A Unique Mode of Spermatization in *Cyclotheca kamatii*¹

S. Ananthanarayanan

M. A. C. S. Laboratories, Poona-4, India

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Introduction

Since the classical research of Higgins (1920, 1929, 1936) on the occurrence of spermogonia and their function in the ascomycetous fungi, many reports are available on the presence of these bodies in perithecial and apothecial genera and their function in the initiation of sexual phase. One of the recent and notable reports is that of Tilak (1960) on the occurrence of spermogonia in *Phyllachora actinodaphnes* Uppal *et al.* Such an association between the spermogonia and ascocarps was first noted by Ward (1882) in *Asterina spissa* included under Microthyriales. The writer studied the fungus *Cyclotheca kamatii*, parasitizing *Ligustrum neilgherrense* Delz., and some interesting findings on spermatization are presented here.

Material and methods

All observations were made on fresh material obtained from Mahabaleshwar (India) during the months of November-January (1961-'62), fixed in F.A.A., Navashin's fixative, Flemming's fixative, Allen's Bouin's fixative and weak chromacetic fixative and finally stained with iron-alum-haematoxylin counterstaining with orange G in clove oil and also by an improved method of crystal-violet staining.

Results

Spermogonia in *Cyclotheca kamatii* are oblong, ovoid or irregular in shape usually situated at a higher level within the stroma and often extending deep into the endostroma without any ostiolar opening (Fig. 1). Spermatophores are very short, stipitate, slender, hyaline, arising over the entire wall layer of the cavity. Spermatial cells are extremely small, spherical, hyaline, thin-walled, with a single prominent nucleus occupying almost its entire space with very little cytoplasm and without any other staining materials and are produced in large masses entirely filling the cavity. Occurrence of large peg-like sterile cells which probably have supporting function were also seen in the spermogonium. An interesting feature is the mechanism of spermatiza-

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tion in this fungus which is of a type not so far reported in the literature except for the report by Tilak (1960) in his studies on *Phyllachora actinodaphnes*. In the absence of an apical ostiole, a special method of release of

Figs. 2-3. 2, camera lucida drawing of the process of plasmogamy and subsequent diploidization of vegetative cells of ascostroma (Asc). Sperm cells through the basal canal (Ba. Ca.). 3, developing ascocarp with binucleate ascogenous cells (As. Hy. Ce.).

spermatia has been employed by this fungus through a basal canal connecting the spermogonial chamber with the adjoining ascocarp initial at their point of contact (Fig. 2), similar in nature to the phenomenon observed by Tilak (1960) in *Phyllachora actinodaphnes*. The sperm cells stream into the neighbouring ascocarp initial through the basal canal bringing about diploidization of the basal ascostromal cells which consequently become binucleate and subsequently give rise to asci in a manner to be described in a later paper.

Discussion

It may be mentioned that no direct evidence has been obtained of actual sexual fusions between the spermatia and hyphal cells of the ascocarp initials. The close and constant association of the spermogonial bodies with the developing ascocarps, the release of the sperm cell through the formation of a special basal canal connecting it with the developing ascocarp initial, the different sizes of the dikaryon nuclei obtained in the diploidized basal cells of the ascocarp initial, and finally the appearance of binucleate cells in the region of the stroma where the two cells intermingle all appear to support the functional nature of the spermogonia and spermatia in effecting spermatization, resulting in diploidization of the cells of the ascostroma and thus initiating the dikaryophase. That in none of the numerous materials and slides, the ascocarp development was observed to take place without the association of the spermatial bodies, further proves the functional nature of the spermogonia in this fungus. The entire process is thus brought about within the host without the help of any external agency, unlike the general process so far reported in the literature and is closely allied to the one reported by Tilak (1960) in *Phyllachora actinodaphnes*. The type of sexuality may be described as hermaphroditic in view of the occurrence of the two compatible gametangia within the same stroma.

Summary

This constitutes a report on the occurrence of spermatization in *Cyclotheca kamatii* Visw. and Ananth. (Mycrothyriaceae) of a unique type not so far reported in literature except a recent report by Tilak in *Phyllachora actinodaphnes*. The mechanism involved is distinct from the previously reported phenomenon releasing the spermatia through the adjoining ascocarp initial through a basal canal and bringing about the diploidisation of the ascogonial cells. The entire process is thus brought about within the host unlike the normal process so far reported and compares very well with the one reported by Tilak in *Phyllachora actinodaphnes*. The type of sexuality may be described as hermaphroditic in view of the occurrence of the two compatible gametangia within the same stroma.

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