

THE NATURAL HISTORY OF SLAPTON LEY NATURE RESERVE XI: MYXOMYCETES (SLIME MOULDS)

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ABSTRACT

An introduction to the natural history of myxomycetes is given, with details of collection and identification. The distribution of species in different habitats on the reserve is presented and a list of 87 species is recorded for the reserve. Of these *Echinostelium elachiston* Alexop. is reported from the British Isles for the first time and several rare species are recorded as new to Devon.

INTRODUCTION TO MYXOMYCETES

THE myxomycetes are a group of fungus-like organisms whose true nature has puzzled biologists for a long time. Are they animals—or plants? Are they fungi—or protozoans? They are found all over the world, in all kinds of situations, but, in spite of their abundance, they have been generally neglected until the last two decades or so when they have become important experimental organisms for the geneticist, the biochemist, the developmental morphologist and physiologist, and even for the cancer researcher interested in nuclear division.

It is, however, their miniature beauty which first aroused my interest, particularly when seen through a hand lens. Most species are about one millimetre high or broad. A representative selection of common species is illustrated in Figs. 4, 5 and 6 and in the plates.

The stage in the life cycle of a myxomycete, or slime mould, likely to be found on a log or dead leaf is the fruiting body or *sporangium*. Depending upon the genus, this may resemble a miniature fir tree (Fig. 6B), a toadstool (Fig. 6A), a puffball, a reedmace spike (Fig. 6C), or look like a row of black-headed pins (Fig. 4A). The wall of the sporangium may be brightly coloured, iridescent or dull gray or white from deposits of lime, either as star-like crystals or as an egg-shell-like crust. The sporangia may be stalked or may rest directly on the substrate. Some fruiting structures are made up of a thin ribbon of material one sporangium thick but several sporangia long. These structures are always without stalks and are called *plasmodiocarps* (e.g. Fig. 5F).

Where a large mass, often several centimetres in diameter, of sporangial material has matured so that the individual sporangia are obscured we have an *aethalium*.

In some cases the walls of the sporangia making up the mass are still visible and this is then a *pseudoaethalium* (Fig. 6D.)

The fruiting bodies, whether sporangia or aethalia, contain *spores*, which are spherical bodies averaging 10 μm in diameter. They have thick walls ornamented with warts, spines and ridges which may form a network over the surface of the spore. The spore markings are important for the identification of species. Also in the sporangium may be structures which assist in the dispersal of spores. They may be spirally wound tubes, called *elaters*, or an elastic, loofah-like network. In other species there may be limy plates connected by non-limy tubes. These structures, often hair-like, are the *capillitium* and they are important in classification. The

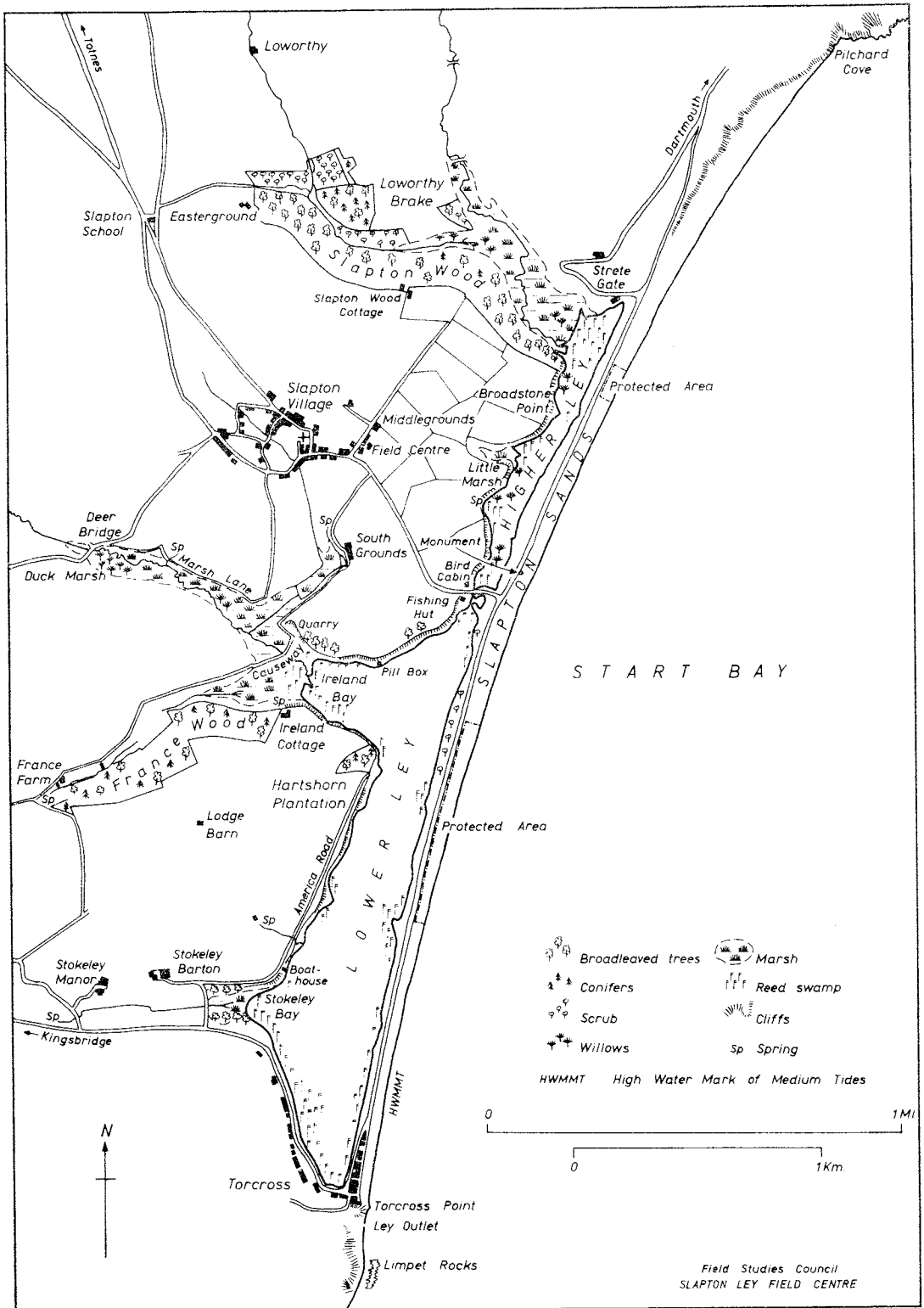


FIG. 1.
Slapton Ley Nature Reserve

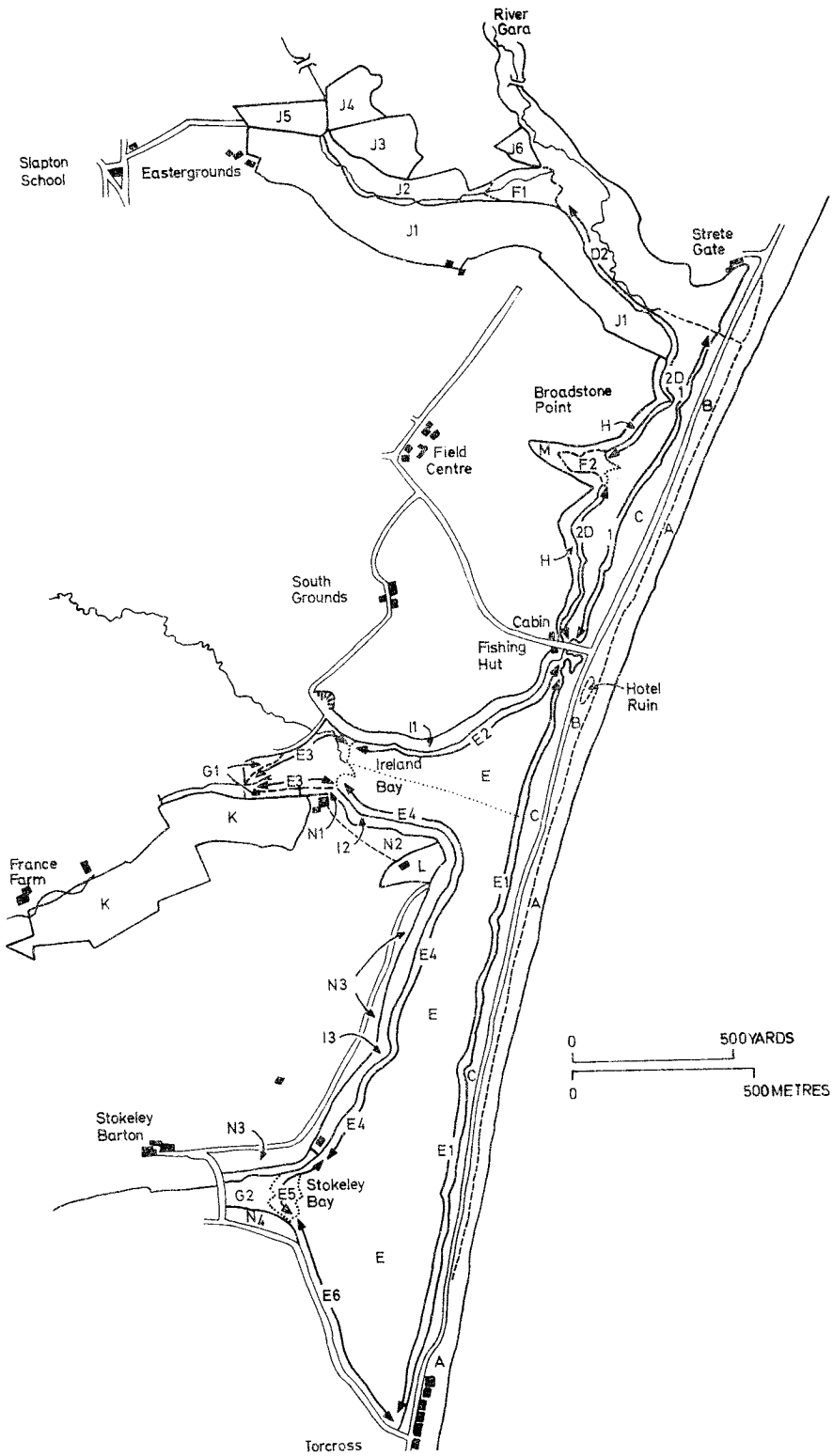


FIG. 2.
Slapton Reserve; recording areas

capillitium expands or contracts with changes in atmospheric humidity and so alters the size of the gaps through which the spores can escape from the sporangium and into the air. Some sporangia are cup-shaped and spores are dispersed by drops of rain or drips from trees splashing them out of the cups.

The typical life cycle of the myxomycetes is shown in Fig. 3. The spore, after liberation from the sporangium and alighting on a suitably damp substrate, absorbs water and germinates. A split appears in the wall and the contents of the spore slip out. The object which emerges is equipped with two swimming hairs, or *flagella*, one long and one short, and is the *zoospore* or *swarm cell*. It swims about in the film of moisture and after a while withdraws the flagella and then resembles a very small edition of the familiar *Amoeba*. This stage, the *myxamoeba*, is involved in both feeding and dividing. Food is engulfed in the same way as in pond amoebae and cell division takes place, resulting in a swarm of myxamoebae. Some of these pair up and begin the next phase of the cycle.

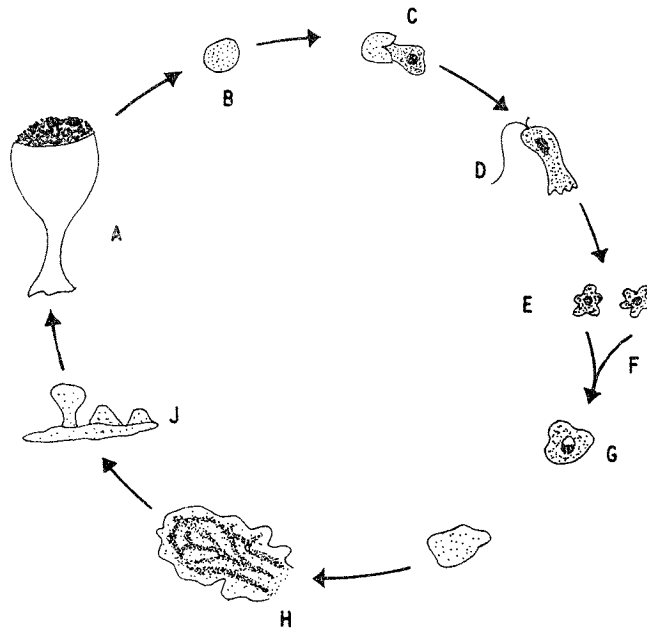


FIG. 3.

Simplified life cycle of a typical myxomycete.

- | | |
|---------------|--------------|
| A—sporangium | F—fusion |
| B—spore | G—zygote |
| C—germination | H—plasmodium |
| D—zoospore | J—fruiting |
| E—myxamoebae | |

The reproductive mechanism in slime moulds follows one of at least three alternatives: either the myxamoeba is sufficient by itself to divide non-sexually and produce the next stage, in which case no genetic material is exchanged; or there is a fusion between two myxamoebae with the consequent exchange of genetic information. The third process is sexual and will either involve myxamoebae of the same mating-

Table 1. Distribution of myxomycete species on different substrates

Unit	Total	Bark	Wood	Litter and dead herbaceous stems						Living grasses
				General	Ulex	Ilex	Rubus	Phragmites	Urtica	
B	3		3							
C	15	3			4		8		1	1
CY	8		3	5						
D1	5							5		
DM	1		1							
E6	4	3		1						
F1	1			1						
G1	3		1					2		
G2	1							1		
I1	2		1						1	
12/3	1									1
J1	62	10	38	14		4	1		1	1
J2	12		10	2					1	
J3	11		9	1		1			1	
J4	5		2				2		1	
J5	3		2						1	
K	19	5	10	1		4			1	
L	11	1	10							
N3	4		1	3					1	
N4	12	7	5							
S	7		7							
Reserve	87	14	47	18	4	4	8	4	1	2

type or of different mating-types. Whichever route is taken the product of fusion of myxamoebae, or direct development in the non-sexual forms, is a cell which undergoes rapid and repeated nuclear division without division of the rest of the cell. This produces a multinucleate structure which acts like a giant amoeba and engulfs food particles such as bacteria. This new structure is the main feeding phase in the life cycle and is called a *plasmodium*. It occurs in soil, leaf litter or in dead wood and may grow to as much as two metres in length, thus claiming the record for the largest single cell. Most plasmodia, however, are only a few centimetres across, and some remain microscopic in size. It is the slimy appearance of the plasmodium which suggest the name 'slime mould'. The plasmodium is capable of considerable movement and crawls through and over its substrate in search of food. Plasmodia produce antibiotics which kill the bacteria they later use as food. If conditions become too dry, too hot or too cold, the plasmodium may be converted into a horny resting stage, the *sclerotium*. This will revert to a plasmodium when conditions improve.

When the plasmodium has exhausted the food supply, it emerges onto the surface of the substrate and forms a series of raised blobs. These differentiate into sporangia. The nuclei from the plasmodium are surrounded by protoplasm, a wall forms and they become spores. Whatever material is left over becomes the capillitium, stalk, sporangium wall or a layer of horny material on the surface of the substrate connecting the sporangia called the *hypothallus*. Those species containing lime secrete it at this stage and the lime may be found in the capillitium, sporangium wall, stalk or hypothallus.

Possession of a plasmodium, myxamoebae and a fungus-like sporangium distinguishes the myxomycetes from all other organisms. The amoeboid stage and the physiology of the plasmodium show strong affinities with the protozoa, while the

spores and sporangia resemble those of fungi in the possession of such substances as chitin and cellulose. On the other hand, the animal protein keratin has also been identified in myxomycetes. The plasmodium has vein-like conducting strands which show some similarities to hyphae in a fungal mycelium. In the past these plasmodial slime moulds have been called "Mycetozoa"—fungus-animals—and this name has recently been revived by Olive (1970, 1975) in his re-classification of all the slime mould groups.

A common slime mould that is no longer regarded as a true myxomycete is *Ceratiomyxa*. Although it has a true plasmodium, it develops its spores in a manner different from that described above and is probably best placed in a class by itself, *Ceratiomyxomycetes*, which is intermediate between the true myxomycetes and the soil protozoa.

In modern classifications of the fungal or plant kingdoms the slime moulds are placed in a phylum Myxomycota. It might be better to include them with the protozoa and other non-multicellular organisms in the Kingdom Protista.

For a useful introduction to the biology of slime moulds see Ashworth and Dee (1975) and for a more detailed review of the subject consult Gray and Alexopoulos (1968).

COLLECTION AND IDENTIFICATION

In spite of their small size myxomycetes are easy to find, especially in woodland in autumn, and certain of the larger species, such as *Reticularia lycoperdon* in spring and *Fuligo septica* in summer are easy to see.

By carefully examining small sticks, slowly turning them along their axis and looking for sporangia on the "sky-line" of the stick, many common species will be found.

It is difficult *not* to find *Comatricha nigra* by this method. Logs should be carefully scrutinized, especially soft, damp patches of rotten wood at the ends or the lower part of the sides. Colonies may show up as patches of colour or as a change in surface texture. The underside of pieces of loose bark, especially of ash or hornbeam, is a good place to find species such as *Perichaena depressa*. Larger logs can be rolled over to allow access to the underside—they should always be returned to the original position. Bracket fungi such as *Stereum* and *Phlebia* are frequently overgrown by the plasmodia and later the sporangia of *Badhamia utricularis*, so logs bearing these fungi should receive special attention.

The standing trunks of dead trees, especially hawthorn and pine, may bear large aethalia of *Reticularia lycoperdon* and *Symphytocarpus flaccidus* respectively; the fruit bodies may appear several metres above ground.

Leaf litter is a rich habitat and, where it has piled up under trees or in thick drifts on the woodland floor or in hedge bottoms, it will repay careful searching. The leaves should be turned over one at a time and sporangia will usually be found in the top few centimetres of litter. Where some leaves are marked with dark slime tracks showing where the plasmodium has crawled, fruit bodies can be found on neighbouring leaves. In damper parts of the litter, plasmodia may be found and these will often fruit if kept in a damp container for a day or so. Holly litter is especially good, particularly if a large bush has branches hanging close to the ground. Bramble clumps are also an excellent, if uncomfortable, habitat; both the litter and the arching stems in the middle of the clump are worth searching.

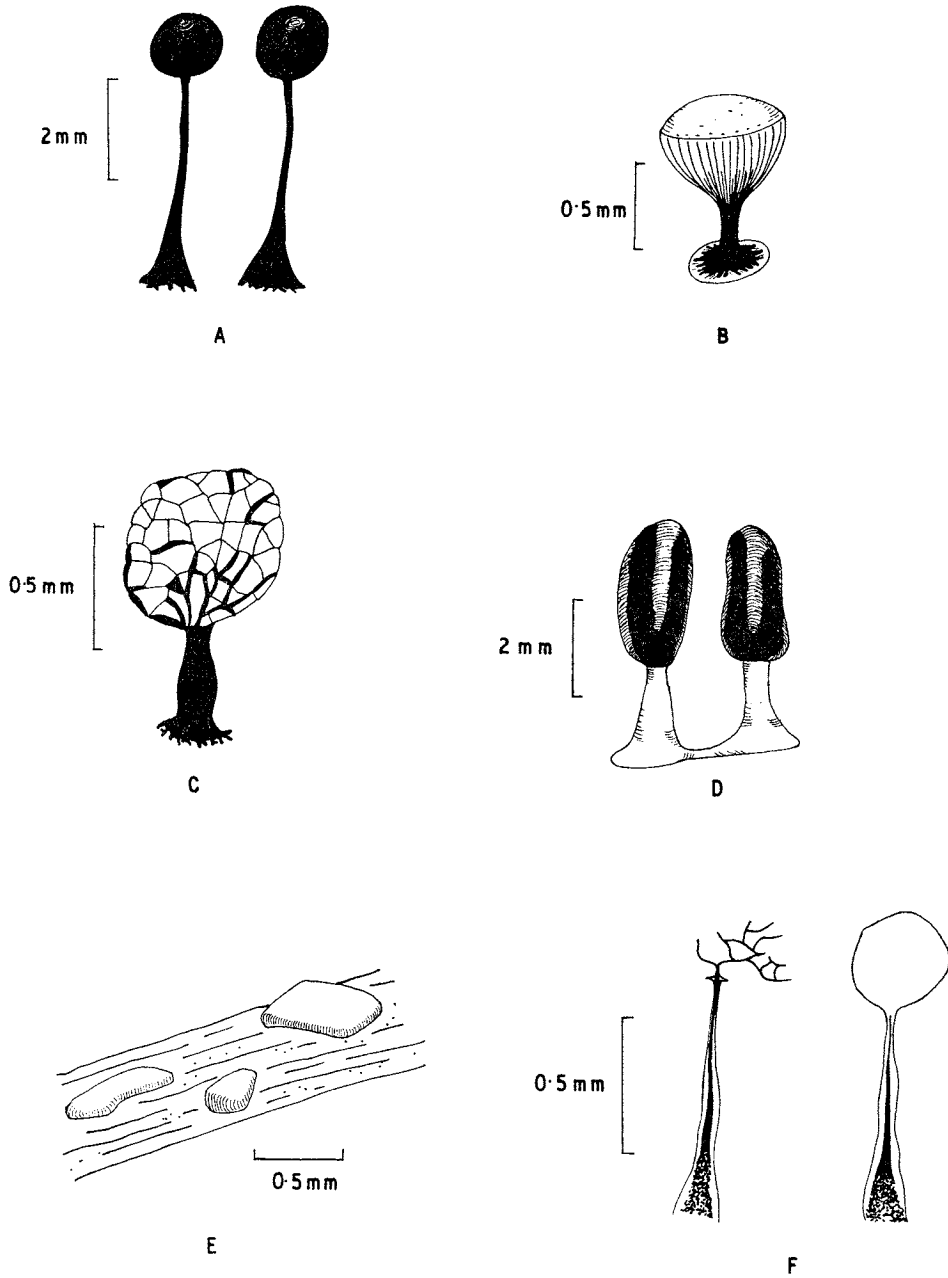


FIG. 4.

A—stalked sporangia of *Comatricha nigra*; B—stalked, lidded sporangium of *Craterium minutum*; C—stalked sporangium of *Cribraria argillacea*, showing peridial net; D—stalked sporangia of *Diachea leucopodia*, showing limy stalks arising from hypothallus; E—sessile sporangia of *Didymium difforme*; F—stalked sporangia of *Echinostelium minutum*.

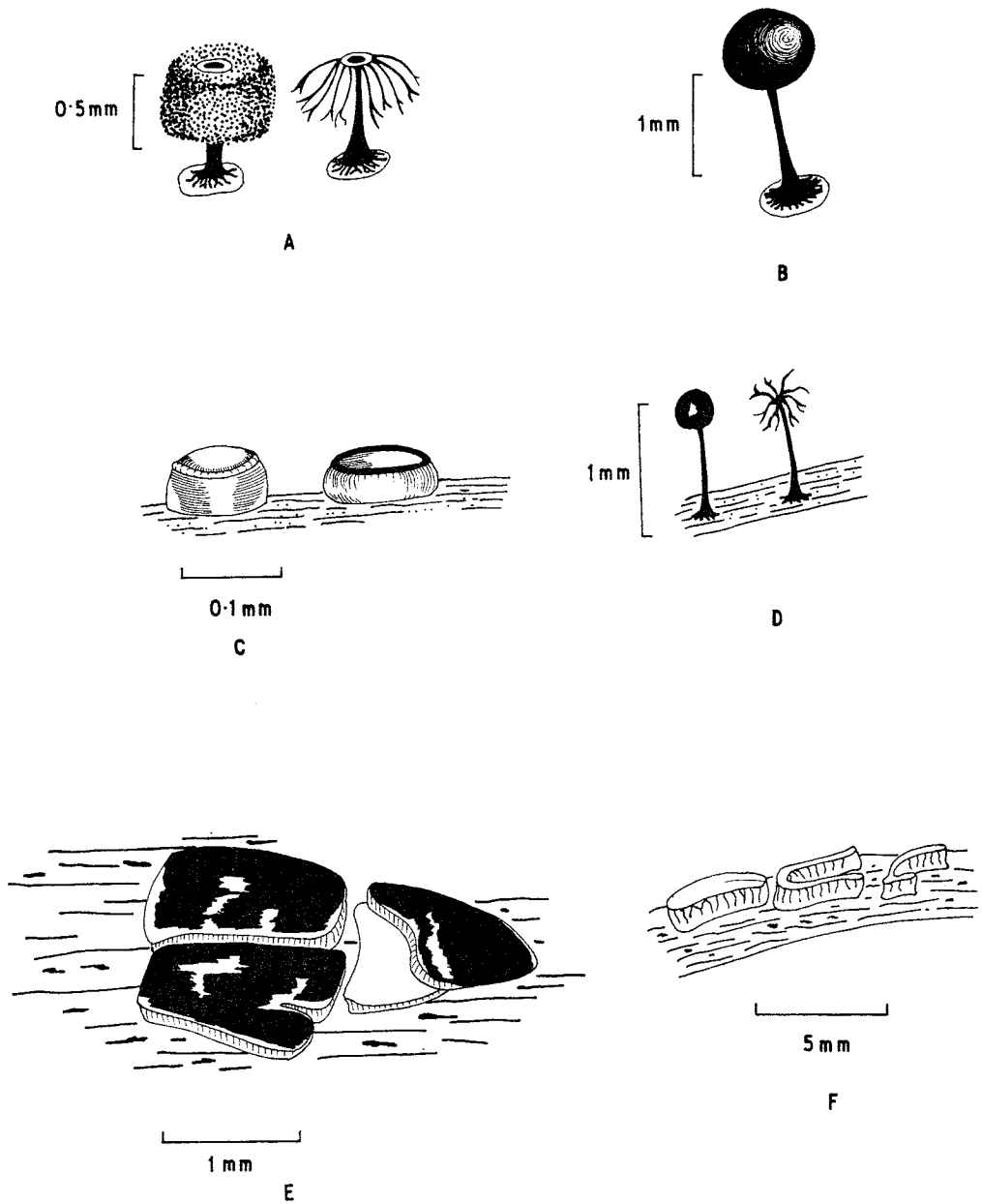


FIG. 5.
 A—stalked sporangia of *Enerthenema papillatum*; B—stalked sporangium of *Lamproderma scintillans*; C—sessile sporangia of *Licea parasitica*; D—stalked sporangia of *Paradiacheopsis fimbriata*; E—sessile sporangia of *Perichaena depressa*; F—plasmodiocarps of *Physarum bivalve*.

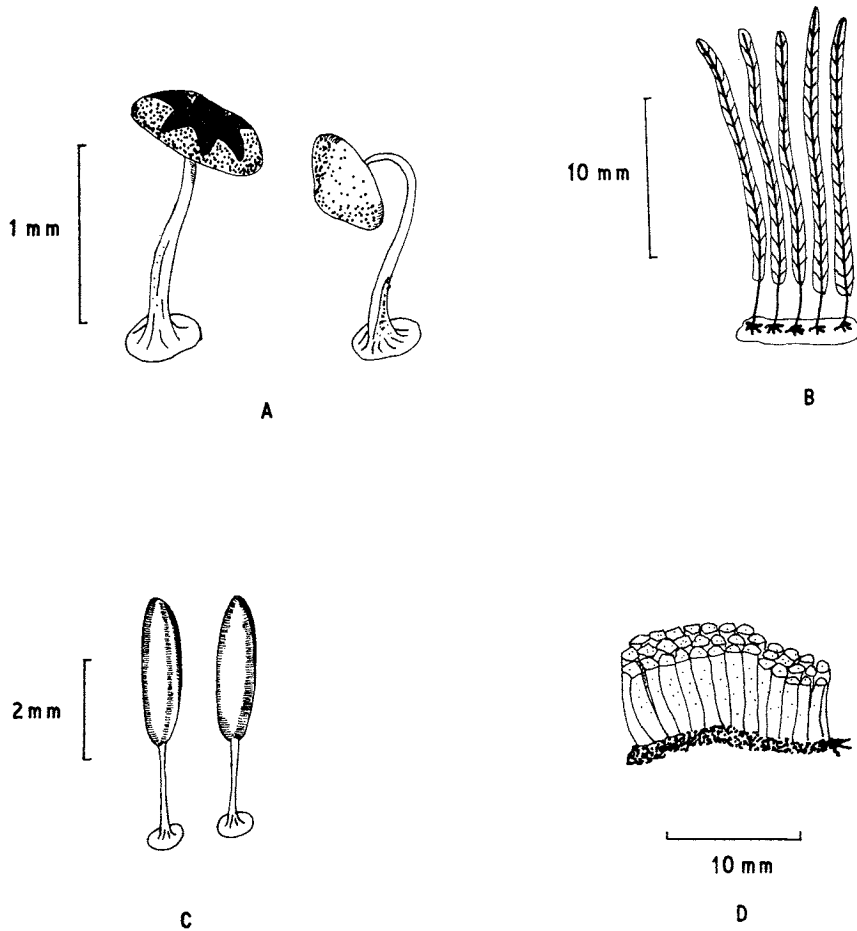


FIG. 6.

A—stalked sporangia of *Physarum nutans*; B—stalked sporangia of *Stemonitis fusca*; C—stalked sporangia of *Stemonitopsis typhina*; D—pseudoaethalium of *Tubifera ferruginosa*.

Large patches of rosebay willow-herb are also a rich source of myxomycetes, especially in woodland or on peaty soils. Marsh vegetation is best investigated during the winter. Many species may be found on the slowly rotting remains of last year's growth of marsh grasses and herbs. Also in winter, the decaying vegetation of sand dunes and shingle beaches is worth examining.

When specimens have been found, small pieces of the substrate, such as wood fragments, leaves, herbaceous stems, etc., bearing sporangia, should be removed carefully, with a sharp knife or scissors so as not to damage the sporangia. Small compartmented plastic boxes, such as those used for storing screws or fishing tackle, will allow fresh material to be carried safely; specimens on substrates can be pinned, with bead-headed pins, into cork lined boxes, or the material may be glued into the trays of matchboxes. Polythene bags are useless. Myxomycetes are delicate and fragile and, whichever method is used, the material must not be jolted or shaken. When sending specimens by post they should be carefully packed in shock-absorbing material.

Accurate identification of specimens involves a magnification of at least $600\times$ and a calibrated micrometer eyepiece for measuring spore diameters.

Whole sporangia are placed on slides and examined in a variety of mountants. The contents can be gently teased out with needles or squashed lightly under a coverslip. Plain water is useful, particularly if preceded by a drop of alcohol used as a wetting agent. Routine examination is often carried out in a 10% potassium hydroxide solution or in special media such as Hoyer's gum chloral which has the advantage of being a semi-permanent mountant if required, but has the disadvantage of being very poisonous!

Characters used in identification include the general shape, size and colour of the sporangium, the characteristics of the capillitium, and size, colour and surface markings of the spores.

Herbarium material is usually stored in small cardboard boxes, such as matchboxes. The substrate is glued to a white card which is labelled and then slipped into the matchbox tray. The sleeve of the box carries the main label on which all available information is included, such as serial number, name, locality (including grid reference), substrate, date, name of collector, name of person identifying specimen, spore size, etc.

In whatever cabinet the collection is stored it should be protected against the ravages of mite, moth and beetle by the liberal use of crystals of paradichlorbenzene or similar repellent. If the specimens are likely to be required for cultural studies, however, they must be kept away from paradichlorbenzene as this has been shown to inhibit spore germination.

A useful method of obtaining specimens of those minute species which are too small to be spotted in the field is the culture in moist chambers of pieces of bark or plant litter or dung of deer or rabbit. Petri dishes are usually used, but any waterproof, lidded container will serve. The bark sample, up to 5×3 cm., is carefully removed from the living tree with a sharp knife, some of it with mosses, liverworts or lichens growing on it. The bark sample is soaked overnight in distilled water, which simulates the effect of a rain shower; it is then drained and placed on damp filter or blotting paper in the chamber and the lid replaced. The bark is examined daily with a hand lens or binocular microscope. Any sporangia developing can be picked up with a fine needle or forceps and examined under the microscope. Some species, such as in the genus *Echinostelium*, may appear within 24 hours, but most will start to develop sporangia in four or five days. On the other hand several species of *Licea* will not be mature for some months, so it is worthwhile keeping the cultures for as long as storage space permits. It is important to keep the bark moist; if it begins to dry out it will be rapidly overgrown by moulds such as *Mucor* or *Penicillium*.

Plasmodia collected in the field may also be kept in a moist chamber until they fruit, but not all specimens will complete their cycle.

When growing in the field under very damp conditions myxomycetes are frequently attacked by hyphomycete moulds, usually the imperfect stages of *Nectria* or its allies. An interesting feature of these moulds is that they are often similar to or identical with species which parasitise insects. The common factor here is presumably the chitin in both hosts. Those moulds attacking myxomycetes may be identified using the key in Ing (1974.)

Identification of myxomycetes is not easy as the species are not always well defined and the common species are often very variable. However, there are excellent

collections at Kew and the British Museum (Natural History) for comparison and there are some good monographs available in libraries. Although very out of date, the famous Monograph by Gulielma Lister (1925) is valuable for its beautiful colour plates. The best modern treatment is by Martin and Alexopoulos (1969). Although in Dutch the recent account of the Netherlands' species by Nannenga-Bremekamp (1974), with its excellent drawings, is worth consulting.

A handbook to the British species is in preparation. An introduction to the distribution of species in the British Isles is given by Ing (1968.)

THE SLAPTON SURVEY

The Reserve has been well described in previous papers in this series, notably by Mercer (1966) and Brookes and Burns (1969), and, with special reference to the lichen vegetation, by Hawksworth (1972). A map of the Reserve is provided in Fig. 1.

No myxomycete records have been traced prior to 1968, when the British Mycological Society visited Slapton Wood (Holden, 1969). I have visited the Reserve at all seasons during 1972, 1973 and 1974 and my records have been added to by Dr. D. L. Hawksworth and Mr. M. C. Clark, up to autumn 1975.

The units into which the Reserve is divided for recording purposes are shown in Fig. 2. Table 1 shows the number of species found on different substrates in these units. The main part of Slapton Wood (J1) is the richest unit, with abundant dead wood and other substrates providing ideal conditions for myxomycete growth. Of particular interest are the communities of litter-inhabiting species such as those among decaying leaves under holly. These occur on the Reserve wherever suitably decayed holly litter collects, even under hedges, as in N3. The deep, moist litter under bramble bushes is also productive, the best area being on the backslope of the shingle ridge (C) where the clumps of bramble and gorse are conspicuous and, in spite of the discomfort involved, well worth examining. The woodlands at the sides of the tracks around Southgrounds Farm (S) are very damp and several of the larger wood-inhabiting species are especially conspicuous here. A further area of much interest is the marsh vegetation on each side of the Causeway (CY) where several uncommon species have been found. In general, where a suitable microhabitat, as detailed in the list of species, occurs, the characteristic species are likely to be found.

A card index of all the records will be deposited in the Slapton Ley Field Centre.

LIST OF SPECIES

Nomenclature follows Martin and Alexopoulos (1969) and Ing (1968), modified by recent work; synonyms are given in parentheses where the name in this list differs from that in either of these works.

Details of habitat within the Reserve are given together with a note on the known distribution in Devon. Occurrence in the Watsonian vice-counties South Devon and North Devon is indicated by the use of vice-county numbers 3 and 4 respectively.

Where specimens are retained in the herbarium of the Commonwealth Mycological Institute, the relevant IMI number is given; in most other cases material is deposited in the author's collection. As all the records were made during the period 1968 to 1974, no dates are given. Where the habitat is given as "bark" the record implies the use of moist chamber cultures.

CERATIOMYXOMYCETES

Ceratiomyxa fruticulosa (Muell.) Macbr.
B; J1; L. On rotting logs. Common (3, 4).

MYXOMYCETES

Arcyria cinerea (Bull.) Pers.

J1. On oak (*Quercus*) bark and well rotted, mossy logs, sometimes attacked by the hyphomycete *Verticillium rexianum* (Sacc.) Sacc. Common (3, 4).

A. denudata (L.) Wettst.

J1. On stumps and logs. Common (3, 4).

A. ferruginea Sauter

J1. Once, on a rotten log; essentially a winter species. Third county record (3, 4).

A. incarnata (Pers.) Pers.

J1, 2; N4. On sticks and ends of branches, especially oak. Common (3, 4).

A. nutans (Bull.) Grev.

J1. On rotten logs, especially beech (*Fagus*); usually a summer species. Common (3, 4).

A. pomiformis (Leers) Rost.

J1. On oak sticks. Common (3, 4).

Badhamia utricularis (Bull.) Berk.

J1. The plasmodium feeds on the sporocarps of *Stereum hirsutum* on logs. Frequent (3, 4).

Brefeldia maxima (Fr.) Rost.

S. On rotting stump, the white plasmodium spreading onto adjacent grass and the aethalia forming here and on the stump. Second county record (3).

Calomyxa metallica (Berk.) Niewl.

E6; N4. On bark of ash (*Fraxinus*) and elm (*Ulmus*), not common. Second county record (3).

Collocladum oculatum (Lipp.) G. List.

J1; N4. On bark of oak and elm, and on liverwort-covered wet log. Occasional on bark in several sites in the county (3, 4).

Comatricha alta Preuss (*nigra* var. *alta* (Preuss) List.)

J1. On rotten oak branch. Third county record (3, 4).

C. nigra (Pers.) Schroet.

C; J1 (IMI 179271), 2, 3, 4, 5; K; L; N3, 4. On dead wood of all kinds, but especially sticks up to 5 cm diam.; sometimes attacked by the hyphomycete *Aphanocladium album* (Preuss) W. Gams. This, our commonest myxomycete, is abundant throughout Devon, as elsewhere (3, 4).

C. pulchella (C. Bab.) Rost.

J1. On dead fronds of male-fern (*Dryopteris* spp.). Frequent (3, 4).

C. tenerima (Curt.) G. List.

D1. On dead *Phragmites* shoots. Third county record (3).

Craterium minutum (Leers) Fr.

C; J1; K. On litter of bramble, gorse, holly and general herbaceous material. Common (3, 4).

Cribraria argillacea (Pers.) Pers.

L. On rotten pine log. Common (3, 4).

C. aurantiaca Schrad.

J3; L. On sweet chestnut (*Castanea*) and conifer logs. Common (3, 4).

C. cancellata (Batsch) Nann.-Brem. (*Dictydium cancellatum* (Batsch) Macbr.)

L. On rotten pine branch. Common (3, 4).

C. persoonii Nann.-Brem. (*vulgaris* Schrad. in part).

J1 (IMI 186867). On rotting wood. Third county record (3).

Diachea leucopodia (Bull.) Rost.

C; J4. On litter and stems of brambles. Frequent (3, 4).

Diderma effusum (Schw.) Morg.

J1. Amongst beech litter. Fourth county record, (3, 4).

D. hemisphaericum (Bull.) Hornem.

J2. On litter in marshy woodland floor. Uncommon in Devon (3, 4).

D. spumarioides (Fr.) Fr.

CY. On marsh litter. Third county record (3).

D. umbilicatum Pers. (*radiatum* (L.) Morg. in part).

J1. On rotten log. Third county record (3).

Didymium bahiense Gottsberger (*iridis* (Ditm.) Fr. in part).

G2. On marsh litter. Frequent in Devon (3, 4). This difficult group of species has been elucidated by Nannenga-Bremekamp (1972).

D. difforme (Pers.) S. F. Gray.

C; D1; E6; I1; J1, 2, 3, 4, 5; K; N3. Very common on litter, especially of nettle. Abundant throughout the county (3, 4).

D. laxiflora G. List. & Ross.

J1. In deep chestnut litter. New to Devon (3). A rare species previously known from the London area (Ing, 1965) and scattered localities elsewhere.

D. melanospermum (Pers.) Macbr.

C. Amongst gorse litter. Frequent (3, 4).

D. nigripes (Links) Fr.

J1; K. Characteristically on holly leaves. Common (3, 4).

- D. squamulosum* (Alb. & Schw.)Fr.
C; CY; D1; F1; G1; J1, 3; K; N3. On dead herbaceous material generally, including holly, *Iris*, *Phragmites* and brambles. Very common (3, 4).
- Echinostelium elachiston* Alexop.
J1. On oak bark. New to the British Isles, recorded from Greece and North America.
- E. minutum* de Bary
E6; J1; K; N4. On bark of sycamore (*Acer*), beech, ash, poplar (*Populus*), and elm. Frequent on bark in Devon (3, 4).
- Enerthenema papillatum* (Pers.)Rost.
B; J1; K; L. On small sticks and on oak bark, especially if epiphytes are present; occasionally on logs. Common (3, 4).
- Fuligo septica* (L.)Web. var. *flava* (Pers.)Morg.
J1 (IMI 159814, as *Physarum luteolum*; 168570; 179268, attacked by *Dendrodochium* sp.; 179272) 2, 3; K. On logs and stumps, very conspicuous, often looking like spilled scrambled egg. Common (3, 4).
- Hemitrichia calyculata* (Speg.)Farr (*stipitata* (Masse)Macbr.).
J1 (IMI 179270), 2; N4. On rotten logs. This species differs from *H. clavata* in a number of constant, small details and is by far the commoner species in Britain. Frequent (3, 4).
- H. clavata* (Pers.)Rost.
J1 (IMI 179267). On rotten log. This is the first Devon record of a species which has been confused in the past with *H. calyculata*.
- H. leiotricha* (List.)G. List.
J1. On moss and leaf litter. Second county record (3).
- H. minor* G. Lister (*Perichaena minor* (G. List.)Hagelst. in part.).
J1. On bark of oak. Frequent in Devon (3, 4). The Slapton material contains both var. *minor* and var. *pardina* Minakata ex G. Lister.
- Lamproderma arcyrioides* (Sommerf.)Rost.
J1. On leaf litter, especially amongst ivy (*Hedera helix*) on the ground. Frequent (3, 4).
- L. columbinum* (Pers.)Rost.
J1. On moss-covered chestnut log, once only. Uncommon (3, 4).
- L. scintillans* (Berk. & Br.)Morg.
C; J1; K; N3. On litter, especially of holly. Frequent (3, 4).
- Leocarpus fragilis* (Dicks.)Rost.
C; J1. On litter generally, often fruiting some distance up plant stems. Common (3, 4).
- Licea kleistobolus* Martin.
J1. On oak bark. First county record. A few scattered records in Britain for this very small and overlooked species.
- L. minima* Fr.
J1; K. On *Acer* bark and rotten conifer logs. Not common (3, 4).
- L. parasitica* (Zukal)Martin.
C; E6; J1; K; N4. On bark of sycamore, beech, ash, poplar, elder (*Sambucus*) and elm, usually on mosses and liverworts such as *Frullania*, and lichens. Frequent in these situations in Devon (3, 4).
- L. testudinacea* Nann.-Brem.
J1; On ash bark. Second county record (3).
- Lycogala epidendrum* (L.)Fr.
CY; G1; J1, 2, 3; K; S. On logs and stumps. Very common (3, 4).
- Macbrideola cornea* (G. List. & Cran)Alexop.
C; J1; N4. On mosses and lichens on bark of oak, elder and elm. Frequent (3, 4).
- Metatrichia vesparium* (Batsch)Nann.-Brem.
J1, 2; S. On well rotten logs. Frequent (3, 4).
- Mucilago crustacea* Wiggers (*spongiosa* (Leys.)Morg.)
C; 12/3. Encrusting grassland herbs. Common, especially on basic soils (3, 4).
- Oligonema schweinitzii* (Berk.)Martin.
CY. On willow (*Salix*) log in marsh. First record for Devon.
- Paradiacheopsis cribrata* Nann.-Brem.
N4. On fragment of bark, probably of elm. First county record. This species, described in 1968, is also known from a few localities in S.E. England.
- P. fimbriata* (G. List. & Cran)Hertel (*Comatricha fimbriata* G. List. & Cran).
C; J1; L; N4. On bark of beech, pine, elder and elm, usually associated with the alga *Pleurococcus*. Found occasionally in Devon (3, 4).
- Perichaena corticalis* (Batsch)Rost.
J1. On mossy bark of fallen ash logs. Frequent in Devon (3, 4).
- P. depressa* Lib.
J1. Usually with the previous species, but the commoner species in Devon (3, 4).
- P. pedata* (A. & G. List.)G. List. emend.Nann.-Brem. (incl. part of *P. minor* (G. List.)Hagelst.).
K. On bark of sycamore and oak, usually associated with the liverworts *Metzgeria furcata* or *Radula complanata*. Second county record (3).

- P. vermicularis* (Schw.) Rost.
J1. In sycamore litter. First county record.
- Physarum bitectum* G. List.
C. On dead bramble stems. Occasional (3, 4).
- P. bivalve* Pers.
C; J1, 4. On plant litter generally but especially characteristic of bramble thickets. Common (3, 4).
- P. cinereum* (Batsch) Pers.
J1. On grass litter. Frequent in Devon, sometimes on lawns (3, 4).
- P. compressum* Alb. & Schw.
CY. On marsh debris. Uncommon (3, 4).
- P. galbeum* Wing.
C. In a bramble thicket. Second county record (3). A rare species known only from the southern half of the country.
- P. leucophaeum* Fr.
J1. On dead wood. Common (3, 4).
- P. nutans* Pers.
J1, 3; K. On dead wood of all kinds. One of the commonest species everywhere (3, 4).
- P. psittacinum* Ditm.
CY. On marsh litter, especially at the base of stumps. Second county record (3, 4).
- P. pusillum* (Berk. & Curt.) G. List.
CY; D1; G1. Mainly on *Phragmites* litter in marshes. First county record.
- P. vernum* Somm. ex Fr.
D1. On marsh litter. Fourth county record (3, 4).
- P. virescens* Ditm.
J1. Developing on the moss *Mnium hornum*, on woodland floor. Third county record (3, 4).
- P. viride* (Bull.) Pers.
J1. On woodland litter, especially from conifers; also on logs. Common (3, 4).
- Reticularia lycoperdon* Bull.
B; CY; J1, 2, 3; K; L. On logs and dead standing trunks, often very conspicuous; a spring species. Common (3, 4).
- R. olivacea* (Ehrenb.) Fr.
S (IMI 188738). On sticks and branches. Third county record (3).
- Stemonitis axifera* (Bull.) Macbr.
J1. On stumps and logs. Frequent (3, 4).
- S. flavogenita* Jahn.
K. On logs, sticks, etc. Common (3, 4).
- S. fusca* Roth.
J1, 2. Logs and stumps. Very common (3, 4).
- S. splendens* Rost.
J1; K. On stumps. Elsewhere in Devon only in the Bovey Valley woodlands (3). A member of the south-western element in our flora, being found in the west of Ireland, S.W. England and isolated sites in Co. Down and Surrey, also recently on the Island of Mull.
- Stemonitopsis typhina* (Wiggers) Nann.-Brem.
(*Comatricha typhoides* (Bull.) Rost.)
I1; J1. On wet rotten wood, often with *Arcyria cinerea*, and frequently affected by the *Acremonium* conidial state of *Nectria candidans* (Plowr.) Samuels and by *Verticillium rexianum*. Common (3, 4).
- Symphycarpus flaccidus* (List.) B. Ing & Nann.-Brem. (*Stemonitis splendens* in part)
L. On dead standing pine trunk. Fourth county record of a widespread but uncommon species (3, 4).
- Trichia affinis* de Bary (*favoginea* (Batsch) Pers. in part).
J1; S. On mossy logs, stumps and litter, sometimes attacked by the hyphomycete *Blistum ovalisporum* (A. L. Smith) Sutton. Common (3, 4).
- T. botrytis* (Gmel.) Pers.
J1; L; N4. On sticks and branches, attacked by *Blistum ovalisporum* and *B. tomentosum* (Schrad. ex Fr.) Sutton. Common (3, 4).
- T. decipiens* (Pers.) Macbr.
J1, 2, 5; N4. On dead wood of all kinds. Common (3, 4).
- T. floriformis* (Schw.) G. List.
J1, 2, 3, 4; K; S. On wet rotting logs, frequently attacked by *Verticillium rexianum*. Once regarded as rare, is now one of the commonest species in the British Isles; abundant in Devon (3, 4).
- T. persimilis* Karst. (*favoginea* (Batsch) Pers. in part).
J1. On dead wood, usually when less well rotted than that favoured by other species of *Trichia* listed here. Common (3, 4).
- T. scabra* Rost.
J1. On well rotted log, associated with *Metatrichia vesparium*. Frequent (3, 4).
- T. varia* (Pers.) Pers.
DM (IMI 188722); J1, 2; S. On wet, soft, rotten wood, rarely on leaf litter. Very common (3, 4).
- T. verrucosa* Berk.
J1. On wet, well rotted conifer log. First county record.
- Tubifera ferruginosa* (Batsch) Gmel.
J3; K (IMI 179273); L. On logs of conifers and chestnut. Common (3, 4).

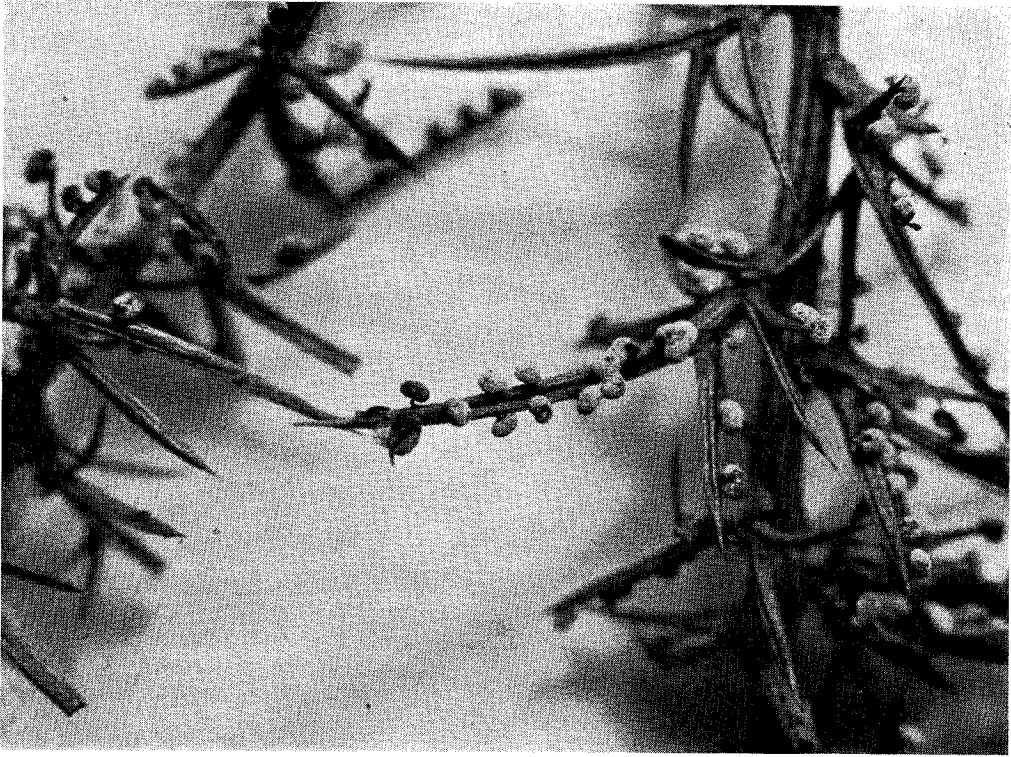


PLATE 1A

Didymium melanospermum (Pers.) Macbr. sporangia on gorse litter. (Actual height of sporangium 1 mm.)

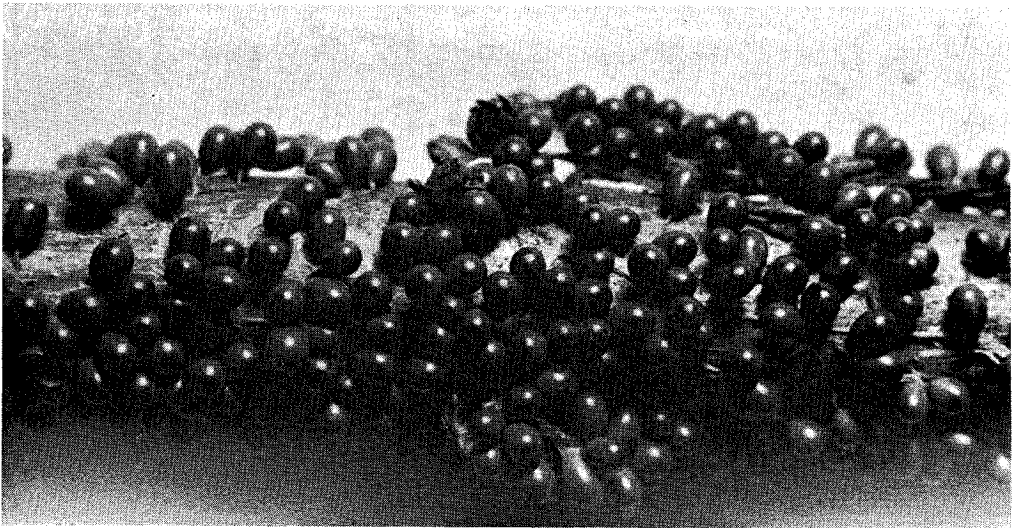


PLATE 1B

Leocarpus fragilis (Dicks.) Rost. sporangia on willow-herb stem. (Length of sporangium 2 mm.)

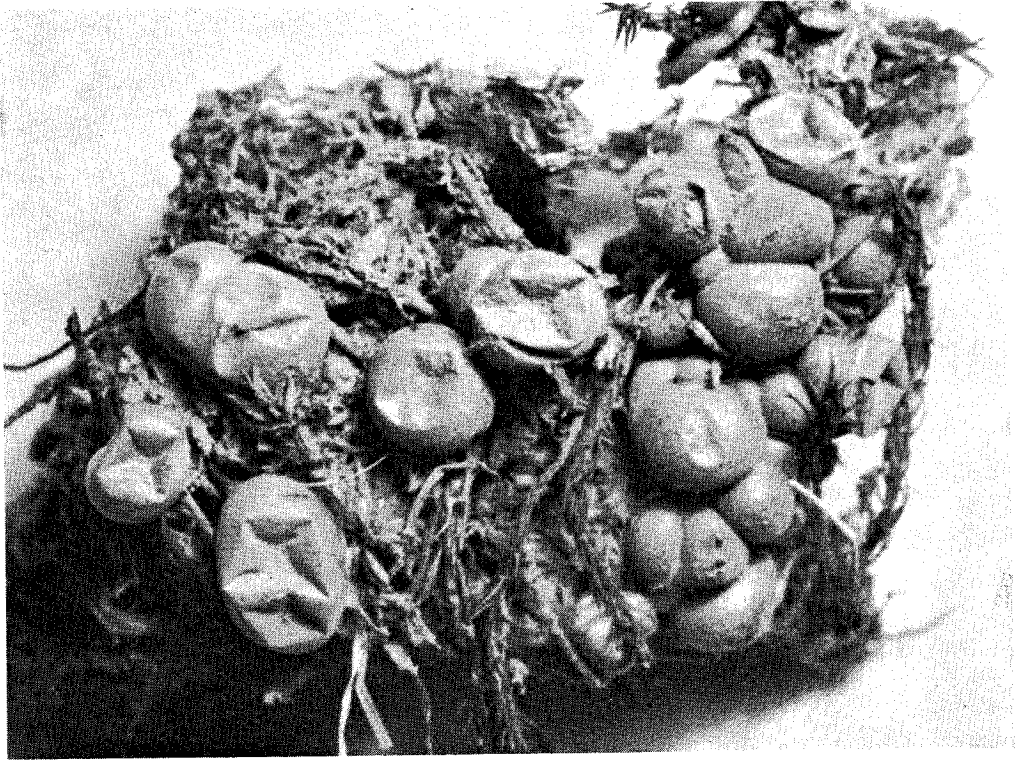


PLATE 2A

Lycogala epidendrum (L.)Fr. Group of mature aethalia (mean diameter of aethalia 8 mm.)

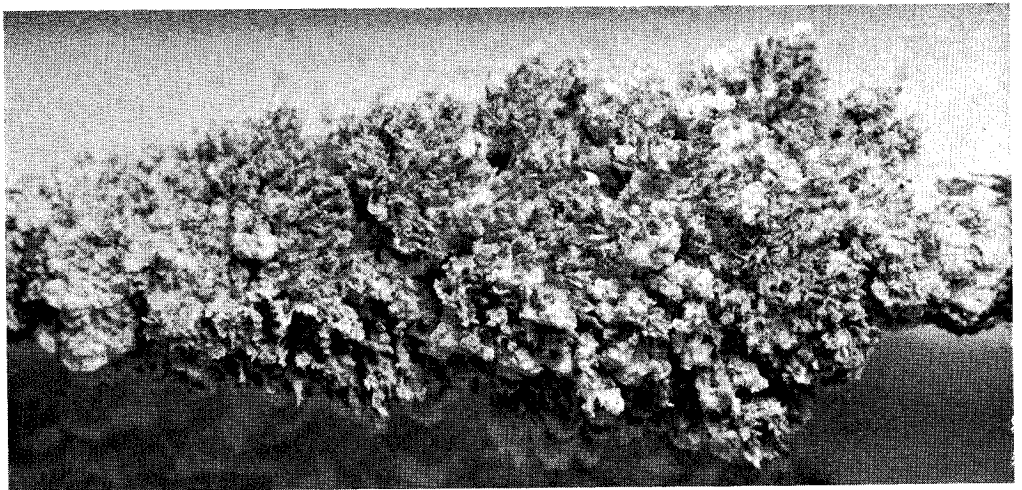


PLATE 2B

Mucilago crustacea Wiggers aethalium on woody stem. (Length of aethalium 55 mm.)

With 87 species of myxomycetes the Slapton Reserve is one of the most productive areas studied in the British Isles, comparing very favourably with other areas of similar size. For instance, the area around Kindrogan Field Centre, Perthshire was sampled almost daily during 1964, 1965 and 1966 and yielded 113 species (Ing, 1967). In both places an abundance of dead wood, plenty of leaf litter and other herbaceous remains, and a good variety of native and planted trees produce a wealth of microhabitats and substrates reflected in the number and variety of myxomycetes found.

The effect of air pollution on myxomycetes has not been studied experimentally but my observations during the last fifteen years in and around large cities suggest that sulphur dioxide pollution is less damaging to myxomycetes, including bark species, than it is to lichens, bryophytes or leaf-parasitic fungi such as rusts or powdery mildews. The air at Slapton is noticeably free from pollution.

The mild, moist climate of south-west England, and at Slapton in particular, encourages a rich myxomycete flora. Bark species especially are more abundant and widespread in the west and are less seasonal than in the drier, eastern region.

Devonshire, with 163 species, has more than half of the myxomycetes on the British List. Of these, 154 have been recorded from South Devon, v.c.3, and 99 from North Devon, v.c.4. Even so the lists from Slapton and Devonshire could be readily increased by more collecting.

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