.* (Lantern, 10 min.)

The oogonia develop through proliferation and growth of interstitial cells. Some of these surpass the others in growth and display synezesis in their nuclei. These represent incipient primary oocytes. One of the primary oocytes grows at the expense of the other primary oocytes and oogonia, which later undergo cytolsis. This oocyte eventually becomes a very large amoeboid cell with an extensive area applied to the mesoglea. Yolk is next developed from material supplied by a locally enlarged endodermal epithelium. With the formation of yolk completed, the amoeboid cell retracts its pseudopods. As the last pseudopods disappear, the first and second meioses ensue. The chromosome number for this species is greater than x= 6 and 2x = 12 which are recorded for *Hydra grisea.*

Throughout the life of Hydra and especially during periods of viscissitude, many cells are sacrificed in the interests of the organism. Likewise during the first phase of the nutrition of the ovum of this polyp many cells are sacrificed, in cytolysis, in the interests of a new organism. An hydra may be defined, therefore, as an hierarchy of cells presided over by an effort to sustain an individual.

17. Morphology and Histogenesis of the Blood of the Mealworm (*Tenebrio molitor L.*)

Herbert William Jackson; *Virginia Polytechnic Institute.*

The blood of the mealworm, *Tenebrio molitor* L., consists of a fluid plasma, the hemolymph, and formed elements or cells, the hemocytes. Four types of hemocytes are found.

Micronucleocytes arise in the midline from the upper layer of the inner cell mass and macronucleocytes from the lower layer, oenocytoides arise from cells on the neural crest. These cell types separate from the germ

band at 30 to 36 hours of age and migrate throughout the yolk mass, returning to the germ band before the formation of the yolk membrane at 42 hours. They are found in the hemolymph throughout the rest of the life of the organism. The first two types comprise the bulk of all hemocytes.

Spherule cells appear deep in the lateral regions of the mesoderm early in embryonic life. They never leave the germ band, but seem to penetrate tissues at will, including the hemolymph. They collect in certain tissues at the time of the completion of the heart when the blood begins to circulate, and are there absorbed.

Oenocytoides are colorless in early embryonic life, but after the blood begins to circulate, stain deeply.

Numbers of hemocytes of all four classes are maintained and increased by means of mitotic division in the blood stream. Amitosis occurs rarely in senescent cells.

Hemocytes do not lose their identity during metamorphosis.

The hemolymph or plasma is clear and colorless in early embryonic life, but as circulation commences, becomes filled with stain absorbing materials. It thins out again only in senescent imagos.

18. Origin of the Midgut in *Tenebrio molitor L.*

Herbert William Jackson; *Virginia Polytechnic Institute.*

The endoderm rudiments in the mealworm, *Tenebrio molitor*, arise directly from the germ band as large cell masses. Cells move cephalad from the posterior rudiment and caudad from the anterior rudiment in typical "endoderm ribbons". They follow along the under side of the yolk membrane which is suspended between the mesoderm ridges like canvas between the two sides of a hammock. Hemocytes may play some part in the formation of these endoderm ribbons. The yolk membrane is entirely non-nucleate and is apparently a product of the fusion of ental membranes surrounding neighboring vitellophages.

LENA B. HENDERSON, *Secretary.*