SEGREGATION (?) IN PHOMA TERRESTRIS

WHILE engaged in a study of the pink-root disease of *Allium cepa* the writer isolated the causal organism *Phoma terrestris*[1] from infected onion roots obtained from the following states: Arkansas, California, Colorado, Louisiana, Massachusetts, New York, Oregon and Texas. Though all the isolated fungi apparently are of the genus *Phoma* and all are able to cause the pink-root disease, they differ markedly in their morphological cultural characters, such as in abundance, shape and size of pycnidia, number and length of ostioles, color of mycelium and substratum, rate of growth, etc. The differences, both macro and microscopic are so obvious and of such magnitude that, were it not for the fact that all these organisms are able to cause the same specific disease, one would be justified (according to precedents set in the taxonomic treatment of other genera in fungi imperfecti) in naming three new species and several new varieties.

In considering causes for such striking variations one might suppose that either an undiscovered perithecial stage exists or that mutations (saltations) are of unusually frequent occurrence. During the past five years extensive culturing on a large variety of media has failed to show any sector formation, and during that period of time no perfect spore-form has been observed either in nature or in culture. Hence other explanations must be sought.

A more intimate study of the California organism revealed the fact that if constant spore-mass transfers were made through several generations pycnidia were produced earlier and in much greater abundance than by mycelial transfers. This phenomenon, which has also been observed in other genera of the imperfect fungi, indicates that the genetic constitutions of spores and hyphae are dissimilar and that therefore single-spore cultures might be expected to differ in some degree from the parent culture. This was found to be the case. Though several morphological characters showed variations during this investigation, only color of the culture as a whole will be considered here. Of fifty single-spore cultures from the California organism forty-two were pink like the parent and the remaining eight were dark, almost black. Several generations from single spores proved this dark variant to be homogenic for color. Subsequent generations of the pink form gave both pink and black in various proportions varying from 10 per cent. black to 36 per cent. black, with an occasional individual producing only pink progeny, showing that in so far as color character of culture is concerned we have homogenic individuals of both the dominants and the recessives. Combining the pure dark with the pure pink by mixing either spores or mycelium gives rise to a uniform culture that is pink. Single-spore cultures from such a union give rise to cultures of four color types, pink, dark, yellow and purple, but apparently with no definite genetic ratios.

Inoculation experiments on onion seedlings with variants obtained from single spores also show considerable variation in pathogenicity, indicating that use of the single-spore method in obtaining pure cultures may prove confusing to both mycologist and phytopathologist.

The fact that *Phoma terrestris* breaks up into variants when singe-spore cultures are made indicates that segregation of character factors occurs, and the fact that it remains constant when it is perpetuated by mycelial transfers indicates that segregation takes place during pycnidium formation or spore maturation.

Tentative experiments with *Fusarium martii* var. *phaseolus* indicate that members of the genus *Fusarium* may behave similarly. The problem is being studied further by cytological methods.

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1 "Etiology of the Pink-root Disease of Onions," *Phytopathology*, 19: 691–704, 1929.

BOOKS RECEIVED

BARRY, MARY ELIZABETH, and PAUL R. HANNA. *Wonder Flights of Long Ago.* Pp. x + 204. 23 illustrations. 5 maps. Appleton. $2.00.

CLELAND, HERDMAN F. *Why be an Evolutionist?* Pp. xi + 73. Coward-McCann.

COWDRY, EDMUND V., Editor. *Human Biology and Racial Welfare.* 28 Contributors. Pp. xviii + 612. Illustrated. Hoeber. $6.00.

DEHN, EDGAR. *Algebraic Equations.* Pp. xi + 208. Columbia University Press. $4.25.

ELWYN, ADOLPH. *Yourself, Inc.* The Story of the Human Body. Pp. 320. 71 illustrations. Brentano's. $3.50.

KAEMPFFERT, WALDEMAR. *Reading with a Purpose;* Invention and Society. Pp. 38. American Library Association. $.35.

"Quest" Expedition Report on the Geological Collections made during the Shackleton-Rowett Expedition to the South Atlantic & Weddell Sea in 1921–1922. Pp. 161. 26 figures. 3 plates. British Museum. 12s. 6d.

The National Physical Laboratory. Report for the Year 1928. Pp. vi + 283. 59 figs. London; Published by His Majesty's Stationery Office for the Department of Scientific and Industrial Research. 9s.

STANLEY, DOUGLAS. *The Science of Voice.* Pp. vi + 327. Illustrated. Carl Fischer, New York.

SNYDER, HARRY. *Bread.* Pp. x + 293. 20 illustrations. 15 maps. Macmillan. $2.50.

Triangulation in Hawaii. Pp. vi + 240. U. S. Government Printing Office. $.50.

Twenty-first Report of the Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis. Illustrated. Henry Phipps Institute.