

Volutellospora, a new Genus of Sphaeropsidales.

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With 6 fig. in the text.

During the course of studies on soil fungi for production of antibiotics and other useful metabolic products, a fungus resembling *Chaetomella raphigera* Swift (Swift 1930) in the type of its fruiting body, but distinct from it, was isolated. The fungus grew readily on most of the media, and produced an antifungal antibiotic against *Myrothecium verrucaria* Tode (Thirumalachar 1958). At higher antibiotic concentration, *M. verrucaria* was completely inhibited, but at lower concentrations, the hyphal cells of *M. verrucaria* rounded off, proliferating in an undifferentiated manner.

On Czapeks agar, the colonies of the fungus were slow growing, attaining a diameter of 1.3 cms. in 7 days, white at first, later turning brown with the production of numerous pycnidia. On potato dextrose agar, the colonies were flat, velvety, attaining a diameter of 7 cms. in 7 days. In all cases, the plates were incubated at 24 C. After prolonged incubation, the colonies turned dark-brown with the formation of pycnidia.

The mycelium was hyaline to light cinnamon-brown, slender, and septate. The development of pycnidia was studied in detail, and conformed to the type previously described in *C. raphigera*. Several of the pycnidia were incompletely formed, and these appeared as typical sporodochia, resembling the genus *Volutella*. Many of the early formed fruiting bodies conformed to this type. The mass of spores developed on the conidiophores appear as tiny whitish droplets. In the fully developed fruiting bodies, where it was an astomous pycnidium, there was an outer thick brown wall enclosing the spores. A similar combination of pycnidia and partially developed sporodochial structures has been described by Dodge (1930) in *C. raphigera*. Mature pycnidia were dark chestnut-brown (Fig. 2), with a wall composed of 8 to 10 layers of cells. Numerous stout, straight or hooked setae were present on the outer wall. The pycnidia being reniform in shape, showed a dorsal suture on the outer convex side. At this point there was a line of dehiscence of the pycnidium into bivalvular halves, releasing the spore mass. Hence this line of dehiscence appeared like a raphae. A similar ridge-like raphae has been described in *C. raphigera*. The conidiophores were grouped as

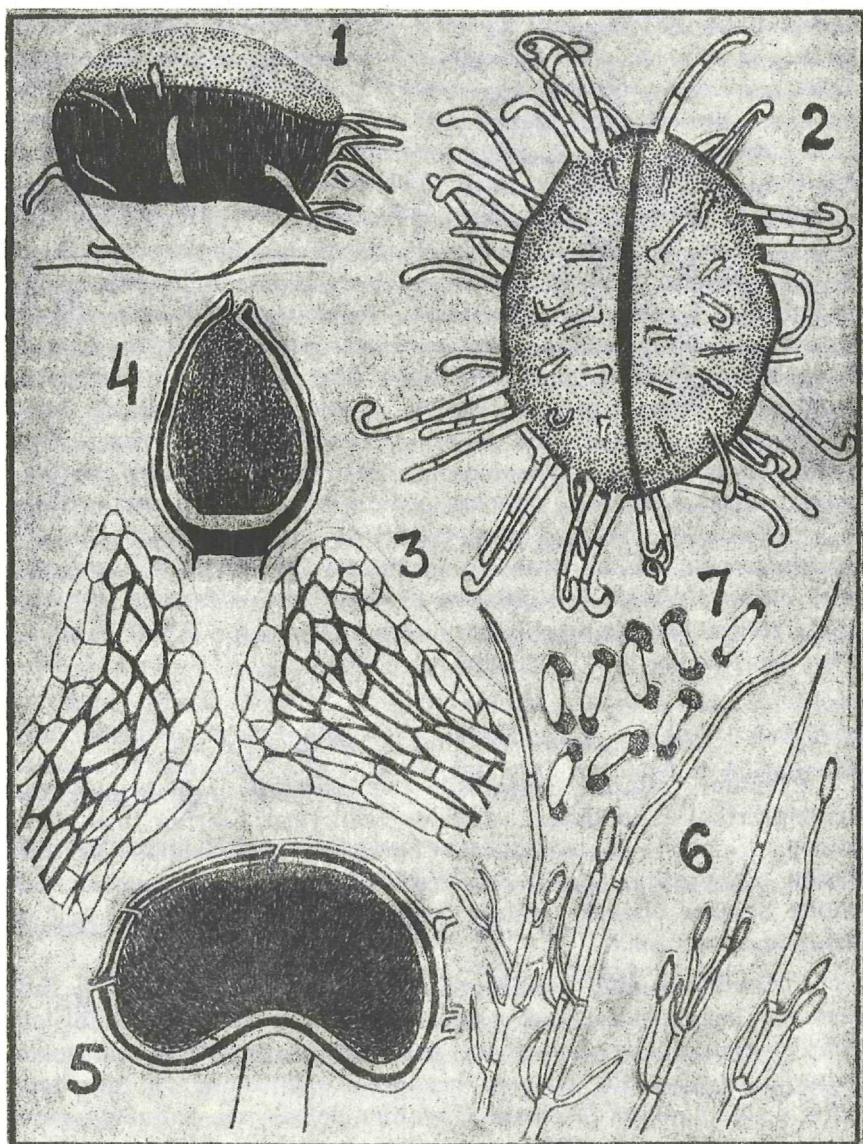
in a sporodochia, and were verticillately branched, bearing numerous conidia at the nodes (Fig. 4 & 5). The spores were pale cinnamon yellow, oblong to rod shaped and measured $5.5-9 \times 1.5-2.5 \mu$. When stained with carbol fuchsin, the spores exhibited the presence of gelatinous caps at either ends (Figs 6 & 7). These were not visible when the spores were observed in water mount only.

The fungus under study closely resembles *Chaetomella raphigera* described by Swift, except for minor characters which are of specific importance only. It must however be pointed out that *C. raphigera* has incorrectly been placed in the genus *Chaetomella*, and some of the comments to that effect are given here.

The genus *Chaetomella* was established by Fuckel in 1869 for accommodating two species; *Chaetomella atra* Fuck. and *C. oblonga* Fuck. The former had previously been described by Fuckel himself under the name *Chaetomium paucisetum* in 1861. Since he found that the fruiting body was not an ascocarp, but a pycnidium, he created the genus *Chaetomella* and described the two species mentioned above. The superficial resemblance between *Chaetomium* and *Chaetomella* are very evident by the external appearance of the fruiting bodies bearing characteristic appendages. Since mature perithecia of *Chaetomium* have freely dispersed ascospores, the resemblance to pycnidia is further strengthened. Realising that *Chaetomella* is an imperfect fungus. Fuckel included in the diagnosis the terms „asci nulli, stylosporae in sporophorum ramosorum apicalibus . . . “. The generic name *Chaetomella* was also given to indicate the superficial resemblance to *Chaetomium*. Until now 30 species of *Chaetomella* have been described, some of them according to Stolk (1963) are true *Chaetomium* species. Recent excellent paper by Stolk (1963) brings out most of the salient features so far known about the genus.

Stolk however has given some new interpretations regarding our concepts of the genus *Chaetomella* which are not correct if Fuckel's work is carefully followed. While describing the genus, Fuckel gave descriptions of the species *C. atra* and *C. oblonga* but did not designate any type. His work, however, clearly showed that he was transferring *Chaetomium paucisetum* described by him to his newly established genus *Chaetomella* with which it has close resemblance superficially including the presence of appendages and phaeospores. The spores have the status of ascus in the former and conidia in the latter. *C. oblonga* which he described along with *C. atra* has hyaline spores which are totally different. The common features however are, the shape of the fruiting body and the presence of setae. Though technically no type species was designated by Fuckel for *Chaetomella*, it was apparent that it was *C. atra*

which he had in mind in giving the generic characters. Stolk has reviewed the literature on this genus exhaustively and it is not necessary to repeat them again. Most of the authors including Clements and Shear (1931), Barnett (1963), Bender



1. A sporodochium-type of structure, $\times 500$. — 2. A surface view of a mature pycnidium, $\times 500$. — 3 & 4. Section views of pycnidia, $\times 500$ — 5. A sectional view showing the wall layers in the raphe-region, $\times 3000$. — 6. Conidiophores, $\times 1000$. — 7. Conidia, $\times 1500$.

(1934), Gilman (1957) and others refer to *Chaetomella* as phaeosporous genus. However, Stolk has taken a different view in interpreting the characters of the genus. She states that Höhnell (1915) transferred *C. atra* under *Amerosporium*, a genus established by Spegazzini (1882) thirteen years after Fuckel described *Chaetomella*. Petrak and Sydow (1937) showed that the type of *Amerosporium*, *A. polynematoides* Speg. has phaeospores and not hyalospores as originally described. If future studies indicate that there are no other distinguishing characters, *Amerosporium* may have to be treated as a synonym of *Chaetomella*. It is not clear why this transfer of *C. atra* by Höhnell to *Amerosporium* was readily accepted by Stolk, and make *C. oblonga* as the type and emend the characters of the genus *Chaetomella* as having hyalospores. Since the phaeosporous *C. atra* has to be considered as the type of the genus as indicated by the discussions given above, the status of hyalosporeous species like the fungus isolated in the present study, as well as *C. raphigera* Swift, *C. terricola* Rama Rao (1963) etc. have to be considered. These species with the characteristic fruiting body opening by a raphae, with stout straight or recurved setae and hyalosporeous condition represent an undescribed genus. Stolk has pointed out that *Hainesia* Ell. & Sacc. which shows some resemblance is a different genus. It is proposed to erect a new genus for these hyalosporeous forms under the name *Volutellospora* Thirum. & Mathur with the type species *V. raphigera* (Swift) Thirum. & Mathur. As already stated, the imperfectly formed pycnidia appear like *Volutella* with sporodochia type of fruiting structures.

Volutellospora Thirum. & Mathur gen. nov.

Pycnidia minute, sessile to stipitate, chestnut-brown, hemispherical to reniform, astomous, wall firm, bearing firm dark-brown, straight to uncinat setae. Conidiophores fasciculate, hyaline, closely grouped like sporodochia verticillately branched, bearing one-celled hyaline conidia. Mature pycnidia showing distinct line of dehiscence or raphae.

Pycnidia minuta, sessilia vel breviter stipitata, castaneo-brunnea, hemisphaerica vel reniformia, omnino clausa, in maturitate rima longitudinali, rectiuscula dehiscentia; pariete crassiusculo, extus selis nonnullis obscure brunneis, rectiusculis vel uncinatis oblecto conidiophora fasciculata, hyalina, densissime ordinata, sporodochiis verticillatim ramosis similia; conidia hyalina, continua, cylindracea vel subfusioidea.

Type species: **Volutellospora raphigera** (Swift) Thirum & Mathur comb. nov.

Valutellospora cinnamomea Thirum. & Mathur sp. nov.

Colonies on Czapek agar and potato dextrose agar white at first, later turning brown after the development of pycnidia; immature pycnidia appearing like sporodochia. Mature pycnidia minute, dark reddish-brown to black, subsessile, hemispherical to reniform, astomous, setose, $100-330 \times 65-180 \mu$, opening at maturity by raphae-like suture; setae septate, straight or unciniate, up to 65μ long and 2.5μ broad, 15 to 25 in number per pycnidia; stalk cinnamon coloured. Conidiophores hyaline, verticillately branched. $50-16 \times 1.5-2 \mu$ thick (at base) tip prolonged into a sterile hair. Conidia hyaline, white in mass, cylindrical to fusoid, with mucilaginous sheath at the apices, measuring $5.5-8 \times 1.5-2.5 \mu$.

Caespituli primum albidii, postea ob pycnidia numerosissima orta brunnea; pycnidia immatura sporodochiis similia, matura obscure castaneo-brunnea vel nigrescentia, subsessilia, hemisphaerica vel reniformia, omnino clausa, in maturitate rima longitudinali rectiuscula dehiscentia, setis 15-25 septatis, rectiusculis vel uncinatis, obscure brunneis, usque ad 65μ longis, ca. 2.5μ crassis oblecta; stipite breviusculo, cinnamomeo, interdum indistincto; conidiophora hyalina, verticillatim ramulosa, $50-16/1.5-2 \mu$; antice sterilia, simplicia, capilliformiter protracta; conidia hyalina, cylindracea, utrinque obtusa, vix vel parum attenuata, tunc subfusoida, recta vel inaequilatera, interdum lenissime allantoidea, continua, utrinque appendice mucilaginosa praedita, $5.5-8 \times 1.5-2.5 \mu$.

Hab. Isolated from soil sample, Pimpri, Poona, leg. M. J. Thirumalachar, Aug. 1957.

Type culture (H. A. C. C. 180) deposited in American type culture collection, Washington, D. C., Centraalbureau Voor Schimmelcultures, Baarn and C. M. I., Kew, England, and Indian Agriculture Research Institute, New Delhi.

Volutellospora oblonga (Fuckel) comb. nov.

Syn. *Chaetomella oblonga* Fuckel Symb. Mycol. p. 402, 1869.

Volutellospora circinoseta (Stolk) comb. nov.

Syn. *Chaetomella circinoseta* Stolk, Trans. British Mycol. Soc. 46: 403, 1963.

Volutellospora terricola (Rama-Rao) comb. nov.

Syn. *Chaetomella terricola* Ramarao, in Mycopath. Mycol. et Mycol. Appl. 19: 255, 1963.

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