BIOLOGY

'Sporangial Drops' in the Mucoraceæ

IT is remarkable that such a commonplace occurrence as the natural liberation of the spores from a sporangium of *Mucor* seems not yet to have been accurately described.

The text-books either ignore the matter, or state briefly that the sporangial wall bursts, setting free the spores. Many of the figures published[1,2] show spores apparently being liberated into the air from the end of an erect and turgid sporangiophore, and there is one familiar drawing by Brefeld[3] which has been described, in at least three books[4,5,6] which have reprinted it, as of a sporangium shedding its spores. Reference to the original work, however, shows that the drawing is of a sporangium which has been crushed and treated with alcohol.

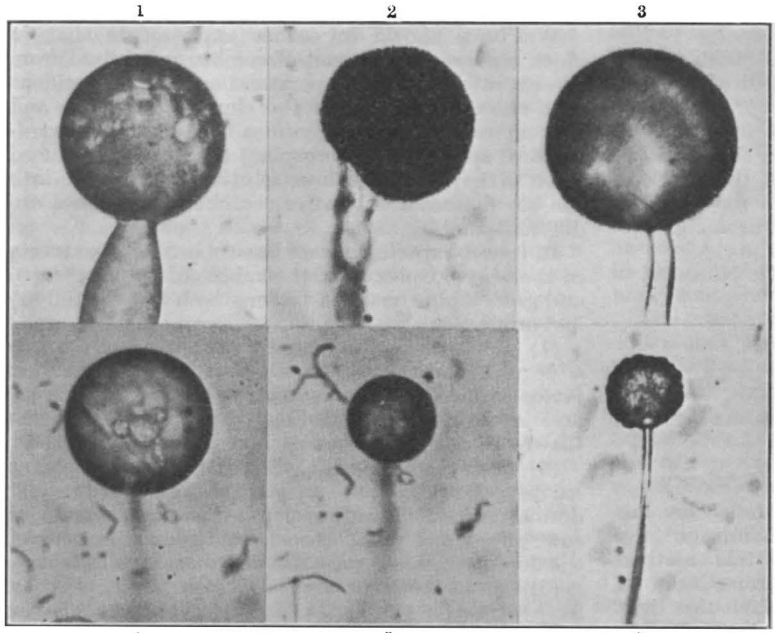

Fig. 1 (×275).
Dicranophora fulva SCHRÖT., A SPORANGIAL DROP.
Figs. 2–6 (×437).
Mucor hiemalis WEHM. 2, 3, MATURE SPORANGIA WITH (2) COLLAPSED, (3) TURGID, STALK; 4–6, A SERIES TAKEN AT 20 MIN. INTERVALS, SHOWING A SPORANGIAL DROP DRYING DOWN TO A SPORE MASS OF IRREGULAR OUTLINE.

Normally, sporangia which burst in mid-air can be watched only under a low power of the microscope, as those which are within range of a $\frac{1}{6}$ in. objective almost invariably burst against the coverslip, the spores flowing out and adhering to the glass around the columella somewhat as shown in Brefeld's figure.

The conclusions I have reached after observations on the sporangia of eight species of Mucoraceæ are that, when the sporangium bursts in air and away from any solid surface, the spores are not set free when the wall breaks, nor for some time afterwards. The sporangial wall is replaced by a water surface, and the sporangium becomes a 'sporangial drop' of liquid containing the spores and columella (Fig. 1). At this stage the spores may be dispersed by contact with solid objects. Comparison may be made with the 'oidial drops' of *Coprinus* described by Brodie[7], but a similar function in relation to dispersal by flies has not been observed in the Mucoraceæ. Where the 'sporangial drops' come in contact with aerial hyphæ, they tend to run down them and collect as large irregular spore-containing drops at points where a number of hyphæ touch. Such sporangial and spore-containing drops occur in every culture in which sporangia develop to maturity; but all those observed by me have dried down into solid masses of spores firmly stuck together (Figs. 4–6). The precise conditions under which spores are distributed into the air have not yet been determined, but there is no evidence that in any of the species examined the spores are so dispersed while the sporangiophore is still turgid.

The expansion and contraction of the liquid contents of the unseptate mycelium in response to variations in temperature cause rapid changes in the size of the sporangial drops and the turgidity of the sporangiophores. Even in a sealed cell containing a water surface, sporangiophores and other aerial hyphæ are in constant motion owing to slight temperature changes. Thus the stalk of a mature sporangium collapses, as shown in Fig. 2, after a slight fall in temperature, but regains turgidity, as in Fig. 3, when the temperature rises again. This factor is also of some importance in connexion with the growth and bursting of the sporangia.

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Jan. 12.

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[1] Harshberger, J. W., "Mycology and Plant Pathology", Fig. 11 (after Conn) (London, 1917).
[2] "Strasburger's Text-book of Botany", Fig. 385 (London, 6th Eng. ed., 1930).
[3] Brefeld, O., "Botan. Untersuch. ü. Schimmelpilze", 4, Taf. 2, Fig. 11 (Leipzig, 1881).
[4] v. Tavel, F., "Vergl. Morphol. der Pilze", Fig. 12, 5 (Jena, 1892).
[5] "Strasburger's Text-book of Botany", Fig. 387 (1930).
[6] Bower, F. O., "Botany of the Living Plant", Fig. 313 (London, 1923).
[7] Brodie, H. J., *Ann. Bot. Lond.*, 45, 315–344 (1931).

Excretion of Nitrogen by Leguminous Plants

THE results of Virtanen[1] and his associates, concerning the possible excretion of nitrogenous compounds from legumes and their absorption by associated non-legumes, have not in general been confirmed. The investigations of Wilson[2], Bond[3] and ourselves[4] have