Fungi Living in the Guts of Arthropods

Robert W. Lichtwardt
University of Kansas
Project Number 104

The investigations conducted at the Station from June 20 to August 2, 1961 were a continuation of studies initiated the previous summer on the Trichomycetes, a group of obligate commensal fungi that live, with the exception of one genus, in the digestive tract of various arthropods. A primary objective was to study in more detail some of the very interesting discoveries of the previous summer, particularly relating to the development of the fungal thalli, the structure of the peculiar appendages found on some of the spores, and the phenomena of "sexuality" in these fungi. The major part of the work involved Trichomycetes associated with Diptera larvae.

No species of endocommensal Trichomycete has ever been cultured outside of its host. However, it was possible, for the first time, to follow various asexual and vegetative developmental stages of these fungi by mounting them in water and observing them over periods of hours or days. A phase contrast microscope aided considerably in studying the live, unstained material. Numerous photographs were taken to follow the growth precisely.

Two processes were studied that in the literature are reported as sexual in nature. One involves the conjugation of thalli of species of Harpella and the other the formation of structures that resemble zygospores of the higher Phycomycetes. Both processes are of great significance in understanding the relationships of the Trichomycetes to other fungi.

During the course of collecting material for the above studies several new and interesting finds were made. A new species of Harpella was discovered attached to the peritrophic membrane of a species of Simulium. Also, in the rectum of another species of Simulium was discovered a Paramoebidium, an interesting genus heretofore known only from Europe. A study was made of part of its development and the structure of the peculiar amoeboid cells that it produces. A new species (?) of Amoebidium was also found, attached to the anal gills of chironomid larvae. Amoebidium is the only genus of Trichomycetes that occurs outside the digestive tract of its host.

Additional new discoveries included a new member of the order Eccrinales in the hindgut of Gammarus lacustris lacustris, and other species of Eccrinales in mosquito larvae and a mayfly larva. In all, four of the five known orders of Trichomycetes occur in the Jackson Hole region.

Preliminary attempts to culture the Paramoebidium and Amoebidium were not successful, due, in part, to the lack of appropriate equipment for this purpose.

During the summer, twenty collections were made at ten different stations. Only a few of the infected hosts that were worked with have been identified at this time. Also, additional studies of the numerous slides prepared from the living fungus material are still needed.

The successful summer's work has materially contributed to our knowledge of these little-known organisms and their relationships to their hosts. Nevertheless, many interesting problems still remain to be worked on, and the rich habitats of Jackson Hole will, undoubtedly reveal many other new forms of Trichomycetes.

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The Collembola or Springtail Insects of the High Altitude Areas of Yellowstone and Grand Teton National Parks

Elliott A. Maynard
University of Rochester
Project Number 111

Extensive collecting of Collembola, perhaps the most intensive for any region of comparable size in the U.S., was carried out during the summer of 1961. The region involved encompassed Yellowstone and Grand Teton National Parks and certain adjacent areas of Teton and Shoshone National Forests. A new type of modified Berlese funnel, involving a battery of 12 Buchner separatory funnels, was employed to extract the Collembola from such materials as soil, humus, moss, etc. This new apparatus proved highly efficient for the purpose. Several hundred lots of material were collected and passed through the Berlese apparatus. Extensive manual collecting, particularly sweeping vegetation, was also done. Emphasis was placed on the study of the Collembolous fauna of high altitude areas; collections were made at elevations ranging from about 6,500 to 13,700 feet.

Invaluable assistance was rendered by two fellow investigators. Dr. J. Gordon Edwards provided about a dozen lots of material from mountain peaks ranging from 11,000 to 13,700 feet, with a yield of 15 species of Collembola, including some new species. Dr. Kenneth Diem brought back from his various pack trips to remote regions more than fifty lots of material that yielded a great quantity of Collembola, including several new species.

Much of the final study of the material collected remains to be carried out during the coming winter. The completion of this work will be performed at the Southwestern Regional Laboratory of the American Museum of Natural History at Portal, Arizona. There, Collembola will be collected at the high elevations of the Chiricahua Mountains in Southeastern Arizona for a comparative study with the Wyoming species.

Although the study is still incomplete one fact is evident: Altitude as such is not a factor in determining the distribution of most species of Collembola; numerous species known from near sea level have