

THE SEX ORGANS OF *PHYTOPHTHORA* *HIMALAYENSIS* DASTUR

THE genus *Phytophthora* de Bary has been given, in spite of the unique mode of sexual reproduction in a section of its members—the amphigynous group—scant cytological attention in comparison with several other genera of the Peronosporales. The only thorough study of an amphigynous *Phytophthora* made so far is that of Murphy¹ on *P. erythroseptica* Pethyb. who advanced arguments to show that there is a piercing of the antheridium by an oogonial incept during copulation.

It has been claimed by some workers, however, that the amphigynous relation of the sex organs is an illusion resulting from an encircling of the female by the male gametangium, and that there is no actual penetration of the antheridium.

In an investigation into the morphology and cytology of development of the sex organs of a new species of *Phytophthora*, *P. himalayensis* Dastur,² I have observed that amphigyny, as the term is generally understood, is no artefact and that the oogonial incept does actually penetrate the antheridium.

Nuclear behaviour in *P. himalayensis* follows essentially the same sequence of events as that recorded by Murphy for *P. erythroseptica*. A stage in nuclear development, unique in the Oomycetæ and first described in *P. erythroseptica*, has also been observed in *P. himalayensis*. This particular stage of development has the basal region of the oogonial cytoplasm stratified in arcs of concentric circles whose centre lies somewhere in the oogonial stipe, while the cytoplasm at the distal (apical) region of the oogonium is non-stratified. The nuclei in the stratified region of the cytoplasm are linear or bow-shaped and oriented tangentially in relation to the stratifications, and occur in invariable association with the latter. The nuclei at the distal, non-stratified region are spherical like the nuclei at all other stages of development of the sex organs (Fig. 1).

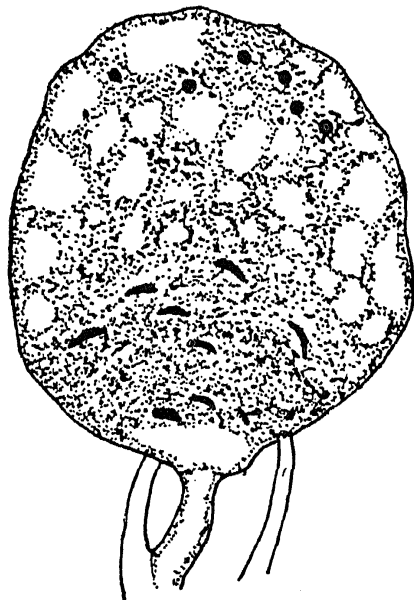


FIG. 1

Murphy regarded the elongate nuclei as eventually transforming into the spherical. In my opinion, the linear form of the oogonial nuclei is due to the pressure exerted on them owing to their characteristic association with cytoplasmic strata which result from regular differences in density of the proximal oogonial cytoplasm.

A curious feature in the morphology of *P. himalayensis* is the development of short, tubular protrusions from antheridia.

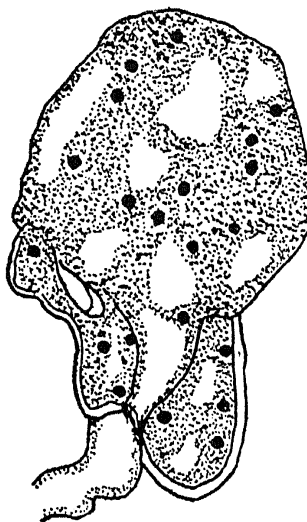


FIG. 2

These antheridial papillæ have not been observed in all copulating gametangia. Each antheridium, in which such papillæ have been observed, generally puts out one protrusion, rarely two or three at a time. Similar papillæ, also observed in *P. erythroseptica* by Murphy were believed by him to function in easing the pressure developed within the antheridium as a result of penetration of the latter by an oogonial incept. My observations do not bear out the function ascribed to them by Murphy. Rather, they serve as fertilization tubes much as the antheridia of paragynous *Phytophthoras*; owing to the origin of such papillæ from amphigynous antheridia and their homology with paragynous antheridia, such a type of gametangial copulation demonstrates the fundamental similarity of paragyny and amphigyny.

A detailed discussion of the ontogeny of the sex organs of *P. himalayensis* will be published later.

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1. Murphy, P. A., *Ann. Bot.*, 1918, 32. 2. Dastur, J. F. (in press).

A XENOSTELE ON *NEOLITSEA* *ZEYLANICA*

COLLECTIONS of rusted branches and leaves of *Neolitsea zeylanica* Merr. were collected from near Ootacamund, South India. Field observations indicated that the rust had broken out in an epiphytotic form. A detailed examination revealed that the rust is a species of *Xeno-*