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3. *P. lilacinum* was not the only fungus which was encountered in assembly materials, but it was the only survivor in the experiments.
4. The fungus showed unexpected tolerance for some chemicals.
5. The sensor solution used in the ozone meter had inhibitory properties but was not fungicidal for *P. lilacinum.*
6. The lower concentrations of methylparaben, scorbic acid, propylparaben, and sodium benzoate were all stimulants for *P. lilacinum* when used in conjunction with the sensor solution.
7. O-Phenylphenol was the most effective of the chemicals invesigated.

ACKNOWLEDGEMENT

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Literature Cited

1. Raper, K.B., and C. Thom. 1949. A Manual of the Penicillia. Williams and Wilkins Co., Baltimore.
2. Gilman, J.C. 1945. A Manual of Soil Fungi. The Iowa State College Press. Ames.
3. Lederer, S. J., and Delaney, J. 1960. Tappi. Vol. 43 No. 2.

The Plasmodium of the Myxomycete Cribraria Violacea[1]

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Abstract. Cribraria violacea is a minute myxomycete which could be expected to possess a protoplasmodium similar to the plasmodia of other minute species such as *Clastoderma debaryanum, Echinostelium minutum,* and *Licea parasitica.* Observations reported here show that it differs from protoplasmodia previously described in forming a small network with a fanlike area at the advancing front, and in showing protoplasmic streaming which did not reverse its direction of flow during two 40-minute periods of continuous observation.

The classic picture of "the" myxomycete plasmodium has recently undergone several modifications. It is now known that at least two types of plasmodia exist among the myxomycetes which do not conform to the usual description. Textbooks and sources of general information usually describe the type which has been designated the "phaneroplasmodium" by Alexopoulos (1). This plasmodium is readily visible to the naked eye, be-

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coming quite large and fleshy, and spreading out into a heavy advancing fan with a network of veins in the rear. The protoplasm is granular, and the granules are often pigmented, producing a colored plasmodium. Many species of the genus *Physarum* have this type of plasmodium.

Certain of the Stemonitales have a quite different type of plasmodium (2, 3). It is transparent, delicate, and agranular—nearly invisible even when well developed and magnified. Only when it is about to fruit does this plasmodium become macroscopically visible, and for this reason it has been designated an "aphanoplasmodium" (1).

Both the phaneroplasmodium and the aphanoplasmodium have the reversible or shuttle type of protoplasmic streaming peculiar to the myxomycetes, and both fruit to produce many sporangia from one plasmodium.

A third distinct type of plasmodium has been found in *Licea parasitica* (4), *Echinostelium minutum* (5), and *Clastoderma debaryanum* (6). These plasmodia are microscopic, and they fruit to produce only one sporongium per plasmodium. The plasmodia sometimes divide to produce two or several new plasmodia, which then remain separate; they do not coalesce to form a large coenocytic mass. Protoplasmic streaming can rarely be seen in this type, and when observed it is slow and intermittent and irregular; i. e., there are no discernible vein-like channels in which the protoplasm flows actively and reverses its direction of flow regularly. These plasmodia have been called "protoplasmodia" (1), suggesting their primitive character.

Since the species thus far found to have protoplasmodia belong to different orders (Liceales and Stemonitales) and to different families in the Stemonitales, possession of this type of plasmodium may not be a character which can be used taxonomically. However, all species which have been found to have it are minute.

I have isolated the plasmodium of another minute species, *Cribraria violacea*, a member of a second family in the Liceales. The plasmodium of this species is also very tiny. In moist chamber bark cultures the nearly mature plasmodia often migrate from the dark bark onto a light-colored paper substrate and can then be seen with the naked eye as black specks about 1 mm. across. They can then be picked up on a bit of the paper and transferred.

I have transferred them in this way to agar plates, hoping that they would migrate off from the paper onto the agar, but they have never done this. Instead, they crawl about on the paper and eventually fruit there.

If they are transferred to a piece of lens paper in water on a glass slide, however, they often crawl off from their substrate onto the lens paper, where they can be studied by transmitted light. They seem to need a fibrous substrate for their migration.

These plasmodia remain black even after migrating on light paper for some time; their color is due to their pigmented granules rather than to ingested materials. They are usually stretched out into a small net, as shown in Figure 1. When they are actively migrating, there is often a fan-like anterior portion heavier and blacker than the region behind.

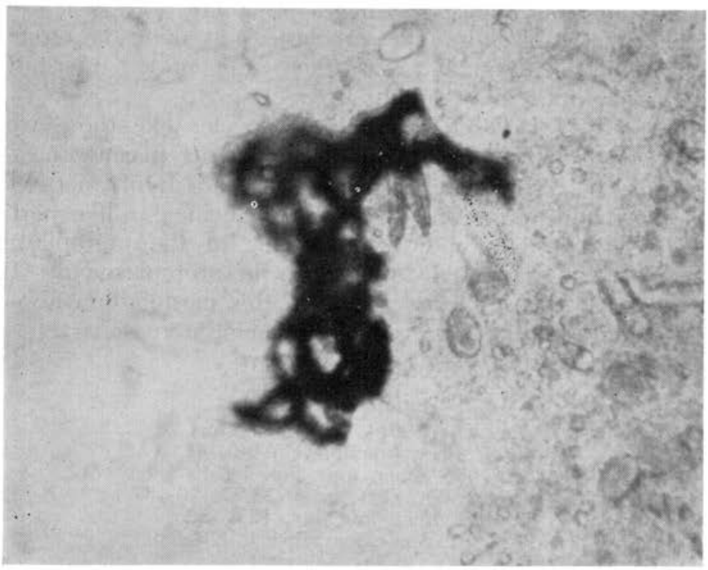

Figure 1. Small net plasmodium of *Cribraria violacea* (X 200)

The protoplasmodia of *Echinosteilum minutum* and *Clastoderma debaryanum* usually remain almost spherical; they never stretch out into a net. When migrating, they extend only short pseudopods, and these are often confluent. Active protoplasmic streaming has not been seen in them, excepting in the strand between the two parts when the plasmodium of *C. debaryanum* is dividing. There is nothing resembling an advancing fan in these species.

I have been able to make detailed observations on the streaming in the plasmodium of *C. violacea* at high magnification by transmitted light twice. In one case, the plasmodium was actively migrating among mold hyphae in water on the bottom of a Petri dish. I observed the main strand in which there was an active flow of protoplasm constantly for a period of 40 minutes. During this whole time, the protoplasm, containing easily visible black granules, flowed actively in one direction only. There was no reversal during the entire 40 minutes.

Near the end of the period of observations, the active streaming slowed as if preparing to reverse its direction of flow, but there was only an irregular mixing which lasted for a few seconds, and then active streaming was resumed, in the same direction as before.

Because these plasmodia so rarely migrate through a clear space, I have been able to make confirmatory observations of the same length only once, but it both cases I observed the plasmodium continuously during a 40-minute period, and the presence of the black granules precluded mistaking the direction of flow. Both plasmodia were then kept under intermittent observation until they fruited.

Although *C. violacea* is a minute species like those which have been found to have protoplasmodia, its plasmodium differs from theirs in several respects. It spreads into a net, which protoplasmodia never do; it has an advancing fan-like portion, which they do not; and the streaming of the protoplasm is active and in veins, not irregular as in protoplasmodia. It is possible that the active streaming in this plasmodium also departs from the shuttle or reversible type considered characteristic of all myxomycetes.

Literature Cited

1. Alexopoulos, C. J. 1960 (1961). Mycologia 52:1-20.
2. ——————1959. Amer. Jour. Bot. 46:140-142.
3. McManus, S. M. A. 1961. Amer. Jour. Bot. 48:582-588.
4. Zukal, H. 1893. Oester. Bot. Zeitschr. 43:73-77:133-137.
5. Alexopoulos, C. J. 1960. Amer. Jour. Bot. 47:37-43.
6. McManus, S. M. A. 1961. Amer. Jour. Bot. 48:884-888.

The Influence of Bicarbonate Ion Concentration on Cell Division and Cell Orientation of *Pediastrum*[1]

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Abstract: Disorientation of daughter colonies of *Pediastrum* was induced by reduction of the bicarbonate ion concentration in the culture medium. Threshhold values were established for disorientation by the use of two sources of bicarbonate ions. Below these threshhold values daughter colonies were disoriented; above them, oriented. When placed in new solutions having bicarbonate ion concentrations above the threshhold values, colonies which were disoriented by bicarbonate ion deficiency produced oriented daughter colo-

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