

# A new Ascomycete on *Riccia*

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The paper reports a new species of ascomycetous fungus *Didymella*, viz., *D. thirumalachari* belonging to family Pleosporaceae as parasite in a thallus of *Riccia himalayensis* St. (a bryophyte). The species produces large flask shaped pseudothecia with several bitunicate asci, conspicuously constricted two celled, hyaline, ascospores, pseudoparaphyses and a wide spreading hymenium. Anamorph stage, *Phoma* species has also been found in the same thallus.

**Key-words**—Fungus, Parasite, Bryophyte, New taxon.

## INTRODUCTION

DURING the course of exploration of fungi of Western Ghats of Maharashtra State, India, the author came across some infected thalli of *Riccia himalayensis* St. These infected thalli externally showed conspicuous, sunken, black spots along the dorsal surface, which in preliminary observations were often confused with the capsules of *Riccia*. Critical observations, fruiting bodies and internal structure of the infected thalli showed that the fungus belongs to an undescribed species of *Didymella* Sacc.

Thirumalachar (1947) published an account of the fungi associated with or parasitizing the thalli of the liverworts and mentioned the occurrence of fungi only with the gametophytes. There are some reports of fungi occurring on Jungermaniales but only a few reports are related to parasitic fungi on the members of Marchantiales (Srinivasan, 1939). They were reported on *Marchantia*, *Lunularia*, *Preissia*, *Targionia*, *Cyathodium*, *Plagiochasma*, *Ricciocarpus*, and *Riccia*. The possible occurrence of a mycorrhizal fungus within the thallus of *Marchantia* was reported by Kashyap (1916) in India. Mahabale and Bhate (1945) have recorded the presence of a mycorrhizal fungus in the ventral tissue of the liverwort, *Fimbriaria angusta* St. In 1939 Srinivasan also collected some infected thalli of *R. himalayensis* and studied the development of the ascomycetous fungus in detail. He deposited this material in the British Museum for further identification. Later Stephens (1939) critically examined the deposited material and described it as *Phaeosphaerella ricciae*. The present ascomycetous species also infects *Riccia* thalli but widely differs from the previously described species *P. ricciae* in having pseudothecia, bitunicate asci, conspicuously constricted two celled, hyaline ascospores, pseudoparaphyses and several other characters. All the above characters clearly indicate that the fungus belongs to a new species of genus *Didymella* Sacc. Hence, it is being described as a new species.

## MATERIAL AND METHODS

The present investigations are totally based on free hand

sections and microtome preparations of the freshly collected infected thalli. No cultural methods were tried. Infected thalli were collected in polythene bags, brought to the laboratory and carefully washed in running water to remove the soil particles. They were fixed in FAA and processed through the alcohol - xylol series by usual method (Johnson, 1940). Thereafter, they were embedded in paraffin for microtomy. Sections were cut at 8 - 10  $\mu$ m thick to study details of the fungal development in the host. These sections were stained with haematoxylin -light green combination. Some fruiting bodies were crushed and squashed in 1 % iodine to detect the nature of the ascus wall.

## OBSERVATIONS

*Didymella thirumalachari* sp. nov.

(Plate I, Figs 1-5)

Peritheciis sparsis, immersis, nigris, globosis vel subglobosis, erumpentibus, 154–315  $\mu$ m in diam, (85.0-181.0 x 154-231  $\mu$ m); muris perithecialibus pseudoparenchymatis 3-5 seriatis; ascis cylindrico-clavatis, attenuatis ad basim, bitunicatis, 46.0-58.0 x 10.0 - 12.0  $\mu$ m, octosporis; sporis obliquemonostichis vel distichis, hyalinis, ellipticis vel ovoideis, uniseptatis, ad apicem rotunatis, ad septum/leviter constrictis, 14.0 -16 x 5.0  $\mu$ m; paraphysibus vel pseudoparaphysibus hyalinis, filiformibus.

In thallus of *Riccia himalayensis* St. IMI - 376341 (I) Type (Permanent Slide) Leg. R.V.GANDHE, October 10 1997, Ferguson Hills, Pune, India.

Pseudothecia many, immersed in thalli, sunken, erumpent, scattered along the upper surface of the thallus, black, conspicuous, globose, subglobose to flask shaped, 154 - 315  $\mu$ m in diameter (85.0 - 181.0 x 154 - 231  $\mu$ m) dark brown to black, embedded in the photosynthetic tissue, often merging laterally with adjacent pseudothecium. Pseudothecium wall uniformly thickened, 19.0-26.0  $\mu$ m in thickness, consisting of 3 to 5 layers of dark brown angular to prismatic cells. The pseudothecia become smaller and narrow at the apex. Pseudoparaphyses hyaline, numerous, septate, persisting at the top. Asci



## PLATE - I

1. Thallus of *Riccia himalayensis* showing infection. 2. V.S. thallus showing pseudothecia x 100. 3, 4. Sections showing enlarged ascocarp with asci x 450. 5. Ascus showing two celled ascospores x 450.

Table 1- Showing comparison to allied species of *Didymella*

Species	Pseudothecia	Paraphyses	Asci	Ascospores
<i>Didymella hellebori</i>	Immersed, subglobose to flattened, 187 - 213 $\mu\text{m}$ wide by 156- 187 $\mu\text{m}$ high	Hyaline, septate, 1.5-3.0 $\mu\text{m}$ wide	Bitunicate, more or less cylindrical 58.5-77 X 12-14.5 $\mu\text{m}$	Ellipsoidal, straight to slightly curved, 17-21 x 5-7 $\mu\text{m}$ , hyaline, septate more or less at the middle
<i>Didymella thirumalachari</i> sp. nov.	Immersed in thalli, sunken, subglobose to flask shaped 154-315 $\mu\text{m}$ in diameter (84.7 - 180.0 x 154 -231 $\mu\text{m}$ )	Hyaline, numerous, septate 18.9x 25.9 $\mu\text{m}$ in thickness	Many, Bitunicate, more or less radially arranged 46.2-57.7 x 9.6- 11.5 $\mu\text{m}$	Ellipsoidal, straight to slightly curved, 4.8 x 14.4-16 $\mu\text{m}$ , hyaline, thin walled, two celled

numerous, crowded, bitunicate, more or less radially arranged, mostly cylindrical, broader at the middle and gradually tapering at the both ends, 46.0 - 58.0 x 10.0- 12.0  $\mu\text{m}$ . Ascospores ellipsoidal, straight to slightly curved, hyaline, thin walled, two celled, round at one end, usually eight in number, often uniseriate or sometimes biseriate in ascus, 5.0 x 14.0-16  $\mu\text{m}$ , distinctly constricted at the middle at the septum. Upper cells sometimes wider, lower cell slightly tapering, wall smooth.

IMI - 376341 (I) Type (Permanent Slide) in thallus of *Riccia himalayensis* St. Leg. R. V. GANDHE, October 10 1997, Ferguson Hills, Pune, India.

### DISCUSSION

Srinivasan (1939) while working on Bryophytes found a few infected thalli of *R. himalayensis* by an ascomycetous fungus and described the detailed development of the fungus in the host tissue. However, he was unable to identify the fungus to the generic level and he deposited the material in the British Museum (Natural History) for further identification. Later on Stephens (1939) examined the deposited material and described it as *Phaeosphaerella ricciae*. However, his observations were based on very small amount of preserved material. No fresh material was available to him for critical observations. Therefore, he admitted his difficulty in deciding the genus and simply described it as *P. ricciae*. He further compared and identified the fungus by referring previous records on Hepaticae. i) *Arcangelia Hepaticarum* Sacc. in *Riccia tumida* (Italy), which differs in having shorter neck, hyaline spores and long hyphal-like hairs on the perithecia, ii) *Phaeosphaerella marchantiae* (Starb.) P. Henn. which has smaller spores and shorter neck, and iii) *Lizonia emperigonia* (Aeursw.) de Not., which occurs on a moss, *Polytrichum commune*, not on a liverwort, and is quite superficial with a very short neck. Stephens further remarked that the deposited material showed both pycnidia and sclerotia, which are presumably organically connected with the above-described species of Pyrenomycetes. Finally he concluded that the deposited material showed different characters than the previously described species of Srinivasan. Hence he established a new species, *Phaeosphaerella ricciae*.

Recently, Corlett (1981) made a taxonomic survey of some species of *Didymella* and *Didymella* like species. He discussed the species delimitation in the genus and supplied a key for identification to the species based on fungus morphology and host. He characterized *Didymella* and critically evaluated the differences between *Didymella* and its allied genus

*Mycosphaerella*. He further confirmed that the species of *Didymella* distinctly show conspicuously constricted and broader ascospores, large pseudothecia, numerous crowded pseudoparaphyses and a wide spreading hymenium than the species of *Mycosphaerella*. Therefore, he suggested revision of many species, which were wrongly placed under *Mycosphaerella*. He further added that the principal anamorphs of *Didymella* are *Ascochyta* and *Phoma* species. These anamorphs are often found in the same thallus. The species described here shows very close similarities of pseudothecia to *Didymella*. It also shows *Phoma* species as an anamorph in the same thallus. The present species certainly satisfies the characters of *Didymella*. Further, it resembles *Didymella hellebori* in few characters (Table I) but widely differs from it by several other characters. The large numerous immersed pseudothecia and pycnidia in the present bryophyte thallus, many septate fragmented pseudoparaphyses, distinct bitunicate asci and conspicuously constricted hyaline ascospores put apart this species from *D. hellebori* and other described species. Therefore, a new species viz., *Didymella thirumalachari* parasitic on *Riccia himalayensis* is proposed.

*Etymology*: The proposed species is named in honour of a well-known mycologist Late Professor M.J. Thirumalachar, an internationally reputed mycologist of India.

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