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Parasitic Aquatic Phycomycetes Inhabiting Some Fresh Water Bodies of Bareilly, India

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ABSTRACT: The present communication enlists 11 species among 6 genera of aquatic Phycomycetes *viz., Blyttiomyces spinulosus, Myzocytium proliferum, Olpidiopsis saprolegniae* var. indica, *Olpidiopsis pythii, Olpidiopsis luxurians, Olpidiopsis aphanomycis, Olpidium sp., Rhizophydium corpophilium* and *Rozella allomycis,* belonging to orders Chytridiales and Lagenidiales. All the species were parasitic on various fungal or algal forms.

Index Terms- Parasitic, Aquatic Phycomycetes, Bareilly.

I.INTRODUCTION

Fungi are universally present in all types of natural waters and are important in maintaining aquatic ecosystems as decomposers. They are parasitic on various aquatic plants and animals and regulate the biological interactions in water bodies.

The record of parasitic aquatic fungi from India is scanty. A perusal of the literature reveals that some valuable contributions have so far been made by Butler (1907); Thirumalachar (1947); Karling (1948, 1966); Das Gupta and John (1953); Srivastava and Bhargava (1963); Srivastava (1964,1975); Dayal and Thakurji (1968, 1985) and Khulbe (1980). The studies on lower aquatic fungi from this region of India remained neglected so far. Therefore, an exhaustive collection of aquatic fungi from various water bodies was made to have a beginning. During two years of study, the authors recorded 11 species of parasitic lower fungi, 4 belonging to the order Chytridiales and 7 to the order Lagenidiales.

II.MATERIALS AND METHODS

Water samples were collected in one-liter sterilized bottles from the surface of different water bodies including ponds, pools, lakes, puddles, and ditches. Besides water samples, wet soil, decaying plant parts, algal forms, and other probable materials, were also collected. The collected samples were transferred in the sterilized glass trays. Each sample was baited with boiled and sterilized, hemp seed halves, snakeskin casts, nails, maize seeds, grass blades, ants, and flies, and incubated at 18°C for 30 hrs. Colonized baits were washed with sterilized distilled water containing a few drops of lactic acid. The baits were then kept in Petri Plates with sterilized distilled water and observed under a microscope. Collected algal forms and decaying plant parts were incubated and observed directly under a microscope for the presence of fungal species.

Details of the methods were followed by Sparrow (1960), Johnson (1973), and Dayal & Kiran (1985). Identifications were made with the help of the books and keys provided by Coker (1923), Coker & Matthews (1937), Sparrow (1960), Johnson (1956), Scott (1961), Howard & Johnson (1969) and Johnson (1973).

III.DESCRIPTION OF THE SPECIES IDENTIFIED

1. *Blyttiomyces spinulosus* (Blytt) Bertsch, Pl. 1, Fig. 1.
   Mycologia, 31: 559, Figs. 1-24, 1939.
   Zoosporangia multispored aggregated, globose, inoperculate, hyaline 15.0-30.4 µ long by 14-30.5 µ in diameter with a single exit pore, wall spiny, 7.5 µ in diameter and 3.0-5.5 µ high, hyaline smooth walled. Zoospores are spherical having large globules. Thallus coarse, consisting of apophyses separated by the zygospore wall of the host, with an extensive branched rhizoidal system. Resting spores are smooth, spherical 17.0-31.5 µ, averaging 26.0 µ in diameter, with two layered brownish-yellow-coloured walls.
   Parasitic on the oogonia of *Oedogonium* sp. This is a new host record for India. This taxon from the Rohilkhand region is reported for the first time.

2. *Myzocytium proliferum* Schenk, Pl. 1, Fig. 2.
   Bull. Nat. Sci. Mus. (Tokyo), 33: 64, Figs. 9, 1953.
   Thallus elongate and constricted, consisting of 1-15 segments. Sporangia many, in bead-like chains, hyaline smooth, spherical 17.0-21.5 µ in diameter, each forming a single narrowly cylindrical discharge tube, extending from a variable distance beyond the host wall, 8.5-11.0 µ long by 2.5-9.4 µ in diameter. Both the gametangia and sporangia are similar in shape and size. Oogonia ellipsoidal, oospores spherical 13.5-20.0 µ in diameter, oospore wall smooth, colourless, and acentric. Antheridia fusiform.
   Parasitic on *Spirogyra* sp. It is being reported for the first time from the Rohilkhand region.

3. *Olpidiopsis aphanomycis* Cornu. Pl. 1, Fig. 5.
   Ann. Sci. Nat. Bot. V. 15: 148, Pl. 4. Figs. 5-11.
   Thallus endobiotic, holocarpic, and zoosporangia are one to many in terminal and intercalary swellings of the host hyphae. Sporangia ellipsoidal to spherical; wall smooth, thin provided with long or short discharge tubes. The ellipsoidal sporangia are 35.5-70.6 µ long and 16.3-29.5 µ in diameter, and spherical ones are 14.5-25.0 µ in diameter. Resting spores globose, brownish, thick-walled; wall ornamented with papillae 18- 30µ in diameter. Companion cells lacking.
   Parasitic in *Aphanomyces levis*, collected from water baited with human nails. The taxon is reported for the first time from Northern India.

4. *Olpidiopsis varians*, Figs. 6-7.
   J. Elisha Mitchell Sci. Soc., 55:171, text figs. A-E, PI. 24
   Thallus endobiotic, holocarpic, Zoosporangia one to many in terminal occasionally, intercalary swellings of the host hyphae; spherical; subglobose, fusiform, ellipsoidal, variable in size; 41- 139 µ long by 17.5-83.0 µ thick in diameter. The walls are smooth, thin, and yellow-brownish in colour. Exit tubes 1-3, variable in length. Zoospores are numerous biflagellates, ovoid, 2.0-3.0 µ long by 1.5-2.0 µ thick in diameter. Resting spores are spherical, ellipsoidal, ovoid, 27.5- 68.0 µ in diameter, the outer surface covered with many small, pointed, straight or curved spines. Spherical, oval, smooth-walled companion cells are present with each resting spore.
   Parasitic in hyphae of *Achlya klebsiana* and *Achlya proliferoides*, collected from the water on hemp seeds and flies. A new record in the Rohilkhand region.

5. *Olpidiopsis luxurians* Barrett., Pl. 1, Fig. 3-4.
   Ann. Bot. London, 26:231, Pl. 23- 26, 1912.
   Thallus endobiotic, holocarpic. Zoosporangia is one or many in terminal and intercalary swellings of the host hyphae. Zoosporangia, spherical, oval, or elliptical; variable in size, 15.5- 30.4 µ long by 10.6-27.5 µ in diameter. Wall smooth and thin, light yellow. Exit tubes 1-3, variable in length. Zoospores are numerous, small, elliptical 1-1.7 µ in diameter, and biflagellate. Resting spores spherical, 20.5-32.4 µ in diameter, outer surface covered with numerous short spines. Companion cells present, 1-3 with each resting spore, spherical, oval, ellipsoidal, smooth-walled, 8.5-22.4 µ in diameter. Parasitic

in hyphae of *Aphanomyces levis* and *Aphanomyces helicoides*, collected from wet soil on snake skin. A new record in Rohilkhand region, India.

6. *Olpidiopsis saprolegniae* var. indica, Dayal and Thakur var. Nov., Pl. 1, Figs. 8,9., Fig. 11.
Sydowia 22:278-283. Figs. 6-11
Thallus endobiotic, holocarpic. Zoosporangia one to many, mostly in terminal swellings of the host hyphae, globose, subglobose ovoid, ellipsoidal 15.5-166 µ long by 15-157.5 µ in diameter, occasionally in intercalary, hypertrophied filament of the host. Sporangial wall thin smooth, light yellowish, discharge tube 1- 4; variable in length. Zoospores are ovoid to elliptical; 1.7-3.5 µ in length. Resting spores are spherical, subspherical 22-86 µ in diameter, brownish, thick-walled covered with small protuberances. Germination not observed. Companion cells one to two with each resting spore, ovoid to subspherical, 15- 42 µ in diameter thin-walled, and colourless smooth. Parasitic in the filament of *Saprolegnia litoralis*. By inoculating the parasite in *Dictyuchus* sterile, it could parasitize a few filaments of *Dictyuchus* sterile, in old cultures.
A new record for this region.

7. *Olpidiopsis saprolegniae* var. levis Coker, Pl. 1, Fig. 10-11.
The Saprolegniaceae, P. 185, PI. 62, Figs. 1-5, Chapel Hill, N. C., 1923.
Thallus endobiotic, holocarpic. Zoosporangia one to many, mostly in terminal, rarely intercalary, hypertrophied filament of the host; spherical to elliptical, smooth, variable in size 11-148 µ in diameter. Wall smooth, thin, colourless, emptying by one to three exit tubes, variable in length. Zoospores, very minute, numerous, ellipsoidal, encysted spores 1.2-2µ in diameter; oogonia elliptical or spherical; oogonial wall thick, quite smooth, and even. Antheridial cells are smaller. The oogonia are smooth, and thin-walled, with one to three attached to each oogonium. Testing spores are spherical, 22-82 µ in diameter, wall smooth, thick, and yellowish. Companion cells not seen. Parasitic in the filaments of *Saprolegnia ferax* and *Saprolegnia declina*, collected from water samples on hemp seeds and ants. A new record for the Rohilkhand region.

8. *Olpidiopsis pythii* (Butter) Karling. Pl. 1, Figs. 12-13.
Simple, Holocarpic Biflagellate Phycomycetes, P. 47, 1942.
Thallus endobiotic, holocarpic, Zoosporangia one to many in terminal and intercalary swellings of host hyphae, spherical, elliptical, variable in size, 8.5-32.4 µ in diameter, predominantly 16.7- 24.5 µ. Wall smooth, thin, colourless, emptying by 1-2 exit tubes, variable in lengths. Zoospores are numerous and ovals. Encysted spores 1.2-2 µ in diameter. Resting spores are ovoid, spherical, and ellipsoidal; 9-23.6 µ in diameter, predominantly 18 µ. The outer surface is brown, covered with small spines. Companion cells are absent. Parasitic in the filament of *Pythium monospermum* collected from water samples on grass leaves and sesame seeds. A new record for this region.

9. *Olpidium* sp. Pl. 2, Fig. 1.
Thallus holocarpic and endobiotic. Zoosporangia are one to many in terminal and intercalary parts of the host hyphae; wall smooth, thick, colourless, emptying by a single exit tube. Resting spores are spherical and ellipsoidal, 12-21 x 22-31 µ with a wall composed of 2 layers thick. Smooth exospore, somewhat brownish and finely verrucous endospore, germination not observed.
Parasitic in the hyphae of *Achlya americana*, collected from wet soil on hemp seeds and flies.

Note: This species of *Olpidium* does not show parallel resemblance with any single species of *Olpidium* described earlier and neither any species of this genera has so far been reported on any species of *Achlya*. That is why the taxon could not be established on the species level.

10. *Rhizophydium carpophilium* (Zopf) Fischer., Pl. 2, Figs. 2-4
Nova Acta Acad. Leop.-Carol., 47: 200, Pl. 20, Figs. 8-16.
Thallus eucarpic. Zoosporangia is one of many epibiotic, spherical, 13.5-21.5 µ in diameter bearing prominent discharge papilla. Zoospores discharge through broad apical pores. The endobiotic portion

of the thalli consisted of sparingly branched rhizoids. Resting spores thick-wailed 16-28.5µ in diameter, bearing a rhizoidal system similar to sporangium.

Collected as a parasite on the oogonia of *Achlya hypogyna* and *Saprolegnia ferax* from water samples on hemp seeds and flies and reported for the first time from this region.

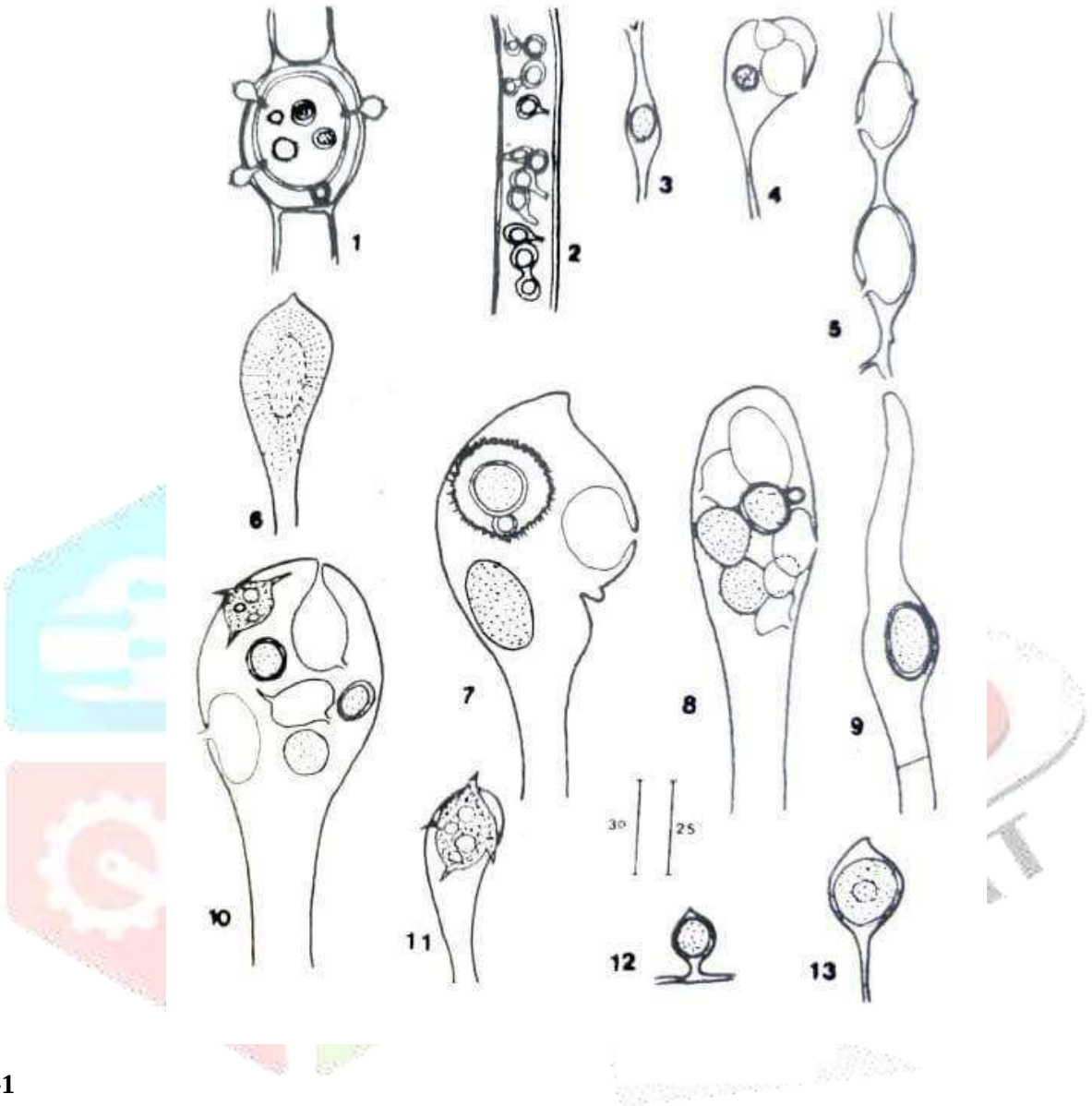

Plate-1

Fig.1- *Blyttiomyces spinulosus*, zoosporangia and resting spores infecting the oogonia of *Oedogonium* sp.
Fig.2- *Myzocytium proliferum*, chains of empty sporangia in the filament of Spirogyra sp.
Fg3-4 *Olpidiopsis luxurians*, resting spores and discharges sporangia in the hyphae of Aphanomyces levis.
Fig.5- Olpidiopsis aphanomyois, discharged zoosporangium in the hypha of Aphanomyces levis
Fig.6- *Olpidiopsis varians*, initial infection stage in the hypha of *Achlya proliferoides*.
Fig.7- *Olpidiopsis varians*, discharged sporangia and resting spore in the hypertrophied hypha of *Achlya proliferoides*.
Fig.8- *Olpidiopsis saprolegniae* var. indica, zoosporangia; discharged sporangia and resting spores in the infected hyphae of *Saprolegnia litoralis*.
Fig.9- *Olpidiopsis saprolegniae* var. indica, resting spore in the filament of *Dictyuchus* sterile.
Fg10-11- *Olpidiopsis saprolegniae* var. levis, discharged sporangia mature sporangia, and resting spores in the hyphae of *Saprolegnia ferax*.
Fig 12-13- *Olpidiopsis pythii*, resting spore and sporangia in the filaments of *Pythium monospermum*.

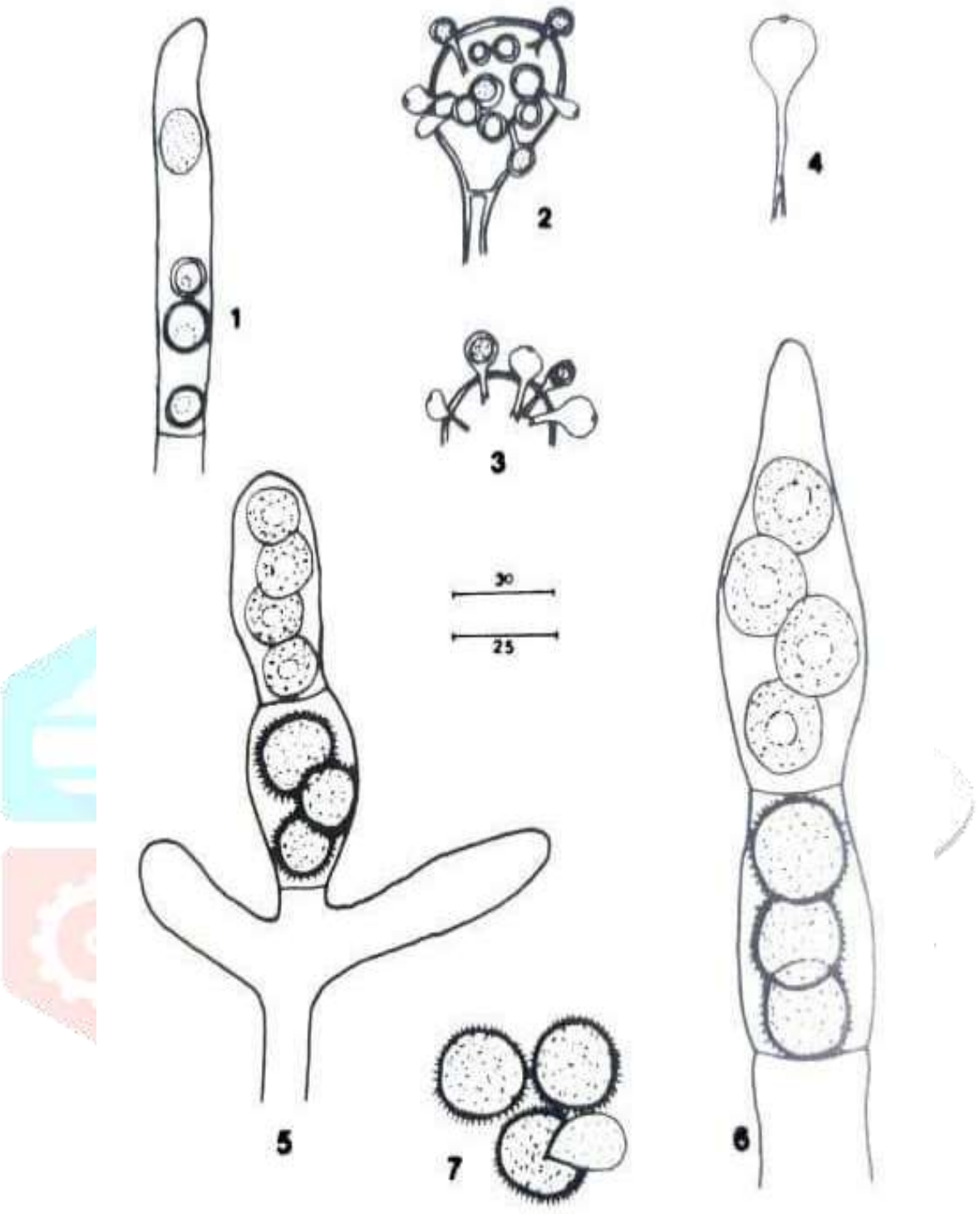

Plate -2

Fig.1- *Olpidium* sp., endobiotic sporangia in the hypha of *Achlya americana*.
Fig.2-4- *Rhizophydium* Carpophilium Thalli growing on the oogonia of Saprolegnia ferax.
2- Thalli growing on the oogonia of *Achlya hypogyna*.
3-4- A mature thallus.
Fig.5-7- *Rozella allomyces.* Endobiotic sporangia and resting spores in the hyphae of *Allomyces arbuscula.*
5-6-7- A germinating resting spore.

11. *Rozella allomycis* Pl. 2, Figs. 5-7.
J. Elisha Mitchell Sci. Soc. 53: 198, Pl. 22-23, 1937.
Thallus holocarpic, endobiotic. Zoosporangia one to many in terminal and intercalary segments of the host hyphae, filling the more distal parts of the host hyphae; inoperculate, thin-walled, smooth, developing linearly from one to eight in the basipetal chain, 17.5-46.7 µ long by 9.6-23.3 µ in diameter, usually with one to two discharge papillae, Zoospores ovoid, 2.5-3.0 µ wide, having a single globule,

posteriorly uniflagellate; resting spores formed behind the sporangia in 1 to 18 swollen, spherical, subspherical irregular or segments; 15-85 µ long by 15- 44.5 µ in diameter, each segment containing one to twelve, brownish to blackish resting spores, the latter spherical 10.5- 26.0 µ in diameter, including the spines. Germination observed, on germination functioning as sporangium.
Parasitic on *Allomyces arbuscula*, collected from wet soil on hemp seeds and sesame seeds. A new record for Northern India.

Morphological and taxonomic investigations of the 11 species of parasitic lower aquatic fungi constituting the phycomycetous flora of Rohilkhand region, Bareilly, India, was undertaken. Among all recorded species; *Myzocytium proliferum, Olpidiopsis varians, Olpidiopsis luxurians, Olpidiopsis saprolegniae* var. indica, *Olpidiopsis saprolegniae* var. levis, *Olpidiopsis pythii* and *Rhizophydium carpophilium* are new records for Rohilkhand region.
Olpidiopsis aphanomycis and *Rozella allomycis* are new records for Northern India.
A new species of Olpidium and a new host for *Blyttiomyces spinulosus* and *Olpidiopsis saprolegniae* var. indica has been reported for the first time in India.

REFERENCES

[1] Butler, E. J. 1907. An account of the genus Pythium and some Chytridiaceae. Mem. Dept. Agri. Bot. Ser. 1:1-160.
[2] Coker, W. C. 1923. The genera of Saprolegniaceae with notes on other water moulds, University of North Carolina Press. Chapel Hill.
[3] Coker, W. C. & Mathews, V. D. 1937. Saprolegniales. N. Amer. Flora, 2(1):15- 67
[4] Das Gupta, S. N. & John, R. 1953. Studies in the Indian aquatic fungi I. Some water moulds of Lucknow. Proc. Indian Acad. Sci. Sec. B. 38: 165-170,
[5] Dayal, R. & Thakurji. 1965. Studies in aquatic fungi of Varanasi. Proc. Nat. Acad. Sci. Sect. 8, 35:309-19.
[6] Dayal, R. & Thakurji 1968. Studies in aquatic fungi of Varanasi. III. Observations of some parasitic Phycomycetes Sydowie 22: 278-283
[7] Dayal. R. & Kiran, U. 1985. Zoosporic fungi of India. 1st Ed. Inter media. Pub. Co., Jalandhar, India.
[8] Howard, K. L. & Johnson, T. W. 1969. Aquatic fungi of Iceland Some filamentous, Eucarpic and Holocarpic species. Mycologia 61:496-510
[9] Johnson, T. W. Jr. 1956. The genus Achlya morphology and taxonomy. Univ. of Michigan Press, Ann Arbow.
[10] Johnson, T. W. Jr. 1973. Aquatic fungi of Iceland: Uniflagellate species. Acta Naturalia Islandice 22:1-38.

[11] Karling, J. S. 1948. An *Olpidium* parasite of *Allomyces*. Amer. J., 35:503-510.
[12] Karling, J. S. 1966. The chytrids of India with supplement of other Zoosporic fungi. Sydowia, 20:1-100.
[13] Khulbe, R. D. 1980. Occurrence of parasitic water moulds in some Lakes of Nainital, India. Hydrobiologia 70: 119-121
[14] Scott, W. W. 1961. A monograph of the genus *Aphanomyces*. Virginia Agr. Exp. Sta Tech. Bull. No. 151.
[15] Sparrow, F. K. 1960. Aquatic Phycomycetes. University of Michigan Press, Ann. Arbow.
[16] Srivastava, G. C. & Bhargava, K. S. 1963. Observations on Indian aquatic fungi. I. Three species of *Olpidiopsis* from Gorakhpur. Indian Phytopathology, 16:271- 274
[17] Srivastava, G. C. 1964. Observations on Indian aquatic fungi II. Occurrence of *Olpidiopsis varians* Shanor at Gorakhpur. Indian phytopathology, 17(3): 249-253.
[18] Srivastava, G. C. 1975. *Olpidiopsis indica* sp. new from India. Curr. Sci. 44(18): 642-644. Thirumalachar, M. J. (1947). Some fungal diseases of Bryophytes in Mysore. Trans. Brit. Mycol. Soc. 31: 7-12.