



The Genus *Dictyuchus* (Aquatic Fungi) Isolated from Aquatic Environment of Lucknow

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Abstract:

Members of Chytridiomycetes and Oomycetes-fungus like organisms are mostly aquatic and are popularly known as water moulds. Water moulds constitute the lower most group of fascinating fungi. These fungi contribute to the energy flow and productivity of aquatic and semi aquatic ecosystems by their active role in the utilization and biodeterioration of a variety of organic and inorganic materials. " Five species of Dictyuchus (D. anamalus, D. carpophorus, D. missouriensis, D. monsporus and D. pisci) isolated from 6 sites in Lucknow. Pioneers in the collection and identification of members of the Saprolegniaceae held opposing views on the supposed occurrence of these fungi in polluted or stagnant waters. In time, studies, were to show that water-moulds did indeed occur in organic enriched or industrial polluted streams and sediments.

Keywords: Water moulds, ecosystem, aquatic fungi, polluted, oomycetes.

1. INTRODUCTION :

Tax-ecological studies of water moulds—fungus like organisms (Oomycetes) from various habitats in India and abroad had been done (Misra, 1980, Khulbe, 2001 and Johnson et al., 2002), but lesser attempts appear to have been undertaken to see the diversity of oomycetes and other fungi occurring in polluted waters. In India we have plenty of sites that are variously polluted including our rivers. To bridge this gap in our knowledge, present investigation was undertaken for 6 sites in Lucknow (4 polluted and 2 comparatively lesser polluted sites) and a number of forms belonging to Saprolegniaceae and Blastocladiaceae were isolated.

This paper embodies the morphological characteristics of the forms isolated. Interesting morphological variations from the described isolates have been incorporated.

2. MATERIALS AND METHODS

Composite water samples from six different sites— water bodies, both that get seemingly polluted water through run off water and those that do not get any waters except through rain or general water supply, were aseptically collected twice a month. These sites are situated in Lucknow within the

radius of 4 Kilometres. Samples so collected were brought back to the laboratory within a few hours of collection and baited with boiled hempseed halves, ants, snake skin, housefly, wheat and maize grains in sterilized Petri plates in triplicate. The plates were incubated in refrigerator at the temperature of 17–20-degree Celsius. Baits having mycelial growth on them were taken out, washed thoroughly with sterilized distilled water and transferred to fresh Petri dishes half filled with autoclaved distilled water containing corresponding baits. Isolations were also made by baiting the aquatic sites with different fruits and flowers. The temperature of water near the bottom of the pond was recorded for each collection. The isolations were raised to pure cultures and identified with the help of available literature (Coker (1923), Mathews (1931), Karling (1942), Johnson (1956), Sparrow (1960), Seymour (1970), Dick (1973) and Johnson et al. (2002).

3. OBSERVATIONS

During the course of this study a total of 5 species of *Dictyuchus* (*D. anomalus*, *D. carpophorus*, *D. missouriensis*, *D. monosporus* and *D. pisci*) belonging to Saprolegniancea were recovered.

1. *Dictyuchus anomalus* Nagai J. Fac. Agr. Hokkaida, Imp. Univ. 32: 1-43, 1931.

Hyphae stout, up to 37 μ m in diameter. Sporangia cylindrical, 175-500 x 15-35 μ m and terminal. Gemmae absent.

This isolate only reproduces asexually. Isolated from site 5 (temp. 20° C, pH 7.9). No significant variations were with the isolates of Srivastava (1981) and Manoharachary (1981).

2. *Dictyuchus carpophorus* Zopf in Beitrage Z.

Phys. U. Morph, n. Organismen 3: 48, 1893.

Vegetative growth moderate, hyphae stout and branched. Gemmae absent. Sporangia borne on the tips of hyphae, renewed by cymose branching, persistent, becoming deciduous after escaping of the zoospores, long and slightly thicker apically, measuring 190-420 x 20- 40 μ m, all sporangia are of true net type. Encysted spores up to 11 μ m in diameter, escaping as usual. Oogonia abundant, borne on the short lateral branches from the main hyphae, smooth, spherical, measuring 30-40 μ m, in diameter, wall unpitted except at the place where antheridia touch. Antheridial branches arising from the tips of the main hyphae, one to two per oogonium, often enwrapping half of the oogonium, tuberous and declinous. Oospores 1-2 in number, almost filling the oogonium and measuring, 25 μ m in diameter and eccentric.

This isolate differs from that of Dayal and Thakurji (1968a) in having shorter and thicker sporangia. Oogonium being lesser in diameter. Oospores having lesser number and less in diameter. Isolated from site 1 (temp. 20° C, pH 8.0). Also, isolated from site 4, 6 and again from site 1 (site 1, temp. 18° C, pH 8.1; site 4, temp. 14° C, pH 7.6; site 6, temp. 19° C, pH 7.8).

3. **Dictyuchus missouriensis Couch in Jour. Elisha Mitchell Sci. Soc. 46: 227, 1931.**

Growth moderate on hempseed halves and hyphae branched. Gemmae rarely present. Sporangia abundant, long, secondary ones formed by the sympodial branching, measuring 210 -280 X 15-30 pm. Oogonia abundant, terminal, spherical and measuring, 25-30 pm in diameter, oogonial wall smooth and without pitting. Antheridia absent. Oospore one per oogonium, filling almost entirely, measuring, 25-30 pm. in diameter and eccentric.

Isolated from site 1 and site 5 (site 1, temp. 20° C, pH 8.0; site 5, temp. 15° C, pH 8.3). This isolate differs from that of Dayal and Thakurji (1968a) in having smaller oogonia and oospores. The sporangia, oogonia and oospores are also smaller than that of Couch (1931).

4. **Dictyuchus monosporus Leitgeb, in Jahrb. f. wiss. Bot. 7: 357, pi. 22, figs. 1-12 & pi. 23, figs. 1-8. 1869.**

Growth moderate on hempseed halves. Gemmae not seen. Sporangia terminal, long, thread shaped, thicker in the middle, measuring, 125-475 x 35-45 pm, renewed by sympodial branching. Encysted spores up to 11 pm in diameter. Oogonia terminal, single on a long stalk, spherical, 30 -35 pm in diameter, oogonial wall smooth and without pits. Antheridia always present, usually 2-3 per oogonium, diclinous and almost completely enwrapping the oogonium. Oospores, 2-3 per oogonium, measuring 25 pm, and centric.

Isolated from site 3, 4, 5, 6 (site 3, temp. 19 °C, pH

5. 9; site 4, temp. 21° C, pH 7.5; site 5, temp. 15° C, pH

6. 3; site 6, temp. 19° C, pH 7. 9). This isolate differs from Misra (1980) in having wider sporangium and larger oospores, that are more in number.

5. **Dictyuchus pisci Khulbe and Sati Bibliotheca Mycologica 91: 609-617, 1983.**

Mycelium grow well on hempseed halves, hyphae up to 32 pm thick. Gemmae absent. Zoosporangia abundant, simple, cylindrical in shape measuring, 230-325 x 15-30 pm. Encysted zoospores up to 20 pm in diameter. Oogonia abundant, spherical, 25-35 pm in diameter, oogonial wall smooth. Antheridia diclinous .Oospores 1 in number, spherical, eccentric, measuring 30 pm in diameter.

Isolated from site 2 (temp. 20° C, pH 8.0). This isolate differs from that of Khulbe (1985) in having shorter sporangium length and diameter, oospores having lesser in number and diameter.

4. DISCUSSION

Five aquatic fungal forms were isolated from six different aquatic sites including their mud samples. During the present study it was noted that almost all forms found are common as compared with the

reports of earlier workers (Das - Gupta & John, 1953; Dayal, 1958; Saksena & Rajgopalan, 1958; Dayal and Thakurji, 1965, 1968a, 1968b, 1968c, 1969; Srivastava, 1964, 1966, 1967a, 1975a, 1975b). It was observed that a few genera viz., *Aphanomyces*, *Leptolegnia* and *Thraustotheca* which have been reported to occur in Indian waters by previous workers, have never been encountered in the present screening of water and mud samples. The similar was the observation of Misra (1980) who has reported thirty aquatic fungi from alkaline habitats. The reason for this may possibly be the unusual aquatic environment studied, which has constantly exhibited higher sodium and potassium content, and total hardness coupled with higher alkalinity. Ecologically it appears that only those forms constitute the mycoflora of such muds and waters which have comparatively better ability and enough plasticity to tolerate the physico-chemical stresses and strains of the environment or those which have adapted the abode by developing certain degree of ecological adaptation.

5. CONCLUSION

Further, the isolation of 5 species of *Dictyuchus* indicates the order of preference of these genera to the polluted habitat studied. Some workers like Suzuki et al. (1960, 1961); Suzuki & Tatsudo (1965a, 1965b); Hodkinson & Dalton (1973); Farr & Paterson (1974); Hodkinson (1976); Liang & Liu (1985) have also reported water moulds from aquatic sites polluted by industrial wastes. These studies further emphasize the plastic nature of these fungi in relation to xvarying habitats and support the observations of the present study. But detailed ecological studies of fresh water isolates of *Saprolegniaceae* in order to give strength to the above hypothesis, warrant wide spread attention.

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REFERENCES

- Coker.** & Couch, J.N. (1923). A new species of *thraustotheca*. J. Elisha Mitchell. Sci. Soc. 39 : 112-115.
- Coker,** W.C. (1923). "The *Saprolegniaceae* with notes on other water Molds." Univ. North Carolina Press, Chapel Hill, 201 pp.



Johnson, T.W. Jr. Seymour, R.L. & Padgett. D.E. (2002). Biology and Systematics of the Saprolegniaeae. Department of Biological Sciences. The University of North Carolina at Wilmington.

Johnson, T.W. Jr. (1956). The genus Achlya : morphology and taxonomy University of Michigan Press, Ann. Arbon. 180 pp.

Karling, J.S. (1942). The simple, Holocarpic, Biflagellate Phycomycetes, Columbia University.

Khulbe, R.D. (2001). A manual of aquatic fungi (Chytridiomycetes and Oomycetes) Daya Publishing House, New Delhi, 255.

Mathews, V.D. (1931). Studies on the genus Pythium. The University of North Carolina Press.

Misra, J.K. (1980). Ph.D. Thesis, Lucknow University, Lucknow