

## Species of *Syncephalis* from India - III

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(With 65 figures).

In addition to the previous work on the Genus *Syncephalis* the following four species have been further isolated in this laboratory. Out of these one, viz., *S. trispora* is described as a new species, the other two *S. plumigaleata* Embree and *S. rapacea* Indoh are new reports and the fourth *S. reflexa* van Tieghem, though reported earlier by Ramakrishnan (1955), is described here in detail.

*Syncephalis trispora* sp. nov.

Hyphae tenuissimae vegetae rhizoideis ramulosis septatis *Mortierellae ambiguae* hyphas inficientes; conidiophora simplicia, levia, in maturitate pallide luteola, 375—720  $\mu$  longa, postice 15—36  $\mu$  lata, superne paulatim attenuata, sub apice 9—18  $\mu$  crassa, ibidem postremo in vesiculam subglobosam, tenuiter tunicatam, 12—20  $\mu$  diam. metientem dilatata; initia merosporangialia 56—87  $\times$  3.7—6  $\mu$  usque 40 in superiore dimidio vesiculae evoluta, e cellulis sterilibus basilibus 16.5—24  $\times$  2.2—3  $\mu$  metientibus, superne conidiis tribus concatenatis, denique dilabentibus auctis composita; conidia 13.5—26  $\times$  3.7—6.7  $\mu$  ovoideo-oblonga, tenuiter tunicata, pallide luteola; zygosporae ignotae.

Fungus growing as parasite on *Mortierella ambigua*, vegetative hyphae, thin and delicate, forming here and there rhizoids with septate branches which penetrate the host hyphae. Conidiophores simple, smooth, light yellow at maturity, 375—720  $\mu$  in length, 15—36  $\mu$  broad near base, tapering to 9—18  $\mu$  near apex and ultimately enlarging into a subglobose, thin walled, comparatively much smaller vesicle, 12—20  $\mu$  in diameter; merosporangial fundaments 56—87.5  $\times$  3.7—6.7  $\mu$ , developed from the upper half of the vesicle, upto 40 in number, each differentiated into a lower sterile basal cell (branch), 16.5—24  $\times$  2.2—3  $\mu$ , and an upper fertile part fragmenting always into a chain of 3 conidia; conidia 13.5—26  $\times$  3.7—6.7  $\mu$ , oblong oval, thin walled, light yellow, immersed under water drops at maturity. Zygosporae not seen.

Type: *M*-40, slide preparations deposited in BSM Culture Collection, Botany Department, University of Allahabad. Isolated from garden soil, pH 7.0, at Allahabad.

There are four species of *Syncephalis*, viz., *S. bispora* Raciborski, *S. fusiger* Bainier, *S. pycnosperma* Thaxter and *S. wynneae* Thaxter in which the merosporangial fundaments are differentiated into lower

nondeciduous sterile basal cells (branches) and upper fertile parts which fragment into a chain of 2 or 3 conidia. Of these, in *S. bispora* and *S. fusiger* only a single chain of conidia is produced over a basal cell, while in other two species more than one chain of conidia are developed over each basal cell. But the present isolate differs from *S. fusiger* and *S. bispora* also in having three conidia in a chain instead of two. Also the shape and size of conidia are different in this species. The present isolate, therefore, has been given a new name *S. trispora*.

*Syncephalis plumigaleata* Embree

Fungus growing as a parasite on *Mucor* sp. (aff. *M. javanicus*), vegetative hyphae delicate, thin, colourless and forming numerous well developed rhizoids which penetrate the host hyphae; conidiophores mostly simple, rarely once branched, developing from above the rhizoids, becoming pale yellow to light brown at maturity, 450—975  $\mu$  high, 9—13.5  $\mu$  broad near base and becoming upto 6.5—9.0  $\mu$  in diam. below the vesicle; vesicle 30—63  $\mu$  in diam., subglobose thin walled, pale yellow, bearing generally numerous, unilaterally arranged merosporangial fundaments, collapsing at maturity and having small yellow warts left after the detachment of merosporangial fundaments; the latter simple, 27—45  $\times$  3—4.5  $\mu$ , fragmenting into 4—6 conidia; conidia thin walled, light yellow, smooth to minutely punctate, oval, 6.8—12  $\times$  3—4.5  $\mu$ , immersed under water drops at maturity. Zygosporangia not seen.

Isolated from farm soil, pH 7.0, at Allahabad. Culture No. MX - 62, deposited in BSM Culture Collection, Botany Department, University of Allahabad and at NRRL, Peoria, Illinois, U.S.A.

The fungus resembles closely with the description of *Syncephalis plumigaleata* Embree in all respects. However, the rare occurrence of branching in the conidiophores as seen in this isolate was not seen earlier.

*Syncephalis rapacea* Indoh.

Fungus growing as parasite on *Mucor hiemalis*, vegetative hyphae, thin, delicate and parasitising the host hyphae by giving slender, branched, septate and hyaline rhizoids penetrating the host hyphae; conidiophores developing from above the rhizoids, often in groups, unbranched but sometimes branched also either once or twice, rarely septate with nodal swellings, erect, thin walled, light yellow, 300—825  $\mu$  high, 15—27  $\mu$  broad near base and 6—10.5  $\mu$  at its narrowest end below the head; dwarf conidiophores much reduced in size and rarely branching at the apex also seen; upper part of the conidiophore finally enlarging into a subglobose, thin walled vesicle, 15—45  $\mu$  in diam., becoming light brown with crowded merosporangial fundaments on its upper half at maturity; merosporangial fundaments 30—80  $\times$  2.2—3  $\mu$ , simple but sometimes dichotomously branched at the base, yellow, almost

parallel, developing as small papillae like outgrowths from the upper surface of the vesicle, fragmenting into 6—16 conidia; conidia yellow to ochraceous buff in mass, cylindrical with rounded ends,  $4.5\text{--}7.0 \times 2.2\text{--}3 \mu$ , immersed under water drops at maturity. Zygospores not seen.

Isolated from farm soil, pH 7.0, at Allahabad. Culture No. MX - 63, deposited in BSM Culture Collection, Botany Department, University of Allahabad and at NRRL, Peoria, Illinois, U.S.A.

The fungus resembles with the description given for *Syncephalis rapacea* Indoh except for the slight differences in the measurements of various parts. However, the rare occurrence of branching and septation in the conidiophores and dichotomously branched merosporangial fundaments as seen in this isolate was not reported earlier.

*Syncephalis reflexa* van Tieghem

Fungus growing as a parasite on *Mucor hiemalis*, vegetative hyphae thin, delicate, colourless and producing numerous rhizoids which either encircle or penetrate the host hyphae; conidiophores developed singly from above the rhizoids, almost cylindrical but recurved at its apex,  $150\text{--}270 \times 6.8\text{--}12 \mu$  and ultimately enlarging into a globose to sub-globose vesicle,  $33\text{--}60 \mu$  in diam., with numerous merosporangial fundaments developing directly as fingerlike projections from the distal half of the vesicle; merosporangial fundaments simple,  $22\text{--}27 \times 3\text{--}4.5 \mu$ , fragmenting into 4—6 conidia and having numerous small yellow warts left on the vesicular surface after their detachment; conidia  $6\text{--}9 \times 3\text{--}4.5 \mu$ , smooth, oval, light yellow in mass and immersed under water drops at maturity. Zygospores not seen.

Isolated from garden soil of Simla, pH 7.5. Culture No. MX - 64, deposited in BSM Culture Collection, Botany Department, University of Allahabad and at NRRL, Peoria, Illinois, U.S.A.

The fungus resembles mostly with the description of *S. reflexa* van Tieghem in essential features viz., cylindrical and recurved conidiophores. The minor differences in length of conidiophore and size of vesicle are considered here as of less taxonomic value.

#### A c k n o w l e d g m e n t s

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#### Explanation of Figures.

Figs. 1—8. *Syncephalis trispora* (Camera lucida drawings). 1—2. Developmental stages of a conidiophore,  $\times 145$ . 3. Upper portion of a conidiophore with young merosporangial fundaments over the small vesicle,  $\times 580$ . 4. Lower portion of a conidiophore showing rhizoids,  $\times 580$ . 5. Two young merosporangial fundaments over the vesicle,  $\times 1450$ . 6. A mature merosporangial fundament showing lower sterile non-deciduous basal cell and upper three conidia in a chain  $\times 1450$ . 7. Upper portion of a conidiophore with sterile non-deciduous basal cells,  $\times 580$ . 8. Conidia,  $\times 1450$ .

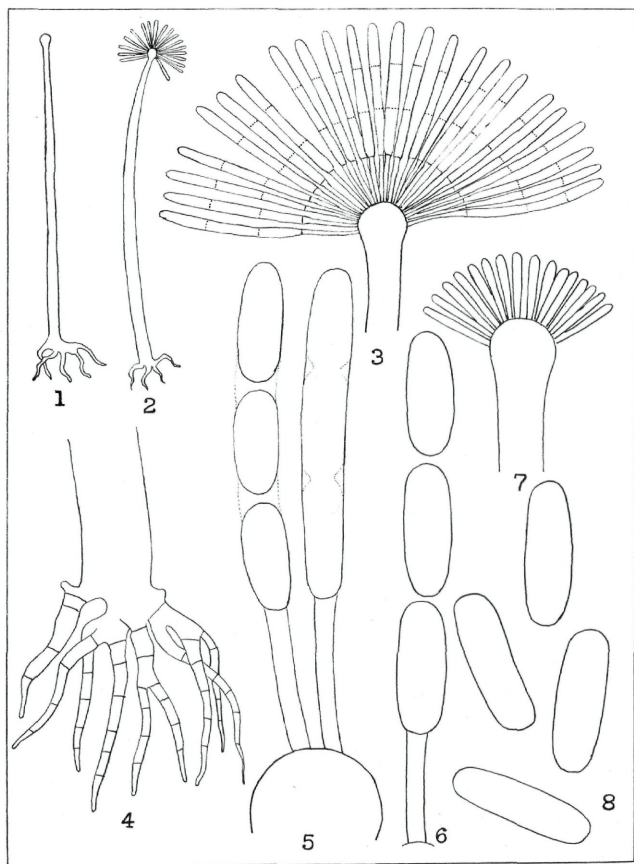
Figs. 9—14. *Syncephalis trispora* (Photomicrographs). 9. An young conidiophore,  $\times 160$ . 10. Upper portion of a conidiophore with merosporangial fundaments,  $\times 640$ . 11. A mature head,  $\times 640$ . 12. Upper fertile portion of two merosporangial fundaments, each with a chain of three conidia,  $\times 640$ . 13. Sterile non-deciduous basal cells (branches) with few conidia over the vesicle,  $\times 640$ . 14. Conidia,  $\times 1600$ .

Figs. 15—23. *Syncephalis plumigaleata* (Camera lucida drawings). 15. Development of conidiophore above the rhizoid,  $\times 580$ . 16. Early stage in the development of conidiophore vesicle,  $\times 580$ . 17—20. Developmental stages of unilateral merosporangial fundaments over the vesicle,  $\times 580$ . 21. Conidia,  $\times 1450$ . 22. An old collapsed vesicle showing warts & conidia,  $\times 580$ . 23. Two mature merosporangial fundaments,  $\times 580$ .

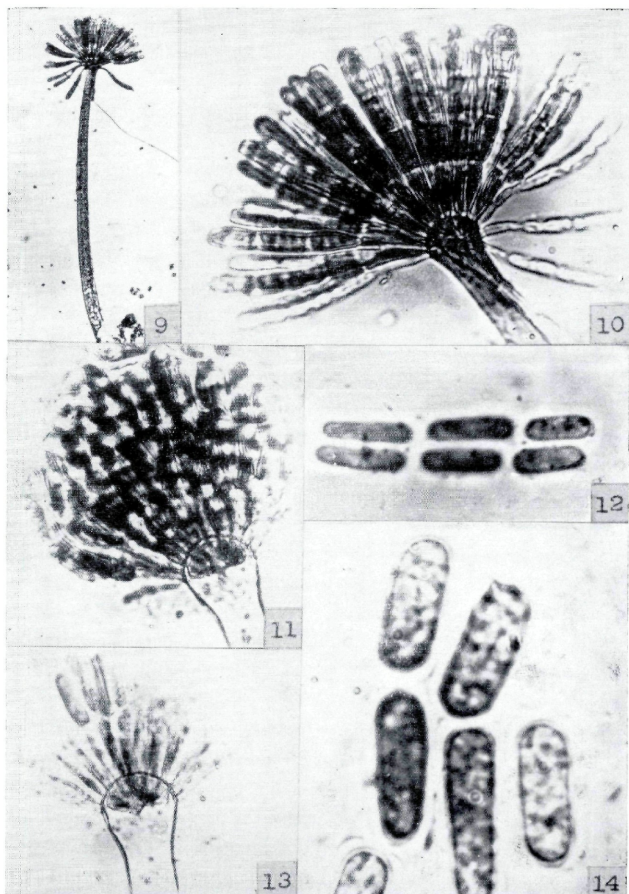
Figs. 24—29. *Syncephalis plumigaleata* (Photomicrographs). 24—25. Developmental stages of unilateral merosporangial fundaments over the vesicle  $\times 640$ . 26—27. Upper portion of young and mature branched conidiophores,  $\times 640$ . 28. An old vesicle showing warts and conidia,  $\times 640$ . 29. A merosporangial fundament with 6 conidia,  $\times 1600$ .

Figs. 30—39. *Syncephalis rapacea* (Camera lucida drawings). 30. Development of conidiophore above the rhizoid,  $\times 580$ . 31. Early stage in the development of conidiophore vesicle,  $\times 580$ . 32—33. Young and mature merosporangial fundaments over the vesicle,  $\times 580$ . 34. Upper portion of a septate conidiophore with nodal swellings,  $\times 580$ . 35. Upper portion of a branched conidiophore,  $\times 580$ . 36. Dwarf conidiophores,  $\times 580$ . 37. Simple and dichotomously branched merosporangial fundaments,  $\times 1450$ . 38. Lower portion of conidiophore showing rhizoids,  $\times 580$ . 39. Conidia,  $\times 1450$ .

Figs. 40—45. *Syncephalis rapacea* (Photomicrographs). 40. A group of young conidiophores,  $\times 160$ . 41. Merosporangial fundaments on the upper part of vesicle,  $\times 640$ . 42. Young dwarf conidiophores,  $\times 160$ . 43. A dichotomously branched merosporangial fundament,  $\times 640$ . 44. A mature dwarf conidiophore with a small branch at the tip,  $\times 200$ . 45. Upper portion of a twice branched conidiophore,  $\times 1000$ .

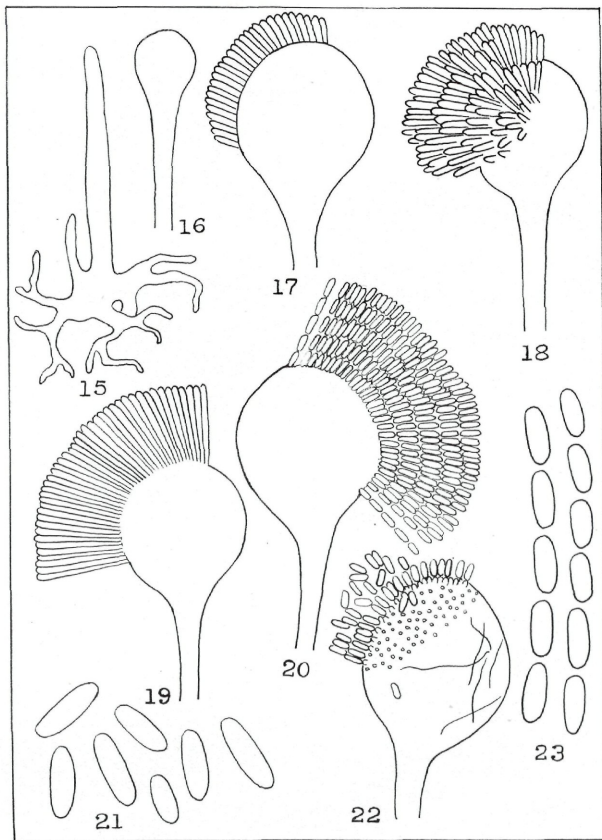




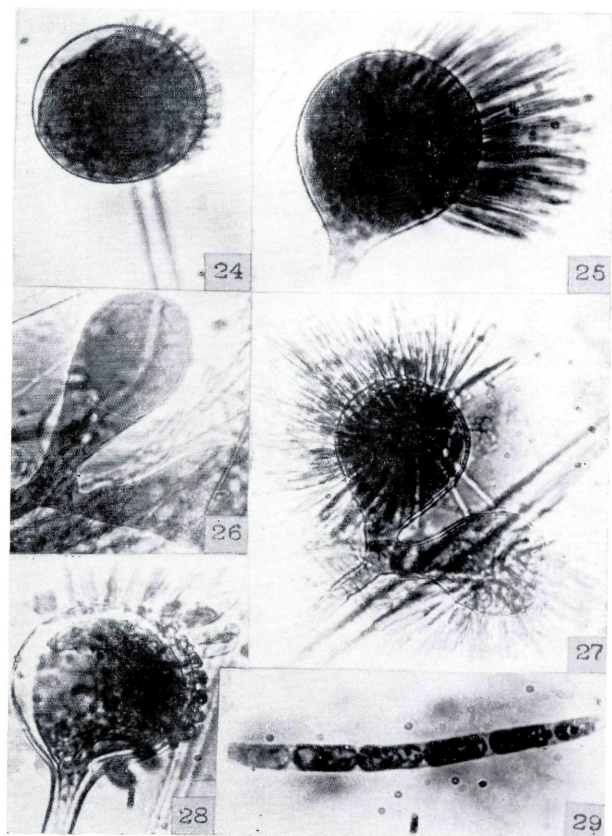




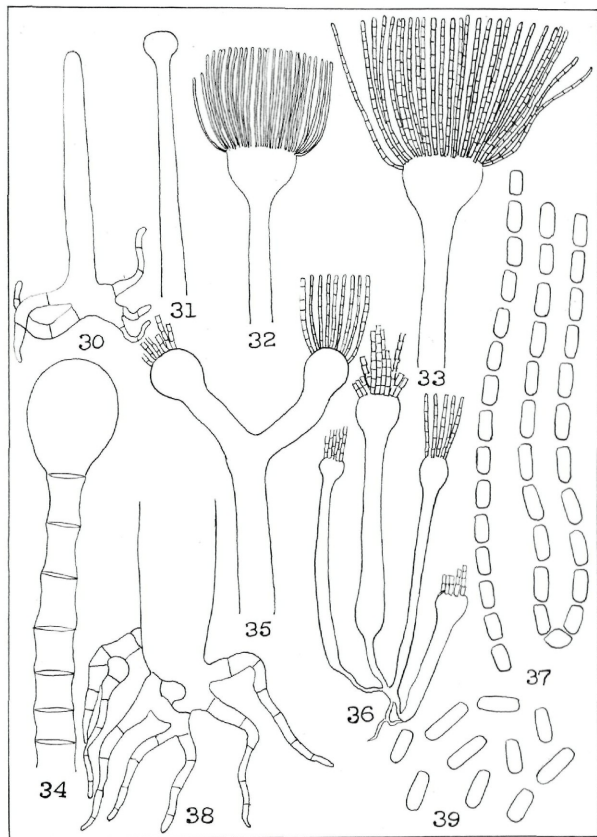




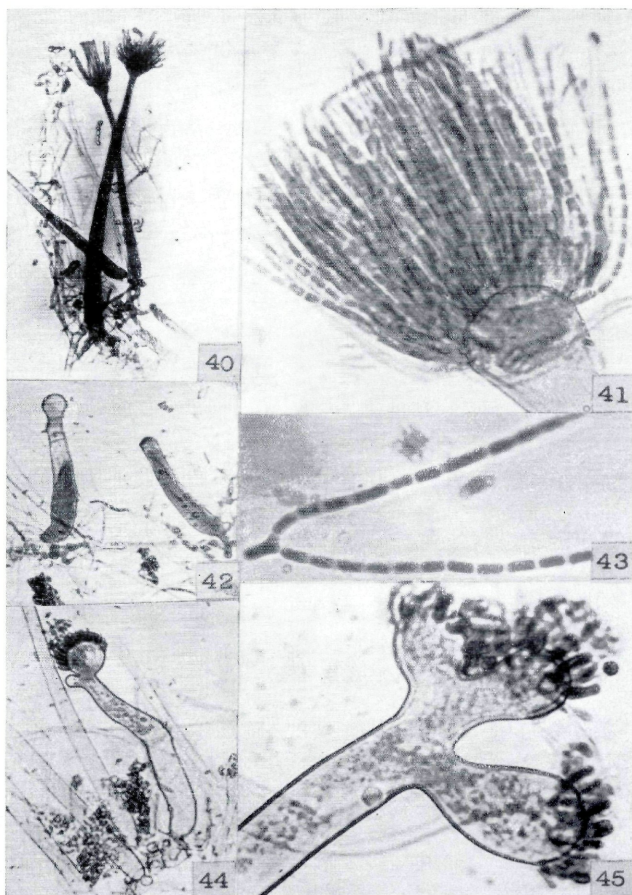






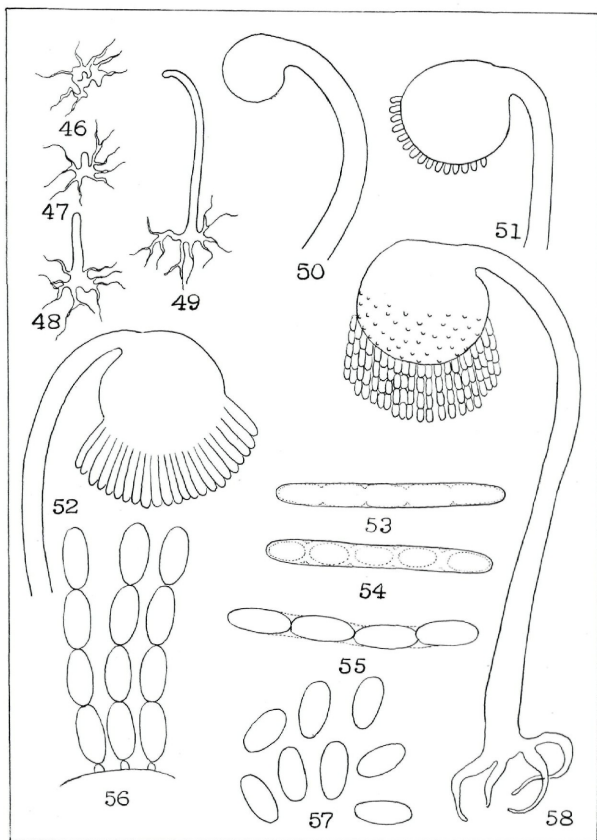




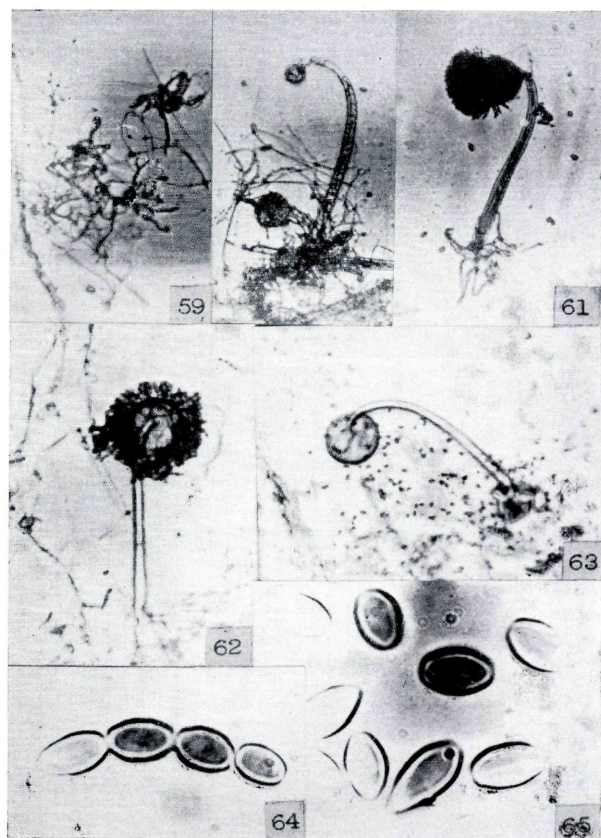














Figs. 46—58. *Syncephalis reflexa* (Camera lucida drawings). 46—49. Developmental stages of a conidiophore above the rhizoid,  $\times 145$ . 50. Early stage in the development of conidiophore vesicle,  $\times 580$ . 51—52. Early stages in the development of merosporangial fundaments over the vesicle,  $\times 580$ . 53—55. Formation of conidia in the merosporangial fundaments,  $\times 1450$ . 56. Merosporangial fundaments attached on warts over the wall of vesicle,  $\times 1450$ . 57. Conidia,  $\times 1450$ . 58. A mature conidiophore,  $\times 580$ .

Figs. 59—65. *Syncephalis reflexa* (Photomicrographs). 59. Young rhizoids,  $\times 160$ . 60. Early stage in the development of conidiophore vesicle,  $\times 160$ . 61. Conidiophore with young merosporangial fundaments,  $\times 160$ . 62. Conidiophore with mature merosporangial fundaments,  $\times 160$ . 63. An old conidiophore,  $\times 160$ . 64. A mature merosporangial fundament with 4 conidia,  $\times 1600$ . 65. Conidia,  $\times 1600$ .

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