NOTES ON PLASMODIAL BEHAVIOR OF STEMONITIS FUSCA ROTH

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So far as can be determined from available literature on Myxomycetes, little attention has been paid to the interesting phenomena of structural and color changes which accompany the development of sporangia from the mature plasmodium. Some references are made to the color changes which occur in the plasmodia of various species, but the changes which take place in the development of the sporangia are generally not described. The genus Stemonitis is an example of one in which comparatively little is known concerning the plasmodia. Of the seventeen species which belong to this genus, there are only eight of which the plasmodia are known. In a genus so difficult taxonomically as is Stemonitis, every feature of each species should be known if possible. The following is a report of such changes as have been observed to take place in the development of *Stemonitis fusca* from plasmodium to mature fruiting structures.

The plasmodium of *S. fusca*, a pearly-white, tubercular mass, was collected at 3:00 p. m., November 2, 1933. It was found on the lower side of a rotting ash log in a ravine about one and one-half miles west of Greencastle, Indiana. The plasmodium was elliptical in outline, measured 2.0x2.5 cm., and was approximately 5 mm. thick.

The plasmodium, together with a portion of its substratum, was taken immediately to the laboratory, placed on a glass plate, and covered with a large beaker which was sealed to the plate with vaseline. A small dish of water was enclosed under the beaker to provide sufficient moisture for the growth of the plasmodium. During the daytime, the plasmodium received natural light from a north-facing window, and artificial light from a seventy-five-watt electric lamp. With only one exception, when the temperature fell to 12°C. for a few hours, the temperature of the laboratory remained at approximately 19°C. Under these conditions, fructification was completed in eighty-nine hours. The following summary shows the changes that took place:

8:30 a. m. (Nov. 3): A portion of the plasmodium had moved from the side to the upper surface of the block of wood, and differentiation had begun. Sessile sporangia, each with a bulbous enlargement at the top, were discernible. The color of the sporangia was still pearly-white. No stipes were as yet evident.

12:30 p. m. (Nov. 3): Purplish-black stipes (2.5-3.0 mm. in length) had developed. The sporangia had developed to a length of 4.5-6 mm. and were faintly tinged with pink. As at the time of the preceding observation, each sporangium was capped with a small bulbous enlargement. None of the plasmodium proper remained.

5:15 p. m. (Nov. 3): The bulb at the top of each sporangium had disappeared, the color was pale lavender, and the stipes had increased in length to about 6.0 mm. The total height of the sporangia (which were very moist with drops of water clinging to the almost black stipes)

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varied from 12 to 14 mm. The sporangia were closely aggregated with the outermost members of the group curving toward the center, thus giving the cluster a rounded appearance at the top.

7:30 a. m. (Nov. 4): The sporangia had become very dark brown to almost black in color. No changes in size or general form of structure had occurred since the preceding observation. The sporangia were still coherent because of their damp condition. During the preceding night the temperature had dropped to 12°C., but no reaction to the lower temperature was evident.

8:00 a. m. (Nov. 6): The fructification was completed, the stipes were shiny black, and the sporangia had become rich chocolate brown. The sporangia, spores, capillitium, and capillitial net showed no deviation from those of a naturally developed fructification of this species.

The question as to whether or not each species exhibits individual features during fructification can be answered only when many observations have been made. Macbride and Martin (1, p. 162) state that the plasmodium of *S. fusca* passes from white through blue and black, which color changes differ from the observed color changes outlined above. Whetzel (2, pp. 261-266), working with another species, *S. splendens*, observed that the fructification passed from the pearly-white plasmodium through purple-black, dark brown, light brown, and finally, with the shedding of the spores, purple-brown. Undoubtedly, further observations on this species, as well as additional ones, will lead to interesting comparative results, which may, in a measure, serve to aid in the separation and identification of members of this difficult genus.

Aside from its possible taxonomic value, the color changes accompanying the changes from plasmodium to fruiting structures are also of some interest physiologically. Seifriz and Zetzmann (3, pp. 175-179, Pl. III), working with the yellow plasmodium of *Physarum polycephalum*, which they have long cultured, have found the plasmodial color to be due to a yellow pigment, which, they suggest, belongs to the group of respiratory ferments known as flavones, lyochromes, or flavins. These workers have found that the yellow pigment is an acid-alkaline indicator, have calibrated the pigment as a pH indicator, and have found that the plasmodium undergoes changes ranging from pH 8, when fruiting, to pH 1.6 (possibly 1.2), when a sclerotium is formed. The latter finding well fits, and more or less partially substantiates the ideas of the late Professor Macbride (4, p. 22), who placed the order Physarales as lowest in the sequence of orders and inferred that the retaining of lime to the last by the plasmodium was indicative of lower rank. Whether or not the color changes observed in *Stemonitis fusca* are due to the presence of an acid-alkaline indicator must be determined by further work, which is, of course, hindered by the difficulty in obtaining plasmodia of this species. If Macbride's idea is the correct one, and an indicator is present in *Stemonitis fusca*, it is to be expected that at time of fruiting the plasmodium would exhibit a somewhat lower pH than that exhibited by *Physarum polycephalum*.

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