

INDIAN WATER MOULDS—V

A New Genus of the Saprolegniaceae: *Hamidia* Gen. nov.

BY H. CHAUDHURI

(From the Botany Department, Panjab University, Lahore)

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Locality and Isolation

SAMPLES of water with decaying twigs were obtained from two localities, viz., Tarn Taran (Dist. Amritsar) and Barhamjit (Dist. Hoshiarpur) in March 1936, from which the mould was isolated on potato blocks. The growth on potato was luxuriant.

Morphology of the Fungus

The general morphological characters of the fungus are as under:—

The hyphæ are delicate, sparsely septate $1.7-4.4\ \mu$ in diameter (Fig. 1), upon which oogonial bodies are borne both in cymose and racemose manner (Figs. 2-4). Hyphal wall $0.5-0.8\ \mu$ thick. The long slender hyphæ are generally racemosely branched, can best be seen in the natural condition, as the staining and teasing processes upset the arrangement.

The oogonia when borne singly are attached by delicate and long stalks (Figs. 5-6), which are extremely fragile and break even by the slightest disturbance. These are also borne in cymose clusters (usually in threes). The diameter of the oogonia varies from $22.2-38.7\ \mu$. The oogonia mostly contain a single egg (Figs. 7-9), which is quite big and prominent filling the whole oogonium. The egg has a wall, catches a deep stain as compared with the hyphæ and $18-34.2\ \mu$ in diameter. The wall of the oogonium is quite smooth. The single large centric or subcentric egg comes out slowly (Figs. 8-9) leaving a hyaline and shrunk capsule behind. The egg discharge is slow and almost imperceptible and one has to be vigilant to watch the gradual emergence of the egg. Germination of egg while still inside the oogonium has been seen (Fig. 19).

It has been noticed that in bodies similar to oogonia, diameter $18-25.5\ \mu$, which may be termed sporangia, 2-7 swarm spores, diameter $6.8-9.5\ \mu$, may be formed (Figs. 11-13, 14). These swarm spores are non-ciliate and germinate immediately on being discharged (monoplanetic)

(Figs. 16–17). Occasionally a discharge tube is formed (Figs. 14, 15). The swarm spores, when they come out, have no properly differentiated wall. If swarm spores are not discharged, then they germinate inside the mother wall and send out germ tubes (Figs. 11–13). These swarm spores either germinate by a single unilateral germ tube or produce tubes bilaterally. Occasionally it has been seen that only a part of the sporangium forms 1 or 2 spores and the rest germinates by a long germ tube (Fig. 18).

Growth in Culture

The fungus was isolated from the decaying twigs under water, and the growth on fresh potato blocks was luxuriant. This was the only thing upon which the fungus could be cultured and leucine (.1%) had tonic effect. Prolonged culture in leucine (.1%) and slightly lower temperature about 20° C., produced certain abnormal types of gemmæ (Figs. 20–21) though not in abundance. Insect and egg yolk were found to be unsuitable. The fungus was very sensitive to high temperature and the mycelium lost its vegetative activity soon.

Discussion

The word "oogonium" has been used here for the rounded bodies attached to hyphæ due to the close resemblances of the structure of these bodies to oogonium and other characters of the egg. Here, as in *Isoachlya*, no antheridia are present. The mere absence of the male structures in the neighbourhood of the female cells does not debar one from calling these structures oogonia, so long as these function as such. Thus these round cells, with a single egg, can easily be regarded as oogonia.

The main characteristics of the fungus, viz., (a) Septate hyphæ, (b) Presence of oogonial bodies, (c) Single egg in an oogonium, (d) Absence of antheridia, (e) Presence of swarm spores, and (f) Gemmæ formation, no doubt show Saprolegnalian affinities. The mycelium is septate, but the septa being sparse, one is apt to take it as a non-septate cœnocytic mycelium. The simple septation is seen in *Blastocladiaceæ* but the absence of the joints and ciliated gametes are radical differences. The fungus suggests diverse affinities by its markedly striking characters. The delicacy of the mycelium brings it closer to *Monoblepharidales* but the absence of antheridia altogether, is again a primary difference.

The formation of swarm spores, the eggs and the gemmæ, are characters of the *Saprolegniaceæ*, though, no doubt, the absence of the true antheridia is a handicap in the proper location of the form. Considering, however, all its characters, one feels justified in placing it as a new genus f *Saprolegniaceæ*.

Diagnosis

Hamidia Gen. nov.

Hyphæ hyaline, generally racemosely branched, delicate, sparsely septate, bearing oogonia and sporangia both in racemose and cymose manner; best seen in natural condition. Oogonia borne singly or in clusters (of usually 3). Oogonia when borne singly have long stalks which break at the slightest disturbance. Oogonium with a single large egg entirely filling it. Egg with smooth wall; emerges gradually and imperceptibly. Apandrous; sporangia resembling oogonia also formed, each with 2-7 swarm spores. Discharge tube may or may not be present. Swarm spores, without a properly differentiated wall and non-ciliate (monoplanetic) germinate soon after discharge. Undischarged swarm spores germinate inside the sporangium, putting forth unilaterally or bilaterally produced germ tubes. Gemmæ also formed. Growth on fresh potato stalks most luxuriant; egg yolks and insects unsuitable for growth.

Hamidia Gen. nov.

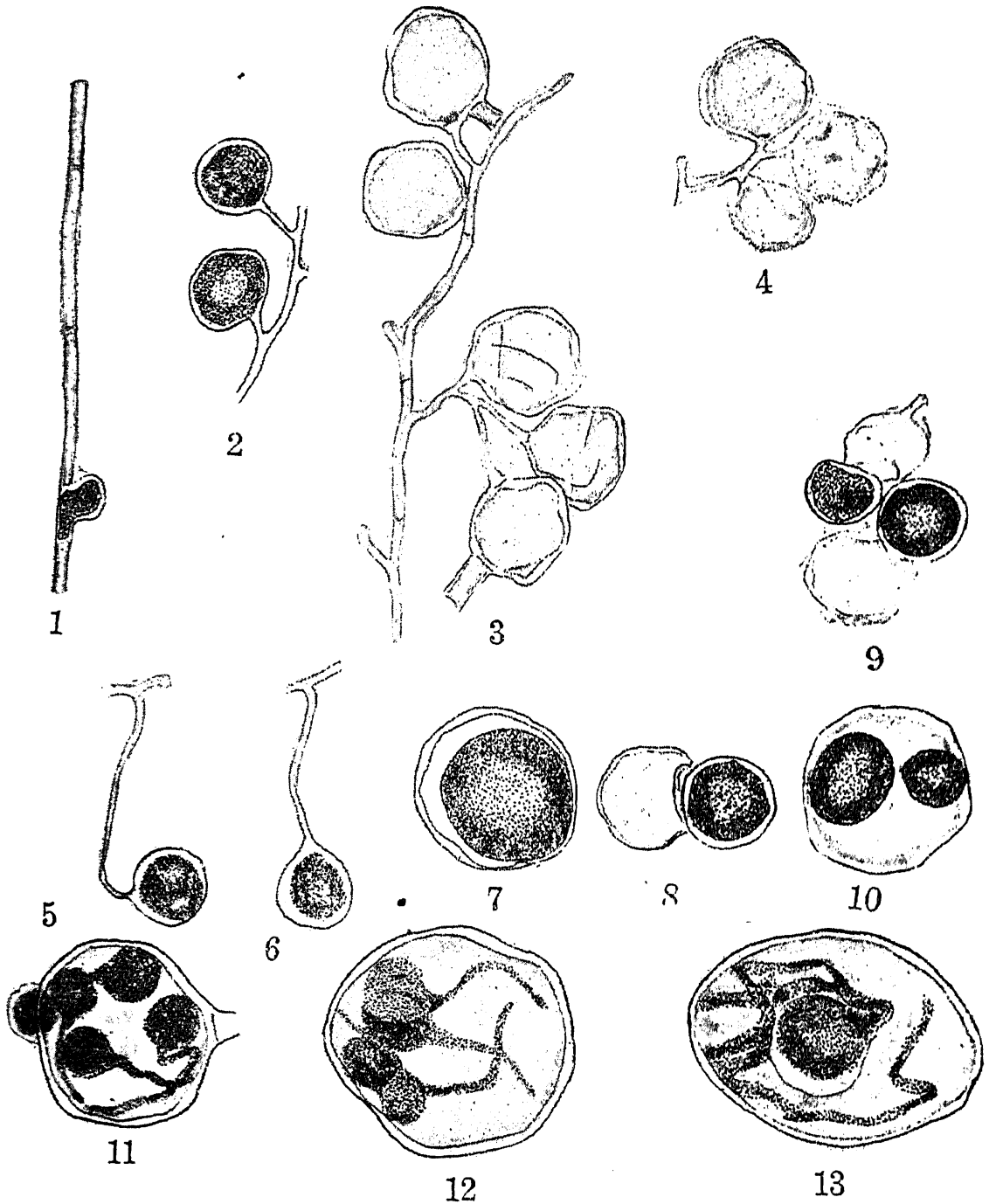
Hyphæ hyalinæ, communiter racemose ramificantes, tenues, sparse septatæ, oogonia et sporangia tum racemose tum cymose ferentes; quam optime observari possunt in vivo. Oogonia singulatim vel acervatim (præsertim ternatim) feruntur. Oogonia singulatim producta longis insident pedicellis, qui facillime rumpuntur. Oogonia uno tantum magno ovo complentur. Ovum, terso pariete, gradatim et sensim sine sensu emergit. Fungus est apandrus. Sporangia etiam, oogoniis similia, producuntur, quorum unumquodque 2-7 zoosporas habet. Tubulus quo sporæ liberantur potest vel adesse vel abesse. Zoosporæ pariete non plene differentiato et non ciliato (monoplano) germinant cito post liberationem; zoosporæ quæ non liberantur, germinant in sporangio, unilaterialiter vel bilaterialiter productis germinationis tubulis. Gemmæ etiam producuntur. Crescit luculentissime super vivos truncos Solani tuberosi; non crescit in medio ex-ovorum vitellis vel in insectis.

Hamidia indica sp. nov. (Plate I)

Characters as above. Hyphæ 1.7-4.4 μ broad. Oogonia wall smooth. Oogonia 22.2-38.7 μ in diameter; eggs 14-34.2 μ in diameter. Sporangia 18-28.9 μ in diameter. On decaying twigs under water. Collected by A. Hamid in March 1936.

Hamidia indica sp. nov.

Characterse ut supra. Hyphæ 1.7-4.4 μ latæ. Oogonii parietes tersi; oogonia 22.2-38.7 μ diam.; ova 14-34.2 μ diam.; sporangia 18-28.9 μ

PLATE I. *Hamidia indica*

Figs. 1-13. Fig. 1. Vegetative hyphae. $\times 636$. Fig. 2. Arrangement of oogonia. $\times 525$. Fig. 3. Arrangement of oogonia and sporangia. $\times 600$. Fig. 4. Arrangement of oogonia. $\times 525$. Figs. 5-6 Oogonia with elongated stalk. $\times 600$. Fig. 7. One large egg before emergence. $\times 600$. Fig. 8-9. Various stages during the emergence of egg. $\times 525$. Fig. 10. Two eggs formed in an oogonium. $\times 600$. Figs. 11-13. Swarm spores germinating inside the mother cell (sporangium) $\times 600$.

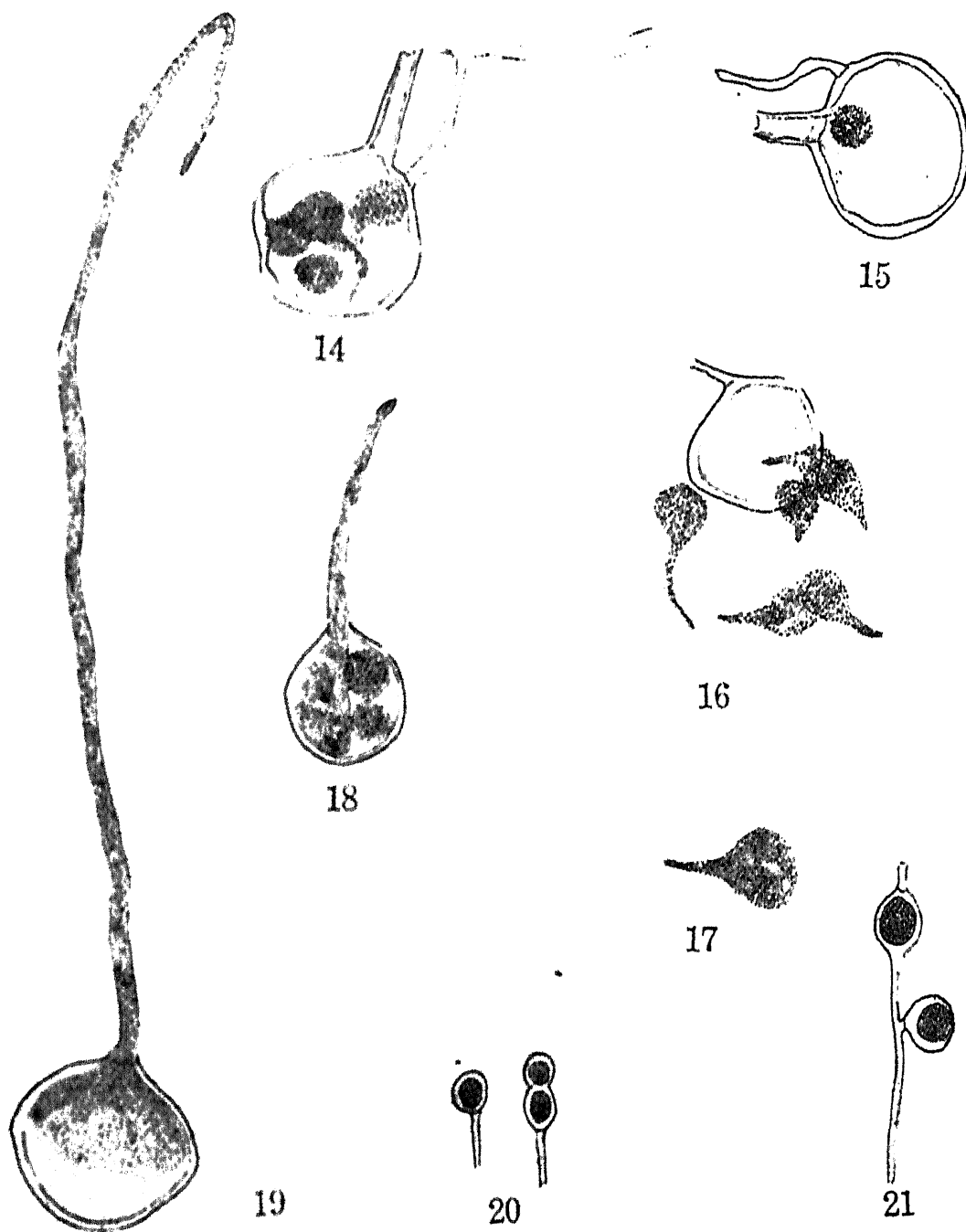


PLATE I. *Hamidia indica* (continued)

FIGS. 14-21. Fig. 14. Spores germinating inside a stalked sporangium. $\times 600$. Fig. 15. A swarm spore just before escaping from the sporangium through a discharge tube. $\times 600$. Figs. 16-17. Swarm spores germinating outside the sporangium. $\times 600$. Fig. 18. Sporangium partly forming spores and partly germinating into vegetative hyphae. $\times 600$. Fig. 19. Egg germinating. $\times 600$. Figs. 20-21. Gemmæ. $\times 525$.

diam. Occurrit sub aqua super putrescentes ramusculos arborum. Collectus ab A. Hamid, mense martio 1936.

Type specimens deposited in Panjab University, Botany Department, Lahore.

Summary

A new genus of *Saprolegniaceæ*—*Hamidia* has been isolated, grown in culture, and described; and a new species *Hamidia indica* established. The Latin diagnosis in both cases has been given.

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