DISCUSSION

A PROPOSED COMPENDIUM OF CULTURE METHODS FOR THE LESSER INVERTEBRATE ANIMALS

AT the Syracuse meeting of the Association in June I suggested cooperation among zoologists in the preparation of a compendium of methods of rearing and maintaining cultures of the lesser invertebrate animals. These animals are needed for experimental purposes and for laboratory use. Many such animals have been kept in dwindling cultures for a time, but I fear that very few have been reared successfully through repeated generations. The methods for these few have cost much time and labor and are not very widely known. They are hidden away in scattered papers whose titles usually give no hint of their presence. It seemed to me that future workers would be greatly aided by making the knowledge of successful cultural practices more available.

The idea was favorably discussed in the opening meeting of Section F. I now invite the consideration of the wider circle of zoologists who are readers of SCIENCE. What I have in mind is a compendium of the best knowledge available concerning the collecting, feeding, sheltering, breeding, etc., of the lesser invertebrates: in short, everything that has to do with maintaining cultures of them. Perhaps there is not much known, aside from a few classic forms, such as Drosophila, Daphnia, Paramoecium, etc.; but perhaps there is more known than we suspect (the discussion at the Syracuse meeting would indicate this); and perhaps if what is known were brought together and studied there might appear some general rules of management of great value.

My thought was, and is, that if a small committee of interested zoologists were commissioned by their colleagues to gather and sift such material, and publish it in a book, the job might be done through cooperation without too great expenditure of time. I have thought that such a book would have for me the help that Lee's "Microtomists' Vade Mecum" had when I began to work alone on animal tissues. I have in mind a small book that any one could afford to own, that would avoid on the one hand anecdotes and freak plans, and on the other hand such futilities as mathematics prematurely applied to inadequate data. In these days of emphasis on the use of living animals is not such a book much needed?

If the question that I here raise elicits sufficient response from the zoologists who may chance to read this, I will at the Atlantic City meeting of Section F propose such a committee, together with cooperative arrangements to facilitate its functioning.

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PHYCOMYCETES, ASCOMYCETES AND FUNGI IMPERFECTI IN OKLAHOMA SOIL

ACCORDING to Waksman,[1] work on soil fungi has been done in Europe, Japan, and in the United States in New York, Michigan, New Jersey, Idaho, and other of the northern and eastern states. However, no counts heretofore have been reported from Oklahoma. This study was made by the plating method, and included the fungi in typical Cleveland County, Oklahoma, soils. Only the noteworthy results and explanations follow.

In general, the counts of Phycomycetes, Ascomycetes and *Fungi imperfecti* made in Oklahoma are higher than those made in northern states. The samples were taken at four different depths in the soil: Sample A, 2 cm below the surface; sample B, 8 cm; sample C, 20 cm; sample D, 40 cm. The work extended over a year. The averages were: Sample A, 313,000 per gram of soil; sample B, 423,000; sample C, 134,000; sample D, 195,000. Waksman gives the average numbers of fungi in soils farther north as follows: At a depth of 2 inches, from 30,000 to 120,000; at a depth of 6 inches, from about 15,000 to 90,000; at a depth of 10 inches, 10,000 to 35,000. Averages for only our very loose sandy soils were: Sample A, 537,000; sample B, 1,277,000; sample C, 224,000; sample D, 216,000. The averages for the finest, most closely packed soils were: Sample A, 230,000; sample B, 217,000; sample C, 129,000; sample D, 365,000.

A notable fact was the large percentages of *Aspergillus niger* present. Of the total number of Phycomycetes, Ascomycetes and *Fungi imperfecti* found at the two cm depth, 43.7 per cent. were *Aspergillus niger;* at the eight cm depth, 38.9 per cent.; at the twenty cm depth, 26.6 per cent.; and at the forty cm depth, 25.2 per cent. A factor here may have been that *Aspergillus niger,* like all other members of this genus, is strictly aerobic.[2]

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MITOCHONDRIA AS CENTROSOMES

IN the papers presented at the New Orleans meeting of the American Association for the Advancement of science on the alveolar structure of the mitotic spindle and the self-repulsion of chromosomes, I did not include the evidence corroborative of those observations as given by the variant locations of the mitochondria during mitosis. The *Amblystoma punctatum* material with which I have been working

[1] S. A. Waksman, "Principles of Soil Microbiology," 1927.

[2] Charles Thom and Margaret B. Church, "The Aspergilli," p. 49. 1926.

for the last three years is uniformly remarkable for the absence of centrospheres, whether it be in an egg undergoing its first cleavage or through intermediate stages up to a 30 mm embryo. What might be considered to be centrosomes, however, are frequently present, but these have in every case proved to be aggregates of mitochondria located at or near the poles of the spindle, particularly during anaphase. As cell-division by mitosis is so universal, it would seem that these assumed dynamic centers might be in other animals, as in Amblystoma, merely the result of vortical currents causing temporary aggregation of mitochondria. Fixatives containing acid, such as Bouin's or Zenker's fluids, do *not* ordinarily *completely* dissolve mitochondria, so that their use could easily give rise to a "central body" contained in a "centrosphere"; or acid staining or destaining could give the same appearance. The controversy concerning the character of central bodies might well be ended, therefore, if the technique required for mitochondria were employed in the preparation of the material to be observed.

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FRESH-WATER MEDUSAE

Craspedacusta ryderi Potts appeared in Swissvale, Allegheny County, Pennsylvania, on or near August 8 of this year. They were found living in a reservoir of the Union Switch and Signal Company. The reservoir is fed from the city water supply and is approximately fifteen by twenty-two feet and is fourteen feet deep. The bottom is bare of any growth, but the walls are covered with algae. On October 1 they were still reported present.

The only explanation for the presence of these animals is that the Hydroid form must have been brought in on fish. These were brought from Lake Erie. There is hardly any chance that they arrived through the city water supply due to the heavy chlorine content. From all available literature it seems that this is the fifth record of the occurrence of fresh-water medusae in the United States, and, for that matter, in the western hemisphere.

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SPECIAL CORRESPONDENCE

NEW ENGLAND INTERCOLLEGIATE GEOLOGICAL EXCURSION

THE twenty-eighth annual New England Intercollegiate Geological Excursion was held in the vicinity of Providence and Newport, Rhode Island, on October 14 and 15, 1932. The department of geology of Brown University (Charles W. Brown, chairman) had charge of the arrangements.

The group assembled at Faunce Hall, Brown University at noon on Friday. After lunch President Barbour, of the university, spoke a few words of welcome. They then journeyed eastward by automobile to the east bank of the Seekonk River, where varved clays were exposed, overlain by cross-bedded, aeolian sands. Two other glacial localities were later visited in succession along Highway No. 6, an esker situated approximately a mile southeast of the village of Seekonk, and a rock-core exposed by a steam shovel in a gravel pit two miles west of Swansea.

Having crossed the Taunton River, the party journeyed southward from Fall River and stopped first at the water tower, a mile or so from the center of the city. Here is exposed the Fall River granite, probably a much faulted variety of the Dedham granodiorite. Following Route No. 138 they turned aside to an exposure on the bay-shore, one and one half miles southwest of North Tiverton. The Pondville conglomerate was found to have a deceptive contact with the Dedham granodiorite. Elsewhere it is known that a weathered arkose from the granodiorite rests unconformably on the igneous rock, but here the arkose is very slightly developed and the granodiorite might be thought to be intrustive into the Pondville conglomerate.

The next stop was made on the shore of the Sakonnet River, a half mile south of Tiverton. The basal arkose, underlying the Pondville conglomerate, was well exposed and included thin seams of slate. The slaty cleavage, developed at an angle to the true bedding, allowed the structural geologist to detect certain indications of the direction of forces which folded and metamorphosed these rocks. Salt water has corroded the feldspars of the arkose and produced a porous sponge of quartz. A brief visit was made to the Portsmouth "coal" mine, at which place beautiful specimens of graphite were collected.

The party found its way at twilight to the Army and Navy Y. M. C. A., where it made its headquarters for the night. During the evening a business session was held in the assembly hall, after which members of the department of geology at Brown University spoke briefly. Dr. C. C. Branson defended the proposition that the Pondville conglomerate rested unconformably on the Fall River granite, Mr. J. S. Beach discussed the thickness of the Rhode Island Carboniferous series,