INTRODUCTION

The state of Maharashtra is the third largest state in India, both in area and population. It forms a major part of Western India, extending over an area of 306345 sq. kms and is almost within the limits of Deccan trap.

The state comprises three natural divisions: narrow coastal low land of Konkan, the Sahyadri ranges and the Deccan plateau. The state is divided into three regions viz. Western Maharashtra, Marathwada and Vidarbha.

The Western Maharashtra has a shape like that of a narrow, oblique leaf blade and is traversed by Sahyadri ranges, more or less parallel to west coast and divide it in narrow coastal strip to the west, "Konkan" and to the east "Desh or Deccan plateau".

Both the regions are connected by routes and paths, locally called "Ghats". The major among them are Bhor and Kumbharli, the others are Bor, Amboli, Phonda to mention some. These ghats are at elevations between 770 - 1540 metres above mean sea level.

The Western Maharashtra, especially the ghat region, is very rich in variety of plant material and is of great interest to Plant geographers and Taxonomists. Many workers like Dalzell and Gibson (1861); Blatter (1909) and Mahabale (1966) have pointed out that the Western Maharashtra region is not only rich in Angiosperms, but also in Algae, Bryophytes and Pteridophytes. From
endless reports of many genera and species of Fungi (Kamat et al, 1971), it can be seen that fungi also abound in Western Maharashtra with other plant groups.

Until recent years large number of fungi belonging to various groups have been reported. The first consolidated report of fungi of Maharashtra (old Bombay Presidency), was published by Uppal, Patel and Kamat (1935) and was supplemented by Patel, Kamat and Bhide (1948). The latest list of "Fungi of Maharashtra" has been published by Kamat et al (1971).

In spite of the good work done on taxonomy of various groups of fungi, few ecological groups like Predaceous fungi, Entomogenous fungi, Myxomycetes seem to be poorly attended to. There are only a few isolated reports of Myxomycetes from Maharashtra. Therefore, it appears that this group of organisms remained more or less neglected inspite of its abundance in this area.

Myxomycetes are characterised by an assimilative phase in the form of a free living, multinucleate, amoeboid, acellular mass of protoplasm the "Plasmodium and a propogative phase consisting of mass of spores enclosed in simple or complex spore cases alongwith a system of netted, branched threads, the "capillitium".

The typical fruitions of Myxomycetes show
1) hypothallus, (ii) stipe (may be present or absent) and (iii) fruiting body or sorocarp.

**Hypothallus**: It is a membranous, horney, spongy or
calcareous stratum on which sporophores are usually seated. It is deposited by plasmodium at the time of sporulation. It may be abundant or scanty to almost absent.

**Stipe**: The sorocarp (actual fruiting body) may be stalked or sessile. When stipe is present, it is usually cylindrical, subulate and in a few cases hair like. It may be calcareous or non-calcareous. It is hollow or filled with strand like material (e.g. Stemonitales) or stuffed with granular material or spore like cells (e.g. Trichiales). Sometimes stipe is nothing but an extension of hypothallus. The characteristics of stipe and its length are important taxonomic features.

**Actual fruiting body or Sorocarp**: It typically occurs in the following three distinguishable forms.

**Sporangia**: from single plasmodium one to many sporangia are simultaneously developed. They may be sessile (Fig.no. 8) or stalked (Fig.no. 1) and have characteristic size, shape and colour. They show various shapes like globose (Fig.no. 1; Pl.fig. 66), depressed globose (Fig.no. 3), reniform (Fig.no. 2; Pl.fig. 53), cylindrical (Fig.no. 4; Pl.fig. 77), hemispherical (Fig.no. 5; Pl.fig. 87), cupulate (Fig.no. 6; Pl.fig. 49) and thimble shaped (Fig.no. 7; Pl.fig. 46).

**Plasmodiocarps**: a typical plasmodiocarp (Fig.no. 12; Pl.fig. 42) is like a sessile sporangium but more or less elongated and forms a net over the substratum, retaining to a certain extent the habit of the plasmodium. The variety of shapes of plasmodiocarps occur in nature, varying from sporangium like spheres to a net work of tubules.
Aethalia: an aethalium is a fairly large and massive structure formed by conversion of entire plasmodium into a single fruiting body (Fig. nos. 10, 11; Pl. figs. 33, 47). Sometimes sporangia are very compactly arranged and the entire body appears as an aethalium. However, the sporangia are clearly distinguishable at or close to the maturity. Such fruiting is called pseudoaethalium (Fig. no. 9, Pl. fig. 44).

The sorocarps (except for Ceratiumyxa Schroet.) are covered by a delicate or tough, early evanescent (Fig. nos. 22, 47–50) or persistent wall, the "peridium" which is made up of single, double or triple layers that are closely appressed or widely separated. It may be calcareous (Fig. no. 102), non-calcareous (Fig. no. 95) or cartilaginous (Fig. no. 110). The configuration of lime on the peridium is also an important taxonomic character. The fruiting body or sorocarp on maturity dehisces to liberate the spores. The dehiscence of the peridium may be either irregular (Fig. no. 13; Pl. figs. 1, 67), along preformed lines (Fig. no. 20; Pl. fig. 4), by longitudinal slit (Fig. no. 21; Pl. fig. 29), along apical suture (Fig. no. 14; Pl. fig. 5), circumscissile (Fig. nos. 15, 16; Pl. fig. 3), cup and lid like (Fig. no. 18; Pl. fig. 2), stellate (Fig. no. 19; Pl. fig. 6), into petaloid lobes (Fig. no. 17) or sometimes the peridium is evanescent leaving the net behind (Fig. no. 22; Pl. fig. 7).

Inside the peridium are enclosed spores along with a system of threads the "capillitium". The capillitium may be elastic (Fig. no. 47) or non-elastic (Fig. no. 84) and
shows variety of ornamentations such as smooth (Fig.no. 23; Pl.fig. 10), spirals (Fig.no. 26, 27; Pl.fig. 13), spirals with spines (Fig.no. 25; Pl.fig. 14), warty (Fig.no. 24; Pl.fig. 11), half rings (Fig.no. 28; Pl.fig. 15), complete rings (Fig.no. 29; Pl.fig. 16) etc. The capillitium may be calcareous (Fig.no. 30, 31) or non-calcareous (Fig.no. 23; Pl.fig. 10). It may be attached to the peridium or columella or both. A pseudocapillitium (Fig.no. 32; Pl.fig. 17), as it typically occurs in aethalia, usually represents the empty strands of plasmodium from which the protoplasm has been evacuated before the spore formation. It shows wrinkles as well as transverse folds (Fig.no. 42 Pl.fig. 17). The capillitium plays an important role in the liberation of spores. The presence or absence of capillitium is also an important taxonomic character.

The asexual reproductive bodies i.e. the spores are borne externally (in Ceratiomyxa Schroet. Fig.no. 39 B; Pl.fig. 26) on individual stalks "spicules" or inside the fructification. Spores are thick walled, uninucleate and haploid structures in compact or loose clusters or are free. They are generally globose (Fig.no. 35; Pl.fig. 22) to subglobose, elliptic (Fig.no. 33; Pl.fig. 25), oval, walnut like (Fig.no. 38 Pl.fig. 19) etc. The spore wall shows variety of ornamentation like smooth (Fig.no. 33; Pl.fig. 19), warty (Fig.no. 34; Pl.fig. 20), spiny (Fig.no. 35; Pl.fig. 21), incompletely reticulate (Fig.no. 36; Pl.fig. 22), reticulate (Fig.no. 37; Pl.fig. 24), with ridges (Pl.fig. 23), with encircling ridge (Fig.no. 38; Pl.fig. 19, 21) to mention
some. The colour of the spores in mass, is the key character in taxonomy of Myxomycetes while the characters like shape, size and ornamentation of spores are used in distinguishing the species.

Along with the spores and the capillitium, a structure which is generally a continuation of stipe into the sorocarp, called columella, (Fig.no. 106; Pl.fig. 8) may be present. It may differ in its colour and nature. Like columella, pseudocolumella (Fig.no. 89; Pl.fig. 9) may also be present. The nature and shape of columella and pseudocolumella are important characters used in taxonomy of Myxomycetes.

The spores on germination give rise to swarm cells or myxamoebae which fuse in pairs to form a free living, amoeboid, acellular mass the "plasmodium". Plasmodium may be hyaline, red, yellow, violet, black with many intermediate shades. Three main types of plasmodia are recognised: microscopic "protoplasmodium"; the flat, transparent "aphanoplasmodium" and thick, gelatinous, granular "phaneroplasmodium" (Pl.fig. 27; Alexopoulos 1962). The type of plasmodium is another important taxonomic feature (Alexopoulos 1969).

The members of the group are widely distributed and occur wherever conditions promote the growth of vegetation. They are preferably moisture and shade loving, and are abundant in forest lands on dead, decaying wood, litter, dead leaves, organic matter and also in the soil (Thom and Raper 1930; Krezmieniewska 1929; Warcup 1950).
Some species also occur on bark and a few in open spaces.

The present work is confined to the Myxomycetes collected from different localities in Western Maharashtra (Map no. 2). The localities visited were Amboli, Bhimashankar, Kanakeshwar, Karjat, Katraj, Khandala, Kolwan, Lohagad, Mahabaleshwar, Matheran, Panchgani, Pashan, Pune, Purandhar, Sinhgad, Vani hills, Vavoshi and Vitthalwadi. During this survey 81 species of Myxomycetes belonging to 23 genera are collected, studied and described. The species are described in the alphabetical order.

Since, not much work has been done on this group in Maharashtra, the study of Myxomycetes is undertaken. It is more or less a pioneering work in this part of the Country.
TYPES OF FRUCTIFICATIONS

Fig. no.
1. Stipitate, globose sporangium - Physarum leucopus.
2. Stipitate, reniform sporangium - Physarum compressum.
4. Stipitate, cylindrical sporangium - Diachea leucopodia.
5. Stipitate, hemisphaeric sporangium - Diderma hemisphaericum.
6. Stipitate, cupulate sporangium - Craterium leucocaphalum.
7. Stipitate, thimble like sporangium - Physarella oblonga.
8. Sessile sporangium - Diderma testaceum.
10. Aethalloid fructification - Fuligo cinerea.
11. Aethalloid fructification - Lycogala epidendrum.
DEHISCENCE, CAPILLITIUM AND SPORE TYPES

1. Irregular dehiscence - Physarum leucopus.
2. Dehiscence by apical cleft or suture - Physarum compressum.
3. Circumscissile dehiscence - Diderma hemisphaericum.
4. Circumscissile dehiscence - Perichaena depressa.
5. Fetaloid dehiscence - Physarum tenerum.
6. Cup and lid like dehiscence - Craterium leucocaphalum.
7. Stellate dehiscence - Physarella oblonga.
8. Dehiscence along preformed lines - Diderma roanse.
10. Fugacious peridium leaving net - Cribaria aurantiaca.
11. Smooth non-calcareous capillitium - Diachea khandalensis.
12. Warty capillitium - Perichaena depressa.
15. Capillitium with spirals - Hemitrichia clavata.
16. Capillitium with half rings - Arvyria denudata.
17. Capillitium with rings - Cornuvia serpula.
18. Capillitium calcareous with nodes and internodes - Physarum roseum.
19. Capillitium calcareous without internodes - Bachania macrocarpa.
23. Spiny, globose spores - Physarum mortonii.
24. Incompletely reticulate, globose spores - Physarum echinosporum.
26. Walnut shaped spores showing encircling ridge - Physarina echinospora.
PLATE FIGS. 1-9

DEHISCENCE, COLUMELLA AND PSEUDO-COLUMELLA

1. *Diderma deplanatum* Fries showing irregular dehiscence.

2. *Craterium leucocephalum* (Pers.) Ditmar showing cup and lid like dehiscence.

3. *Diderma hemisphaericum* (Bull.) Hornem. showing circumscissile dehiscence.

4. *Diderma roseae* (Rex) Macbr. dehiscing along preformed lines.


7. *Cribraria aurantiaca* Schrad. showing evanescent peridium leaving net.

8. *Diderma cor-rubrum* Macbr. showing columella.

CAPILLITIUM, PSEUDOCAPILLITIUM AND NODES OF NET

10. *Diachea khandalensis* sp. nov. showing smooth, non-calcareous capillitium.

11. *Perichaena depressa* Libert showing warty capillitium.


15. *Arcyria demidata* (L.) Mettst. showing half rings on the capillitium.

16. *Cormuia serrula* (Wigand) Rost. showing complete rings on the capillitium.

17. *Lycogala epidendrum* (L.) Fries showing wrinkles and transverse folds on pseudocapillitium.

18. *Cribraria aurantiaca* Schrad. showing convex nodes of the peridial net.
PLATE FIGS. 19 - 27

SPORE TYPES, SPOROPHORE AND PLASMODIUM

19. Didera munensis sp. nov. showing smooth, walnut shaped spores having encircling ridge.

20. Physarum sumatli sp. nov. showing warty, globose spores.

21. Physarina echinospora Third and Manocha showing spiny, walnut shaped spores having encircling ridge.

22. Physarum echinosporum A. Lister showing globose spores with incomplete reticulation on the spore wall.

23. Didera subdictyosparum ( Rost. ) G. Lister showing ridges on the spore wall.

24. Licea sinhagadensis Patil, Ranade and Mishra showing reticulate spores.

25. Caramomyxa fruiticulosa ( Mull. ) Macbr. showing elliptical, smooth spores.

26. Sporephore of Caramomyxa fruiticulosa ( Mull. ) Macbr. showing spores borne on spicules.

27. Phaneroplasmidium.
MATERIAL AND METHODS

The slime-moulds normally appear in moist areas during wet seasons and as such they usually appear on the onset of monsoon in this part of the Country. Hence, most of the collections have been made during rainy season or just after rains, during July to January or so. Few localities from Western Maharashtra as mentioned in the text (page no. 7) were selected for the collections. These localities were visited at least 3 to 4 times or even more every year during the tenure of the research work. The slime-moulds were collected on dead, fallen decaying leaves, stem pieces, wood, bark, litter, organic matter such as dung, humus rich soils etc. from the forests and also in the neighbourhood of the cultivated areas having fairly thick vegetation. It was noticed that these forms grow on any plant material and show very little or no preference for particular substratum. Most of the forms were collected on dead organic matter with few exceptions e.g. *Stemonitis herbatica* Peck and *Physarum cinereum* (Batsch) Pers. which were collected on green, herbaceous plants.

The specimens were collected in cardboard or plastic boxes and brought to the laboratory. They were examined by usual laboratory methods. They were observed first under dissecting binocular microscope (Bosch and Lamb, Germany) and were picked up for further studies. Before their actual mounting on the slide, their characteristic features such as colour, size, nature of the fruiting body, dehiscence etc. were carefully observed and recorded. The colours were checked with Mathuen Hand book of colours (Kornerup and Wansbeek, 1967) to have
standardised notation of colour of fruiting body, spore and capillitium.

Many times, leaf litter, debris, bark, rotten logs were collected in the fields and brought to the laboratory for moist chamber cultures. The materials were soaked overnight in sterile distilled water and placed on moist filter paper. These studies could help in observing the development of the slime-moulds.

Slides were prepared by picking or scraping off the material from the substratum. For simple microscopic examination materials were treated with absolute alcohol, followed by 2 - 3% KOH for causing plumpness of the inner parts. KOH was then blotted out. A drop of 8% glycerine was added as a mounting medium and temporary slides were prepared. These slides helped in observing the nature of the lime on peridium, size and shape of the lime knots and spores etc.

In the similar manner, semipermanent slides were prepared by using Amann’s medium instead of glycerine.

**Formula of Amann’s medium:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenol</td>
<td>20 gms</td>
</tr>
<tr>
<td>Lactic acid</td>
<td>20 gms</td>
</tr>
<tr>
<td>Glycerine</td>
<td>40 ml</td>
</tr>
<tr>
<td>Water</td>
<td>20 ml</td>
</tr>
</tbody>
</table>

Slides were gently heated before they were sealed by sealing wax. It was also found convenient and helpful to prepare permanent slides of some of the forms for the study of the capillitium, columnella etc. Materials were passed through
alcohol grades, alcohol-xylol grades, xylol and finally mounted in Canada-balsam (e.g. members of Stemonitales Pl. fig. 113 – 117). All the above preparations helped in identifying various genera and species of Myxomycetes.

Habit sketches were made by using dissecting binocular microscope and camera lucida drawings were made with the help of "Erma" camera lucida, at the stage level, using 3.5 X, 5 X, 10 X, 40 X and 100 X objectives and 3.5 X, 5 X, 6 X, 10 X and 15 X eyepieces. Choice of the combination of eyepiece and objective lenses was according to the size of the specimen. Careful measurements were taken by using 6 X Ernst- Leitz Wetzler occular and 10 X, 40 X and 100 X objectives, which enabled in preparing the detailed morphological description of each specimen. Photomicrographs of the slides of some of the forms were taken by using "Ernst- Leitz Wetzler" unit of photomicrography. Photomicrographs of some specimens were also taken by zoom camera (MA IV b Leitz Wetzler Co., Germany) to have more realistic views.

Identification of these organisms and their early reports for India and Maharashtra, were confirmed with the help of following literature:

Lister G. (1925); Lodhi (1934); Mundkur (1938); Butler and Bisby (1960); Vasudeva (1962); Mathur (1964); Tilak and Rao (1968); Martin and Alexopoulos (1969); Kamat et al (1971); Ainsworth and Sussman (1973); Mukerji and Juneja (1974); Nannenga-Bremekamp (1974) and Sorbhoy et al (1975).
The specimens are glued on the cards and are placed in cardboard boxes of 9 x 5 x 3 cms size.
Specimens are deposited in the Botany Department,
University of Poona, Pune - 411 007.