

Original Research Article

First Recorded Rare Microhabitat for *Stemonitis inconspicua* from Maharashtra, India

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ABSTRACT

The present research work is the contribution to the existing knowledge of habitat diversity within myxomycetes. Myxomycetes or True Slime Molds are the cosmopolitan group of organisms, collected as fruiting bodies or plasmodium from different usual substrates like woody debris from forest floor, forest floor litter, bark surface of living trees, aerial litter, soil and dung of herbivorous animals. The present paper describes the rare and unusual occurrence of *Stemonitis inconspicua* on stone from Sagaon forest, Alibag Maharashtra, India. From the available taxonomic data on Indian myxomycetes, *S. inconspicua* was only reported from Thatchi, Mandi and Himachal Pradesh on decaying coniferous wood, thus the present study not only adds a new microhabitat for the said species but also a new locality to the existing taxonomic knowledge. The research work also describes the taxonomical variations observed in the collected specimen which were larger fructification, uncommon elongated elliptical spore shape and smaller spore size.

Keywords

Stone,
Unusual,
Stemonitis
inconspicua,
Alibag,
Microhabitat,
Rare

Introduction

Myxomycetes or True Slime molds are the unique eukaryotic organisms of the earth that occurs wherever the conditions are suitable to them. The group comprise of about 1000 species distributed worldwide and are mainly regarded as “Terrestrial organisms”. Myxomycetes are currently classified as Myxogastriids in the Superclass Amoebozoa and in the first class Eumycetozoa (Adl *et al.*, 2005). This follows the International Code of Zoological Nomenclature and the proposed classification of protists by the International Society of Protistologists (Adl *et al.*, 2005).

Myxomycetes are always overlooked in nature mainly due to their smaller size and place where they prefer to grow. Their size mainly varies from few millimeters to centimeters, but some species like *Fuligo septica* may grow up to 70×54×3cm (world record specimen, Keller and Braun, 1999). They commonly occur in cool, shady and moist places and are common inhabitant of decaying plant materials.

General life cycle

Life cycle of myxomycetes shows fruiting bodies which are generally macroscopic and

bear reproductive units called spores. When suitable condition arises, the spores germinate to give rise to two types of gametes or sex cells i.e. myxoamoebae (non flagellated) and swarm cells (flagellated). Both gametes feed, grow and fuse to produce large population.

Under unfavorable conditions, the myxoamoebae converts into resistant cysts called microcysts. Two compatible swarm cells or myxoamoebae ultimately fuses to form diploid zygote which then undergoes repeated mitotic division to give rise to multinucleate plasmodium. Plasmodium creeps for the search of food and under suitable condition give rise to one or more fruiting bodies containing spores. Under adverse condition, the plasmodium may convert into sclerotium which is a hardened resistant structure, which has capability to reform plasmodium when suitable condition arises in nature.

Geographical distribution

From available regional studies, it is clear that the myxomycetes are cosmopolitan in their distribution; still few species are restricted to tropics while others are confined to temperate. (Alexopolous 1963; Farr 1976; Martin *et al.*, 1983) for e.g. *Hemitrichia clavata*, common to temperate region (Stephenson and Stempen, 1994) while *Tubifera bombarda* is well known tropical myxomycetes.

It was also emphasized that myxomycetes diversity in tropical forests is mainly associated with aerial microhabitats, while in temperate regions it is forest floor. Nivicolous species, a distinct group of myxomycetes associated with high snow cover in mountain was also reported while some species have been reported from the aquatic habitats (Shearer and Crane, 1986).

However, only one paper of Blackwell and Gilbertson (1980, 1984) contributes to the knowledge about myxomycetes from desert ecosystem.

Usual microhabitats

Various researchers observed different microhabitats associated with myxomycetes during field collection. These include woody debris from forest floor, forest floor litter, bark surface of living tree, aerial litter, soil and dung of herbivorous animals.

It was also noted that particular species shows association with certain types of substrates only (Stephenson and Stempen, 1994). Lignicolous (wood inhabiting) myxomycetes are best known, while less is known about the myxomycetes associated with bark surface of living tree and forests floor litter for e.g. *Arcyria*, *Stemonitis* and *Trichia* are predominant wood inhabiting species, while species like *Diderma effusum*, *Physarum bivalve* and *Physarum cinereum* were mostly collected from forest floor litter and assumed to be litter inhabiting (Gray and Alexopoulos, 1968; Stephenson, 1989) while some species of *Echinostelium*, *Licea* and *Macbrideola* genus seems to restrict on bark microhabitat.

Eliasson and Lundqvist (1979) reported about 80 species from dung while number of workers (Thom and Raper, 1930; Indira, 1968) studied soil myxomycetes and reported the genera *Didymium* to be abundant in soils (Feest and Madelin, 1988 a, b). Only one study by Basanta *et al.* (2008) reports 65 species of myxomycetes associated with liana microhabitat while the work of Estrada-Torres *et al.* (2009) provides the intensive study of myxomycetes from cacti and succulent's plant and reported 104 species and one variety of myxomycetes.

Unusual Habitats

In addition to above discussed usual habitat, myxomycetes were also reported from unusual habitats like living lizards, mammal skulls, spider, on other myxomycetes and fungi, which adds more fascination to their nature.

The first report of fruiting of *Physarum pusillum* on the body of living cryptic lizard *Corytophanes cristatus* was given by Townsend *et al.* (2005). The only paper of Keller *et al.* (2008) exhibits various unusual occurrences of myxomycetes like occurrence of bright yellow coloured phaneroplasmodium of *Physarum polycephalum* on oyster mushroom *Pleurotus ostreatus*, phaneroplasmodial track on a dog skull, *Craterium leucocephalum* fruiting on squirrel skull, *Licea poculiformis* stalked sporangium from the leg of dead spider and sporangia of *Physarum albescens* on rock respectively.

The paper also reports the rare occurrence of myxomycetes like *Physarum pusillum* on top of plasmodiocarp of *Perichaena vermicularis*, *Barbeyella minutissima* on columella of *Lepidoderma tigrinum* and *Clastoderma debaryanum* on *Diderma chondrioderma* and stalked sporangia of *Stemonitis* species on stem of *Monotropa uniflora* respectively.

Geographical details of Study area:

Sagaon is a small village in Alibag, Raigad district of Maharashtra state, India. The village is situated at the base of mountain full of dense forest. Maximum temperature remains in mid thirties. Monsoons are extremely rainy during the months of June to September. The maximum amount of rainfall in the month of July can reach up to 750 mm. The geographical coordinates are N 18°40'43.32" E 72°55'33.79".

Taxonomy

Stemonitis inconspicua Nann.-Brem.

Fructification sporangiate, stipitate, up to 3 mm in length. Sporangia gregarious in small clusters, erect or bent or flexuous, dark brown becoming paler after dehiscence, cylindrical, apex obtuse or slightly narrowed, 1.7–2.2 mm in length, 0.3–0.4 mm wide; peridium fugaceous; columella well developed narrowing upwards, reaching nearly the apex of the sporangium, merging into the capillitial net just below the apex; capillitium arising from the entire columella, primary branches prominent, branched and anastomosed to form a large meshes internal net which possesses many membranous expansions, peridial net small meshed, delicate and fragmentary, meshes 10-30 μm in wide, with many free ends; spore mass brown to dark brown, pale violaceous in transmitted light, globose, 6–7 μm in diameter, reticulate, 2–4 meshes per diameter, reticulations lighter than the spore boundary stipe.

Distribution in India: Thatchi, Mandi, Himachal Pradesh

Recorded locality: Sagaon forest, Alibag, Raigad, Maharashtra

Habitat: Decaying coniferous wood.

Recorded habitat: Stone

Variations: Fructifications up to 4.5–6 mm in length, spore shape elongated elliptical, globose spores about 4.6–7 μm while elongated spore 9–13 μm in diameter respectively.

Myxomycetes or Slime molds are cosmopolitan in their distribution, but still most neglected group in modern research, in

terms of biodiversity, taxonomy and ecology. The main reason behind this is their unique life history, showing characters of both fungi (spore producing) and animal (locomotion).

Many workers from different regions of the world contributed to the existing data about the biodiversity of myxomycetes and accounts that the common habitats occupied by the myxomycetes include woody debris from forest floor, forest floor litter, bark surface of living tree, aerial litter, soil and dung of herbivores animals. Till now only one species i.e. *Physarum albescence* is recorded from rock (Keller *et al.*, 2008) and stated that this may be because phaneroplasmodium can migrate to a greater extent and can sporulate to a drier site. Keller *et al.* (2008) also reported the occurrence of *Stemonitis* on the stem of Indian pipe, *Monotropa uniflora* which was totally different from the microhabitat reported in the present paper i.e. Stone.

Stemonitis inconspicua is characterized by shortly stalked, densely clustered sporangia, up to 3 mm in length, a delicate capillitial net and banded reticulate spores with only 2-4 meshes per hemisphere. Keller in 1973

reported the same species from Florida but his specimens possessed taller fruiting bodies (2.5–3.5 mm) and larger spores (7–9 μm) in diameter. This Specimen is so far known only from Netherlands and Great Britain while in India it is reported from Thatchi, Mandi, Himachal Pradesh. (Lakhanpal and Mukerji, 1981) and was on decaying coniferous wood.

The present paper thus provides a new habitat for the said species and a first report from Maharashtra state, India. The variations noticed in the collected specimen were taller fructifications up to 4.5–6 mm in length, spore shape globose to elongated elliptical, globose spore were somewhat smaller measuring 4.6–7 μm while elongated spore were of about 9–13 μm in diameter. These variations may be due to adverse environmental conditions and unusual fruiting of the species on barren area of stone.

Such unusual occurrences were reported to be rare and accidental in nature. But every species on the earth will always finds its way of survival and proves the theory of Darwin “Survival of Fittest”.

Figure.1 Life cycle of a typical myxomycete. A) Mature fruiting body. B) Germinating spore. C) Myxoamoebae. D) Fusion of swarm cells. E) Fusion of myxamoebae. F) Zygote. G) Mature plasmodium. H) Beginning of sporulation. (Google image)

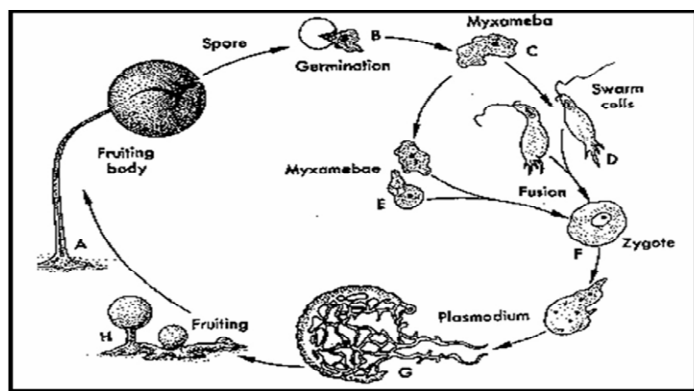


Figure.2 Photomicrographs of *Stemonitis inconspicua*; A- Reticulate spores and capillitial net and B- Unusual elongated spores with normal globose spores

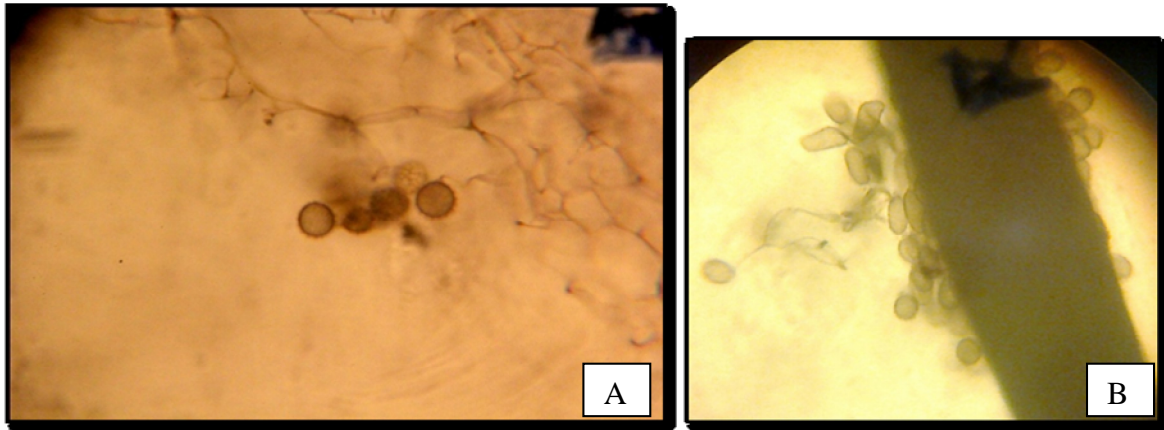


Figure.3 Rare occurrence of *Stemonitis inconspicua* on stone



Figure.4 Stereomicroscopic image of *Stemonitis inconspicua*

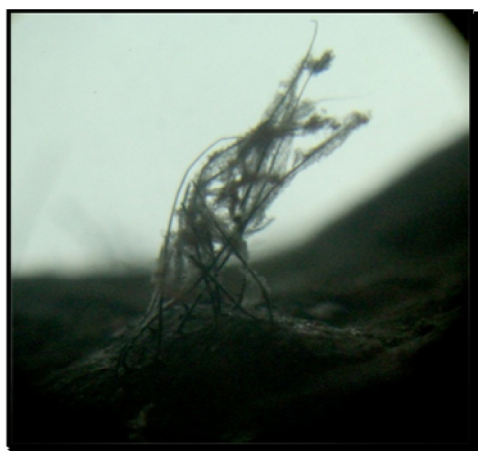


Figure.5 Silvery shining Aphanoplasmodial tracks of *Stemonitis inconspicua* on stone



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