Species of Syncephalis from India I

B. S. Mehrotra and R. Prasad.
Botany Department, University of Allahabad, India.
With Plates XXV—XXXII.

Out of about 30 known species of *Syncephalis* (Hesseltine, 1955) only five, namely, *S. sphaerica* van Tieghem (Ginai, 1936), *S. cornu* van Tieghem (Ramakrishnan, 1955), *S. reflexa* van Tieghem (Ramakrishnan, 1955), *S. nodosa* van Tieghem (Mehrotra, 1959) and *S. depressa* van Tieghem (Mehrotra and Prasad, 1964) are known in India. The present paper includes the description of four species. One of them viz., *S. cornu* van Tieghem, earlier reported from India by Ramakrishnan, is being described here in detail as no description of the Indian isolate was made before. Two of them *S. tenuis* Thaxter and *S. furcata* van Tieghem are new reports from India and *S. drechsleri* Mehrotra and Prasad is a new species.

Syncephalis cornu van Tieghem and Le Monnier.

Fungus growing as a parasite on *Mucor* sp. (aff. *M. hiemalis*) vegetative mycelium delicate, colourless and dominating the entire host, producing numerous well developed rhizoids which encircle the host hyphae. Conidiophores single, smooth-walled, light yellow and recurved at its apex, 113—300 μ high and 4,5—7,5 μ wide, the width being maintained upto a distance of 80—200 μ after which becoming broader till it becomes 10,5—21 μ in diameter in the region of curvature, which tapers above to 6—9 μ and ultimately passing into the vesicle 18—25 μ in diameter, with numerous merosporangial fundaments, borne at its distal half, developing directly as finger like projections upon the vesicle, mostly simple, rarely branched, 18—33 × × 2,5—4,3 μ, fragmenting into 3—6 conidia; conidia light yellow, ovate to oblong, definitely echinulate at maturity, 5—10,5 × 2,5—4,2 μ, germinating by a germ tube at both the ends (bipolar). No zygospores seen.

Isolated from decomposing male inflorescence of Jack Fruit (*Artocarpus integrifolia*) lying on soil, collected at Allahabad. Culture No. MX-31, deposited in BSM, Culture Collection, Botany Department, University of Allahabad and at NRRL, Peoria, Illinois U. S. A.

This isolate differs from the descriptions given by van Tieghem and Le Monnier (1873) in the following characters.

1. The numerous spindle shaped basal cells described by van Tieghem and Le Monnier are absent.

2. Spores are not smooth but echinulate on maturity and somewhat smaller in size.

However, Indoh (1962) also observed in his isolate that the spores on maturity have "minute protuberances".

Also a culture of this species received from Centraal Bureau voor Schimmelcultures, Baarn, Holland resembled the present isolate in all characters.

Syncephalis tenuis Thaxter.

Mycelium growing as a parasite on *Mortierella wolfii*, thin and delicate; on hay and oat meal agar upto 1,5 μ in diameter, producing stolon like structures over the host hyphae. Conidiophores few, scattered throughout the colony, unbranched, often branched once or twice, delicate, erect, hyaline, smooth walled 200—450 μ in length, 7,5—10,5 μ in diameter at base and 3,5—5,2 μ at the tip, ending into a globose to subglobose vesicle; the latter wet sporic, 10—18 μ in diameter, budding out conidia from two third of its surface, these primary conidia on maturity budding out again a secondary conidium; conidia deciduous on maturity, leaving the vesicle naked; conidia smooth walled, hyaline, oval to ellipsoidal, 13—25×8—12 μ, germinating by means of a germ tube.

Type MX-32, slide preparations and dried culture media containing the fungus preserved in the Botany Department, University of Allahabad. Isolated from farm soil, near Hargaon Sugar Factory Sitapur, India.

Zycha (1935) transferred this species to the genus *Spinalia*, a genus of doubtful position. Naumov, (1939) however, considered this to be a valid species of *Syncephalis*. Recently, Krezemicniewska and Badura (1954), reported this species as *Spinalia tenuis* (Thaxter) Zycha from Polland. But as Benjamin (1959) relates, unfortunately the details of spore germination were not described by these authors.

The present isolate differs with the type description of this species in the smaller size of the conidiophores and their frequent branching. However, these differences are of minor importance.

Syncephalis drechsleri Mehrotra and Prasad, sp. nov.

Mycelium tenuissimum et delicatum, rhizoidibus paucis praeditum, saepe in Mucorineis aliis parasiticum; conidiophoris nonnullis vel singulis, 60—110 μ longis, 4,5—9 μ latis, basin versus paulatim usque ad 2 μ attenuatis, tunc etiam in vesiculum subglobosum vel ovoideum dilatatis; vesicula conidiophora in apice conidium unicum (rarius conidia bina) efficiens, in maturitate guttula liquida involuta, conidia ovoidea 16,5—31,5/10,5—16 μ, in apice papillula 1,5—2,2/1,5—3 μ praedita, in uno eius tantum latere tubulo brevissimo mox bifurcato germinantia.

Fungus appearing in oat-meal agar inoculated with plant detritus along with other mucors; mycelium very thin and delicate forming poorly developed rhizoids often attached to mycelium of other mucors. Conidiophores formed in groups or singly, 60—110 μ in length, 4,5—9 μ wide at base gradually tapering to 2 μ but again enlarging into a subglobose to oval vesicle, 8—12 μ in diameter; the vesicle budding out usually a single (less often two) conidium from its apex; on maturity enveloped in a drop of liquid (wet sporic); conidium ovoid, 16,5—31,5 μ in length and 10,5—16 μ in width with a characteristic apical protuberance 1,5—2,2×1,5—3 μ; with the disappearance of the drops a mature conidium is seen to be surrounded by a hyaline thin wrinkled (collapsed) membrane, which on dehiscence usually taking away with it the apical part of the vesicle the latter remaining attached at its base; conidia germinating at its apex from one side of the apical protuberance to give rise to a very short germ tube which very soon bifurcates into two branches.

Type M-38, slide preparations and dried culture media containing the fungus preserved in the herbarium of the Botany Department, University of Allahabad.

Isolated from the soil of Jaunpur (India).

This isolate has been isolated for the second time since it was reported by Drechsler (1961). He had presumably identified it as belonging to the genus *Syncephalis* but had not named it. In view of the sufficient material available with the authors for study and the additional finding of two spores on the vesicle and their germination, it seems best now to name it. The species is named after Dr. Charles Drechsler, who isolated it for the first time.

Syncephalis furcata van Tieghem.

Fungus appearing as a parasite on *Mucor hiemalis*; rhizoids well developed, branched, pale yellow and penetrating the host hyphae; conidiophores simple, sometimes once branched into an equal or unequal lateral branch, at first hyaline later becoming pale yellow to yellowish brown at maturity, 125—900 μ in length, 9—16,5 μ broad at base, 5—8 μ at tip and ultimately enlarging into a globose to subglobose thin walled and delicate vesicle, 26—50 μ in diameter; merosporangial fundaments numerous, 18—38×1,5—3 μ, borne directly on the upper half of vesicle, each merosporangial fundament simple, long, cylindrical with 4—8 conidia formed by cleavage of protoplams; conidia 4—6×1,5—3 μ, immersed in water drop at maturity, oblong, thin walled, smooth, yellowish in mass.

Culture No. Mx-33, deposited in BSM Culture Collection, Botany Department, University of Allahabad and at NRRL, Peoria, Illinois, U. S. A.

Isolated from the soil of Jaunpur (India).

The isolate resembles much with *S. furcata* van Tieghem in branching, size range of conidiophores and conidia but differs in the presence of yellowish to pale brown colour of conidiophores which becomes more pronounced at maturity. However this difference is a minor one.

Acknowledgements.

Thanks are due to the Director, Foreign Research and Technical Division, ARS, Washington, D. C., for the research grant FG-In-121 for studies on Mucorales of India, to Dr. C. W. Hesseltine for reviewing the manuscript, and to Dr. F. Petrak for the Latin diagnosis of the new species.

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Legends

Plate XXV.

Figs. 1—15: *Syncephalis cornu* (camera lucida drawings). 1—7: Developmental stages of a conidiophore, ×580. 8—10: Formation of conidia in the merosporangial fundaments, ×1450. 11: A group of mature merosporangial fundaments showing direct attachment (without basal cells) on the vesicle, ×1450. 12: A mature conidiophore with rhizoids encircling the host hypha, ×580. 13: A branched merosporangial fundament ×1450. 14: A germinating conidium, ×1450. 15: Conidia, ×1450.

Plate XXVI.

Figs. 16—22: *Syncephalis cornu* (photomicrographs). 16: A developing conidiophore with rhizoids encircling the host hypha, ×640. 17: A conidiophore showing the formation of vesicle, ×160. 18—20: Stages of development of merosporangial fundaments on vesicle, ×640. 21: A mature merosporangial fundament with five conidia, ×1600. 22: Conidia, ×2000.

Plate XXVII.

Figs. 23—35: *Syncephalis tenuis* (camera lucida drawings). 23—25: Developmental stages of a conidiophore, ×145. 26—29: Developmental stages of the formation of conidia by budding on the vesicle, ×580. 30: Upper portion of a branched conidiophore, ×580. 31: Lower portion of a conidiophore with rhizoids encircling and penetrating the host hypha, ×580. 32: A simple mature conidiophore, ×145. 33: Conidiophore with two branches, ×145. 34: Conidia, × 1450. 35: A germinating conidium, ×1450.

Plate XXVIII.

Figs. 36—40: *Syncephalis tenuis* (photomicrographs). 36: Upper portion of a mature conidiophore, ×640. 37—38: Developmental stages of conidia on the vesicle, ×640. 39: Upper portion of branched conidiophore, ×160. 40: A germinating conidium, ×640.

Plate XXIX.

Figs. 41—50: *Syncephalis drechsleri* (camera lucida drawings). 41—45: Developmental stages of conidium over the vesicle, ×1450. 46: Upper portion of a conidiophore showing two conidia over the vesicle, ×1450. 47: Upper portion of a conidiophore with the conidium immersed in the water drop, ×1450. 48: Conidium surrounded by a thin wrinkled membrane, ×1450. 49: Two conidia surrounded by the thin wrinkled membrane and attached with the upper part of the vesicle, ×1450. 50: A germinating conidium with the wrinkled membrane and upper portion of vesicle still attached, ×1450.

Plate XXX.

Figs. 51—57: *Syncephalis drechsleri* (photomicrographs). 51: A young conidiophore with vesicle at its tip, ×640. 52: A conidiophore showing the formation of conidium, ×640. 53: A conidiophore with 2 young conidia at its tip, ×640. 54: Upper portion of conidiophore with an young conidium, ×1600. 55: A conidiophore, with a mature conidia, ×640. 56: A conidium with the wrinkled membrane attached to the persistant upper portion of vesicle, × 1600. 57: Two conidia encircled with a wrinkled membrane, ×1600.

Plate XXXI.

Figs. 58—69: *Syncephalis furcata* (camera lucida drawings). 58—60: Developmental stages of a conidiophore, ×145. 61—62: Branching in conidiophores, ×145. 63: Group of three young conidiophores arising together, ×145. 64: A mature head, ×580. 65—68: Formation of conidia in the merosporangial fundaments, ×1450. 69: Conidia, ×1450.

Plate XXXII.

Figs. 70—77: *Syncephalis furcata* (photomicrographs). 70: A developing conidiophore with rhizoids at base, ×376. 71: A conidiophore showing the formation of vesicle, ×376. 72—73: Stages of development of merosporangial fundaments on the vesicle, ×376. 74: Upper portion of branched conidiophore, ×376. 75: Lower portion of conidiophore showing rhizoids, ×376. 76: Two merosporangial fundaments fragmenting into a chain of conidia, ×940. 77: Conidia, ×940.