

# THE NATURAL HISTORY OF SLAPTON LEY NATURE RESERVE

## XVII. ADDITIONS TO AND CHANGES IN THE FUNGI (INCLUDING LICHENS)

D. L. HAWKSWORTH

*CAB International Mycological Institute, Kew*

### ABSTRACT

Additions to the fungi (including lichens) reported from the Slapton Ley Nature Reserve, and its immediate vicinity, since the author's 1972 and 1976 lists are compiled. 185 further species have been found in the area, bringing the total to 1476. Of these, 31 were described as new to science from Slapton material. Walls in Slapton village yielded several rare lichens, including *Moelleropsis nebulosa*. However, Dutch Elm Disease entered the reserve in 1978 and this, together with other habitat changes, particularly on the shingle ridges, has already resulted in the loss of at least 26 species of lichens (9% of the lichen flora), and others are now endangered. The units of the Reserve including woodland are analysed for their "old-forest indicator lichens" and Revised Index of Ecological Continuity (RIEC) values calculated. The maximum reached was 30, in the marsh below and adjacent parts of Slapton Wood, a finding consistent with the known history of the woodlands.

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### INTRODUCTION

ACCOUNTS of the fungi present in the Slapton Ley Nature Reserve and associated habitats have appeared in previous parts of *Field Studies*. The lichen-forming fungi were surveyed by Hawksworth (1972), the Myxomycetes by Ing (1976), and the remainder of the fungi by Hawksworth (1976). Since these reports were prepared, additional survey work has led to the discovery of a considerable number of additional species, especially of non-lichenised fungi. There have also been some dramatic changes in the lichens present over the 15 years that I have been observing them in the Reserve as a result of habitat modification.

Careful field work by Mr and Mrs M. C. Clark in 1977–81 merits particular note as does the visit of the British Mycological Society in 1978 (Greenhalgh, 1980; Hawksworth and Minter, 1980). These have been especially important in improving the coverage of

fungi, especially as several leading mycologists participated in the latter foray (including Drs M. B. and J. P. Ellis, Mr R. Rayner and Miss G. Waterhouse) and contributed records despite the adverse weather conditions. In addition, increased attention has been paid to walls in Slapton village and to Slapton churchyard, yielding a considerable number of lichen records, especially during courses run at Slapton by Mr F. S. Dobson and myself (separately and conjointly) each year throughout this period. Mr N. P. Symons, of the Centre staff, also noted several larger fungi not previously found by other recorders. Recording has not, however, been as intense as in the period leading up to the 1976 publications.

The object of this contribution is to bring the records of Slapton fungi up to date and to discuss changes that have taken place in the species present. The opportunity is also taken to interpret the lichen data from the woodlands with reference to the Revised Index of Ecological Continuity (Rose, 1976).

#### ADDITIONAL RECORDS

Only species not previously reported for the study area are published here. The records are presented with reference to the 38 units used in the previous surveys (Hawksworth, 1972, 1976; Ing, 1976), with herbarium specimens retained indicated in brackets after the unit concerned (i.e. IMI, K). The lichenised species are indicated by "(L)" after the name of the species and, following Cannon, Hawksworth and Sherwood-Pike (1985), are not listed separately. "T" following an herbarium abbreviation indicates that the specimen so indicated is the holotype of the species in the case of further species described as new to science from the area.

Notes based on revisions of material previously reported and cross-references are placed within square brackets, "[ ]", but the numerous nomenclatural changes effected are not indexed here.

Further information on most of the records, including actual dates of collection, names of the identifiers, and of the collectors, are indicated on index cards deposited at Slapton Ley Field Centre. That index also includes information on additional finds of species already included in previous lists which are not published here.

The maps from Hawksworth (1972, 1976) are reproduced on pages 374 and 375.

## MYXOMYCOTA

- Diderma globosum* Pers.  
On *Phragmites* litter; D1 (herb. B. Ing).  
The first record for Devon.
- MASTIGOMYCOTINA**
- Albugo candida* (Hook.) Kuntze  
On *Capsella bursa-pastoris*; nr J1 (IMI 231747).  
Greenhalgh (1980).
- Peronospora alta* Fuckel  
On *Plantago lanceolata* and *P. major* leaves; E6 (IMI 232651, 232652).  
Greenhalgh (1980).
- Plasmodium nivea* (Unger) Schröter  
On *Oenanthe* leaves; DM (IMI 232653).  
Greenhalgh (1980).

## ZYGOMYCOTINA

- Entomophthora montana* (Thaxter) Gustafsson  
On flies on horse droppings; S (IMI 288540).

## BASIDIOMYCOTINA

- Agaricus augustus* Fr.  
In lawn of Field Centre; SV.
- Amanita citrina* Schaeffer  
Greenhalgh (1980).
- Anthracoidea subinclusa* (Körn.) Brefeld  
On *Carex riparia* ovaries; CY (IMI 288537).
- Boletus badius* Fr.  
Greenhalgh (1980).
- Cantharellula cyathiformis* (Bull.) Singer  
On leaf litter; G1.
- Clavulina cinerea* (Fr.) Schröter  
At base of *Castanea*; J1.
- Entoloma rhodopolium* (Fr.) Kummer  
In damp woodland; E2 (K).
- Eocronartium muscicola* (Pers.) Fitzp.  
On moss; J1 nr cottage ruin (K).  
The first collection seen at Kew this century.
- Farysia thuemeri* (A. Fischer & v. Waldh.) Nannf.  
On *Carex riparia* spike; CY (IMI 288536a).
- Gymnopilus junonius* (Fr.) Orton  
DM.
- Hapalopilus nidulans* (Fr.) P. Karsten  
Greenhalgh (1980).
- Hygrophorus dichrous* Kühner & Romagn.  
On woodland bank; S (K).
- H. foetens* Phillips  
DM (K).
- H. russocorticea* Berk. & Miller  
Forming rings in turf; C.
- Inocybe flocculosa* (Berk.) Sacc.  
S.
- I. geophylla* (Sow.) Kummer  
Greenhalgh (1980).
- I. hirtella* Bresad.  
On the ground; E2 (K).
- Ionotus hispidus* (Bull.) P. Karsten  
On fallen *Fraxinus*; N4.
- Greenhalgh (1980).
- Laccaria tortilis* (Bolton) Cooke  
On ground amongst marsh plants; CY (K).
- Lactarius deliciosus* (L.) Gray  
On lawn of Field Centre under *Pinus*; SV.
- L. tabidus* Fr.  
J3.
- L. vietus* (Fr.) Fr.  
Greenhalgh (1980).
- Lentinus cochleatus* (Pers.) P. Karsten  
On wet wood in stream; J2 (K).
- Lepiota melanotricha* Malençon & Berthault  
DM (K).
- Lepista saeva* (Fr.) Orton  
At edge of ploughed field; SV.
- Marasmiellus albus-corticis* (Secr.) Singer  
On dead *Rubus* stems; C (K), S (K).
- Marasmius cohaerens* (Alb. & Schwein.) Cooke & Quélet  
On bark; DM (K).

- M. graminum* (Libert) Berk.  
On base of grass stem; CY (K).  
*Mycena polyadelpha* (Lasch) Kühner  
On decayed *Quercus* leaves; DM (K).  
*M. perigena* (Fr.) Kummer  
On a fern rachis; K.  
*Omphalina rustica* (Fr.) Quélet  
Amongst mosses on wall top; S (K).  
*Psathyrella canocephs* (Kaufman) A.H. Sm.  
DM (K).  
*Pseudocratereus sinuosus* (Fr.) Corner  
On leaf litter; J3.  
*Psilocybe crobula* (Fr.) M. Lange & Singer  
On a dead stick; S (K).  
*Puccinia circaeae* Pers.  
On *Circea lutetiana* leaves; DM, J2 (IMI 296954), K (IMI 247729).  
*Russula farinipes* Romell  
J1.  
Greenhalgh (1980).  
*R. fellea* (Fr.) Fr.  
J1.  
*R. foetens* (Pers.) Fr.  
On leaf litter; J1.  
*R. grisea* (Pers.) Fr.  
J1.  
Greenhalgh (1980).  
*R. mairei* Singer  
J1.  
Greenhalgh (1980).  
*R. veterinosa* Fr.  
Under *Fagus*; J1.  
Greenhalgh (1980).  
*R. violeipes* Quélet  
J1.  
Greenhalgh (1980).  
*R. xerampelina* (Schaeffer) Fr.  
J1.  
Greenhalgh (1980).
- Stropharia aeruginosa* (Curtis) Quélet  
In lawn near boathouse; I1.  
*Suillus grevillei* (Klotzsch) Singer  
J1.  
Greenhalgh (1980).  
*S. luteus* (L.) Gray  
J1.  
Greenhalgh (1980).  
*Tomentella litschaueri* Svrček  
On moss leaves and stems; K (K).  
*Tylophilus felleus* (Bull.) P. Karsten  
Under *Castanea*; J1.  
Greenhalgh (1980).
- ASCOMYCOTINA**
- Abrothallus microspermus* Tul.  
On thalli of *Parmelia caperata* and *P. perlata*; CY (IMI 164972 p.p., 296950), DM (IMI 279667, 279668), N4 (IMI 251260). Mainly as the anamorph *Yonauxiomyces truncatus* (B. de Lesd.) Dyko & D. Hawksw. Previous records of *A. parmeliarum* (Sommerf.) Arnold from Slapton on these hosts refer to this species.  
Hawksworth (1981).  
*Agonimia tristicula* (Nyl.) Zahlbr. (L)  
Amongst moss on wall; CH.  
[*Allophylaria clavuliformis* (P. Karsten) P. Karsten  
The Slapton record of *A. byssacea* (P. Karsten) Sacc. should be referred here.]  
*Anaptychia citaris* (L.) Körber (L)  
Large patches on felled *Ulmus*; N4 (IMI 251265).  
[*Arachnoscypha aranea* (de Not.) Boud.  
On *Castanea* cupules; DM (IMI 288561). Previous Slapton records of *Arachnopsisiza eriobasis* (Berk.) Korf belong here.  
Greenhalgh (1980).]  
*Arthonia epithyscia* Nyl.  
On *Phaeophyscia orbicularis* thallus on *Sambucus*; I1 (IMI 206365).  
*Arthopyrenia laburni* Arnold  
On *Laburnum* young branches; SV (IMI 168673).  
*Ascobolus carbonarius* P. Karsten  
On dung.  
Greenhalgh (1980).

- A. degluptus* v. *Brumm*.  
On bird droppings; CY (IMI 250041).  
*Ascosonus woolhopensis* (Renny) Boudier  
On mouse droppings; CY.  
*Bacidia egenula* (Nyl.) Arnold (L)  
On *Salix* bark in shade; DM (IMI 168479).  
The first record from Devonshire.  
*Belonia nidarosiensis* (Kindt) P. M. Jerg. & Vězda (L)  
On shaded wall; CH.  
*Belonium gradonii* D. Hawksw.  
On straw in field margin; nr J1 (IMI 231746, T).  
This new species is only known from Slapton.  
Hawksworth & Minter (1980).  
*Belomopsis filispora* (Cooke) Nannf.  
On *Brachypodium sylvaticum* dead stems; DM (IMI 254013).  
*Calophaea albotutescens* (Nyl.) H. Olivier (L)  
On walls; CH.  
[*Calophaea flavorubescens* (Huds.) Laundon (L)  
Slapton records of *C. aurantiaca* (Lighf.) Th. Fr. on *Ulmus* belong here.]  
[*C. flavovirescens* (Wulfen) Dalla Torre & Sarnth. (L)  
Slapton records of *C. aurantiaca* on basic rock walls belong here.]  
*Calycellina populina* (Fuekel) Höhnel  
On *Rubus* leaves; K (IMI 247727).  
*C. spiraeae* (Rob. ex Desm.) Dennis  
On *Filipendula ulmaria* fallen leaves; CY (IMI 288534).  
*Ceratocystis ulmi* (Buisman) C. Moreau  
On *Ulmus*, causing Dutch Elm Disease; on elms throughout the Reserve, first seen in DM and N4 in 1978, disappearing with the death of the host trees.  
*Chaetosphaeria myriocarpa* (Fr.) C. Booth  
On rotting wood (as the *Chloridium clavaeforme* (Preuss) W. Gams & Hol.-Jech. anamorph); J1 (IMI 188746).  
*Chelymyces vitellina* (Pers.) Dennis  
Amongst *Urtica* roots; S, SV.  
*Chrysothrix chrysophthalma* (P. James) P. James & Laundon (L)  
On decorticate *Pinus*; J1 (IMI 215217).  
*Giboria amantacea* (Balb.) Fockel  
On old male *Alnus* inflorescences; DM (IMI 250040).  
*Cladonia digitata* (L.) Hoffm. (L)  
On a rotten log; J1.
- C. macilenta* Hoffm. (L)  
On *Castanea* trunk; J3.  
*C. polydactyla* (Flörke) Sprengel (L)  
On fixed shingle and a rotten log; C (IMI 194018), J1.  
*C. portensia* (Dufour) Coem. (L)  
On fixed shingle, scarce and declining; C (IMI 186874).  
*Coprotus granuliformis* (Crouan & H. Crouan) Kimbrough  
On bird droppings; CY.  
*Crocicreas amenii* (Batsch) S. Carp.  
On female *Salix* inflorescences; II (IMI 250036).  
*C. cyathoides* (Bull.) S. Carp.  
On *Urtica* stems; S (IMI 250039).  
*C. starbaechii* (Rehm) S. Carp.  
On *Ranunculus repens* debris; DM (IMI 254011).  
*Dasycephalus albotestaceus* (Desm.) Masseur  
On dead grass stems; CY (IMI 288533).  
*D. carneolus* var. *longisporus* Dennis  
On dead grass stems; II (IMI 254010).  
*D. citaris* (Schradet) Sacc.  
Greenhalgh (1980).  
*D. tenuissimus* (Quélet) Dennis  
On dead grass stems; N3 (IMI 254009).  
*Dtaporthe hederæ* Wehmeyer  
Greenhalgh (1980).  
*Dimerella diluta* (Pers.) Trevisan (L)  
On shaded *Fraxinus* bark; S (IMI 231657b).  
*Diploshistes muscorum* (Scop.) R. Sant. (L)  
Lichenicolous on *Cladonia* and then forming an independent thallus over mosses on churchyard wall; CH (IMI 229665).  
*Durella comivens* (Fr.) Rehm  
On dead *Salix* wood; DM (IMI 250038).  
*Gyalecta jenensis* (Batsch) Zahlbr. (L)  
On shaded stone gatepost and tombstones; CH, CY.  
*Gyalideopsis anastomosans* P. James & Vězda (L)  
On fallen *Castanea* wood; J1 (IMI 168660), J3.  
*Hyaloscypha pseudopuberula* Graddon  
On *Quercus* leaf; DM (IMI 188546).  
*Hymenoscyphus citrinulus* (P. Karsten) Schröter  
On dead *Oenanthe* stem; DM (K).

- H. imberbis* (Bull.) Dennis  
On wood in stream; J2 (IMI 241050).  
Greenhalgh (1980).
- H. vitellinus* (Rehm) Kuntze  
On herbaceous stems; ?C (IMI 247726).  
*Hypocrea rufa* (Pers.) Fr.  
On dead wood; DM (IMI 288541, 288542). Both specimens as the teleomorph.  
*Hypoderma hederæ* (Mart.) de Not.  
On dead *Hedera* leaf; J1 (IMI 241051).  
*Hypoxylon cohaerans* var. *microsporium* Rogers & Candoussau  
On *Quercus* twigs; J1 (IMI 254000).  
The first record for the British Isles.  
*Lactinaevia carneoflavida* (Rehm) Nannf. & Hein  
On dead *Urtica* stems; I1 (IMI 254012).  
*Lanzia luteovirescens* (Rob. ex Desm.) Dumont & Korf  
On old *Acer* petioles; S (IMI 247724).  
*Lecanactis subabietina* Coppins & P. James (L)  
On *Quercus*; I1 (BM, T). Records of *Opegrapha vermicellifera* on *Quercus* from Slapton belong to *L. subabietina*; *O. vermicellifera* is to be found only on *Fraxinus* and *Ulmus*.  
*Lecanora albescens* (Hoffm.) Branth & Rostrup (L)  
On calcareous walls and concrete, occasional; B, C, CH, CY, I1, S, SV. Some of the previous reports of *L. dispersa* (Pers.) Sommerf. belong here.  
*Leprocaulon microscopium* (Vill.) Gams ex D. Hawksw. (L)  
On walls and shaded sandstone rocks, locally abundant; CH, H, SV (IMI 1940081).  
*Lophium mytilinum* (Pers.) Fr.  
On fallen *Pinus* cones; L (IMI 231677a).  
*Lophodermium sediciosum* Minter, Staley & Millar  
On fallen *Pinus* needles; J1 (IMI 180138a).  
*Melanospora chionea* (Fr.) Corda  
On a fallen *Pinus* cone; J3 (IMI 184288c).  
*Metasphaeria* sp.  
On *Stachys palustris* dead stems; E4 (IMI 215206).  
Possibly undescribed.  
*Microthyrium ciliatum* var. *hederæ* J. P. Ellis  
On fallen *Hedera* leaves; J1 (IMI 237285a).  
Greenhalgh (1980).  
*M. microscopium* Desm.
- Greenhalgh (1980).  
*Milaadina lecitina* (Cooke) Svrček  
On wet wood; DM (K).  
*Moelleropsis nebulosa* (Hoffm.) Gyelnik (L)  
On wall top in village, rare; SV (IMI 296966).  
The Slapton material is sterile but matches fertile specimens from Dodbrooke church, Kingsbridge (IMI 296943).  
*Mollisia pteridina* (Nyl.) P. Karsten  
Greenhalgh (1980).  
*Monitina johnsonii* (Ellis & Ev.) Honey  
On half-buried *Crataegus* fruits; S (IMI 250037).  
*Morenomia clarkei* J. P. Ellis  
On decaying *Rubus* stem; K (IMI 247730).  
*Muellerella hospitanus* Stizenb.  
In *Bacidia rubella* apothecia on *Fraxinus*; I1 (IMI 231668).  
*M. lichenicola* (Sommerf. ex Fr.) D. Hawksw.  
In *Lecanora campestris* apothecia on wall; S (IMI 215199a).  
[*Mycromicrothelia confusa* D. Hawksw.  
The Slapton material of *Microthelia micula* Flotow ex Körber should be referred to this species (Hawksworth, 1985).]  
*Mycosphaerella clymenia* (Sacc.) Johanson ex Oudem.  
On living *Lonicera* leaves; J2 (IMI 296955).  
*Nectria boothii* D. Hawksw.  
On dead *Oenanthe* stems; CY (IMI 288538), DM (IMI 232648, T; IMI 238380), F1. This distinctive new species is evidently well established at Slapton but is still unknown elsewhere in the British Isles.  
Greenhalgh (1980), Hawksworth & Minter (1980).  
*N. flavo-viridis* (Fuckel) Wollenw.  
On *Acer pseudoplatanus* bark; J2.  
*N. inuenta* Pethybr.  
On *Dalmania concentrica* (as the *Verticillium cinnabarinum* (Corda) Reinke & Berthold anamorph); K (IMI 247721). Apparently last found on this host in the British Isles at Chesham in 1947 (Hughes, 1951).  
*Nectriella luteola* (Rob. ex Desm.) Weese  
On *Rubus* stems; K (IMI 247718).  
*Neobulgaria lilacina* (Wulfen) Dennis  
On wet wood on path; DM (IMI 288545).  
*Niessia exitis* (Alb. & Schwein.) Winter  
On dead *Oenanthe* stem; DM (IMI 250034).

- [*Opegrapha corticola* Coppins & P. James (L)  
All Slapton records of *O. gyrocarpa* Flotow on bark refer to this species.  
Coppins & James (1979).]
- O. prosodea* Ach. (L)  
On *Fraxinus*; I1 (IMI 168571).  
*O. varia* Pers. (L)  
On felled *Ulmus*; N4 (IMI 251264).  
*Parmelia britannica* D. Hawksw. & P. James (L)  
On tombstones; CH (IMI 186850).  
*P. pastillifera* (Harm.) R. Schubert & Klem. (L)  
On *Malus*, *Sorbus* and *Ulmus* in well-lit situations, especially upper branches;  
I1, N4 (IMI 251259), SV.  
[*Parmeliella jamesii* P. M. Jørg. (L)  
The Slapton record of *Pannaria mediterranea* Tavares belongs here.]  
[*P. plumbea* (Lightf.) Vainio (L)  
Near Slapton, c. 1860, *H. B. Holl* (BM, six pieces). Now extinct at Slapton.]  
*Peltigera horizontalis* (L.) Baumg. (L)  
On wall-top in front of Field Centre; SV (IMI 196213).  
[*P. membranacea* (Ach.) Nyl. (L)  
Slapton records of *P. canina* (L.) Willd. seem to belong here, but all members  
of this genus present need a resurvey in the light of changes in the taxonomy.]  
*Pezizula livida* (Berk. & Broome) Rehm  
On fallen *Pinus* cones (as the *Cryptosporiopsis* anamorph); L.  
*Pezizella campanuliformis* (Fuckel) Dennis  
On dead fern rachis (?*Dryopteris*); DM (IMI 288543).  
*Phaeographis smithii* (Leighton) B. de Lesd. (L)  
On *Acer pseudoplatanus* bark; J6 (IMI 296952).  
*Phaeohelium geogenum* (Cooke) Svrček & Matheis  
On dead herbaceous stems; DM (IMI 288547).  
*Phialina ulmariae* (Lasch) Dennis  
On dead *Filipendula* stems; CY (IMI 288532).  
*Phragmonaeva peltigerae* (Nyl.) Rehm  
On *Peltigera polydactyla* on wall top; CH (IMI 231659).  
*Physcia clementei* (Sm.) Maas Geest. (L)  
On walls, locally abundant; CH, S, SV.  
This rare south-western species is perhaps more abundant in Slapton village  
than anywhere else in the British Isles.  
*Ploetnera exigua* (Niessl) Höhnelt  
On *Rubus* stem; K (IMI 247725).
- Psilachnum tami* (Lamy) Dennis  
On dead *Galium molugo* stems; S (IMI 254006).  
*Pyrenopeziza lycopincola* (Rehm) Gremmen  
On dead *Lycopus europaeus* stems; I1 (IMI 254007).  
*P. millegrana* Boud.  
On dead *Filipendula* stem; DM (IMI 247717).  
*P. petiolaris* (Alb. & Schwein.) Nannf.  
On old *Acer pseudoplatanus* petioles; DM, J1 (IMI 254005).  
[*Pyrenula chlorospila* (Nyl.) Arnold (L)  
Slapton records of *P. nitridella* (Flörke ex Schaerer) Müll. Arg. belong here.]  
[*P. macrospora* (Degel.) Coppins & P. James (L)  
Slapton records of *P. nitrida* (Weigel) Ach. belong here.]  
*Quaternaria dissepta* (Fr.) Tul. & C. Tul.  
On dead *Ulmus* twigs; DM (IMI 260482).  
*Schismatomma cretaceum* (Hue) Laundon (L)  
On old *Quercus* trunk, rare; I1 (IMI 178267).  
Hawksworth & James (1974; as *S. virgineum* D. Hawksw. & P. James).  
*Scoliosporium chlorococcum* (Graewe ex Stenhammar) Vězda (L)  
On *Sambucus* twigs; I1 (IMI 296954).  
[*Skytrea cruciata* Sherw., D. Hawksw. & Coppins  
On *Diploicia canescens* on wall; S (IMI 168572). Listed tentatively by  
Hawksworth (1976: 426) as "*Didymella* sp."  
Sherwood *et al.* (1981).]  
*Solenopora holophaea* (Mont.) G. Samp. (L)  
On sandstone wall; SV (IMI 206377).  
*Spilopodia melanogramma* Boud.  
On dead *Mercurialis* stems; J3 (IMI 254004).  
*S. nervisequia* (Pers.) Boud.  
On *Plantago lanceolata* leaves; CY (IMI 244728, 250033).  
*Strictis radiata* (L.) Pers.  
On dead damp twig (?*Salix*); DM (IMI 288544).  
*Taphrina populina* Fr.  
On *Populus* leaves; CY (IMI 288535).  
*Tarzetta cupularis* (L.) Lambotte  
On ground under *Urtica*; DM.  
Greenhalgh (1980).  
*Thelebolus microsporus* (Berk. & Br.) Kimbrough  
On cow dung; nr K (IMI 247723a).

- Thelidium incavatum* Nyl. ex Mudd (L.)  
On calcareous tombstone; CH.
- Trematosphaeria perusa* (Pers.) Fockel  
On *Acer pseudoplatanus* wood; E4 (IMI 215207).
- Ungularia millepunctata* (Libert) Dennis  
On dead *Filipendula* and *Oenanthe* stems; DM (IMI 250035).  
Greenhalgh (1980).
- Ungulella hamulata* (Feltgen) Höhnelt  
On decaying *Urnica* stems; DM (K).
- Urcolletia crispula* (P. Karsten) Boud.  
On dead *Heracleum* stems; DM (IMI 254008).
- [*Verrucaria maura* Wahlenb. (L.)  
Classed as "very rare or extinct" by Hawksworth (1972) but present at Torcross on crags in 1985 just outside the southern limit of A.]
- DEUTEROMYCOTINA**
- [*Alternaria tenuis* Nees  
Mentioned by Greenhalgh (1980) but a synonym of *A. alternata* (Fr.)  
Keissler, already recorded.]
- Arrungitea fragilis* B. Sutton  
On dead *Hedera* leaves; J1 (IMI 237285d).  
Kirk (1982).
- Ascochyta ari* Died.  
On dead *Arum maculatum* sheath; C (IMI 279669).
- Bactridium flavum* Kunze  
On rotting *Salix* wood; DM (IMI 215201).
- Beltrania querna* Harkn.  
On a dead *Quercus ilex* leaf; SV (IMI 289051).
- Bispora christiansenii* D. Hawksw.  
In *Bactridia* apothecia on *Sambucus*; I1.
- Brachysporium masonii* S. Hughes  
On rotting wood; J1 (IMI 188746h).
- Cercospora mercurialis* Pass.  
On *Mercurialis perennis* leaves; F1 (IMI 296953).  
*Cercosporidium* sp.  
On *Eucalyptus gurnii* fallen leaves; SV (IMI 206382).  
[*Chloridium clavaceiforme* (Preuss) W. Gams & Hol.-Jech.  
See *Chaetosphaeria myrtocarpa* (Fr.) C. Booth.]
- [*Cirrenalia lignicola* P. M. Kirk  
The Slapton record of *Helicoma muelleri* Corda (IMI 188746b) should be referred here.]
- [*Cryptosporopsis* sp.  
See under *Pezizula livida* (Berk. & Broome) Rehm.]
- Cryptostroma corticale* (Ellis & Ev.) Gregory & Waller  
On *Acer pseudoplatanus*; "Slapton Sands".  
Abbott, Bevercombe & Rayner (1977).
- Endophragma alternata* Tubaki & Saito  
On ?*Hedera* leaf; J1 (IMI 237285b).
- [*E. pinnicola* M. B. Ellis  
The Slapton record of *E. bowei* J. Crane (IMI 197536a) should be referred here.]
- Endophraggiella* sp.  
On rotting wood; J1 (IMI 188746d).  
Probably an undescribed species.
- Hansfordia pulvinata* (Berk. & Curtis) S. Hughes  
Greenhalgh (1980).
- Hobsonia christiansenii* Brady & D. Hawksw. ined.  
Associated with *Physcia tenella* on *Sambucus*; I1 (IMI 297525).
- Lichenoconium lecanorae* (Jaap) D. Hawksw.  
On *Lecanora* sp. and *Parmelia sulcata*; N4 (IMI 251261, 251262).  
Hawksworth (1981).
- [*L. usneae* (Anzi) D. Hawksw.  
The Slapton record of *L.* sp. on *Ramalina calicaris* (IMI 186833) can now be placed here. Greenhalgh (1980).]
- L. xanthorhiae* M. S. Christ.  
On *Xanthoria polycarpa* apothecia; DM (IMI 279653).
- Massariothea scotica* B. Sutton & Rizwi  
On *Corylus* twigs; F1 (IMI 297127).  
Previously only known from a single collection on *Quercus* twigs in Scotland (Sutton & Rizwi, 1980).
- Oreamasia hirsuta* Urrie  
On fallen *Pinus* cones; L (IMI 231677c).  
Hawksworth & Minter (1980).
- Phomopsis oblonga* (Desm.) Traverso  
On dead *Ulmus* twigs; N4 (IMI 296964a).
- Polyscitalum hareae* (B. Sutton) P. Kirk  
On fallen *Eucalyptus* leaves; SV (IMI 206381a, T).



- This new species is only known from Slapton.  
 Sutton (1978, as *Subulispora hareae* B. Sutton).  
*Sphaeridium condidium* Fuckel  
 On fallen *Pinus* cones; L.  
*Sporidesmium clarkii* P. M. Kirk  
 On dead *Rubus* stems; J1 (IMI 184283b, T).  
 This new species is only known from Slapton.  
 Kirk (1982).  
*S. rubi* M. B. Ellis  
 On *Rubus* stems; DM.  
 Previously known only from Germany.  
 [*Steganosporium ovatum* (Hoffm.) Corda  
 Mentioned by Greenhalgh (1980), but a synonym of *P. pyriforme* (Hoffm.)  
 Corda which is already recorded.]  
*Stigmina longispora* (M. B. Ellis) S. Hughes  
 On rotting wood; J1 (IMI 188746c).  
*Subulispora britannica* B. Sutton  
 On dead *Hedera* leaves; J1 (IMI 237285c).  
*Taeniola delicata* M. S. Christ. & D. Hawksw.  
 On *Lecanora campestris* apothecia on wall; S (IMI 215199b).  
 Hawksworth (1979).  
*Tetraploa aristata* Berk. & Broome  
 On dead grass stem; N3 (IMI 254003).  
*Thysanophora penicilloides* (Roum.) Kendrick  
 On fallen *Pinus* needles; J1 (IMI 180138b).  
 [*Verticillium cinnabarinum* (Corda) Reinke & Berthold  
 See *Nectria inventa* Pethybr.]  
 [*Youxiomyces ramalinae* (Nordin) D. Hawksw.  
 See *Abrothallus suecicus* (Kirschst.) Nordin.]  
 [*V. truncatus* (B. de Lesd.) Dyko & D. Hawksw.  
 See *Abrothallus microspermus* Tul.  
 Hawksworth & Dyko (1979).]

Attention is also drawn here to the use of Slapton material in critical developmental studies of the lichenised *Cryptolechia carneolutea* (Turner) Massal. (Letrouit-Galinou, 1973, 1974) and *Lecanactis premea* (Ach.) Arnold (Letrouit-Galinou, 1984).

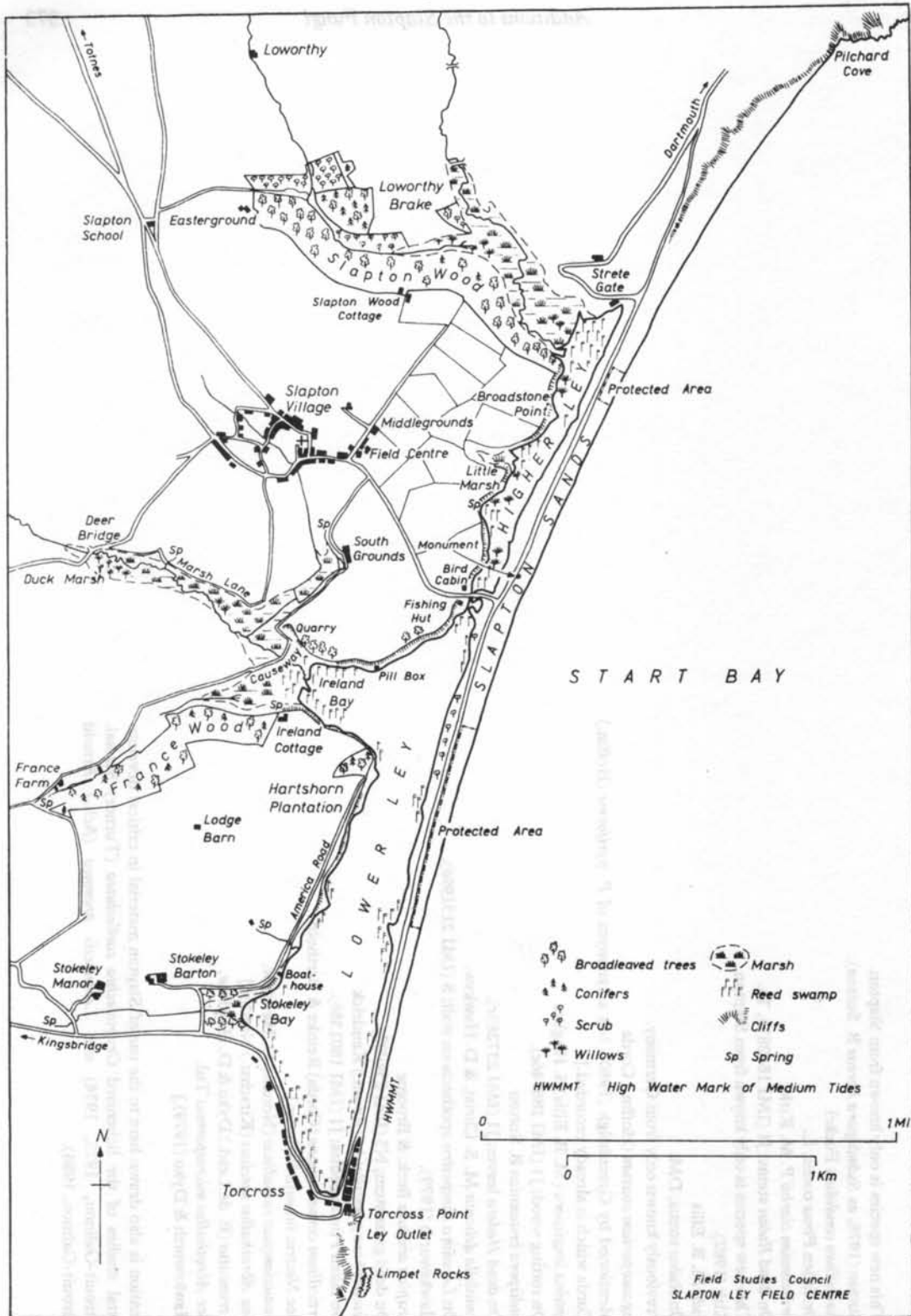


FIG. 1.  
The Slapton Ley Nature Reserve (reproduced from Hawksworth, 1972, p. 537).

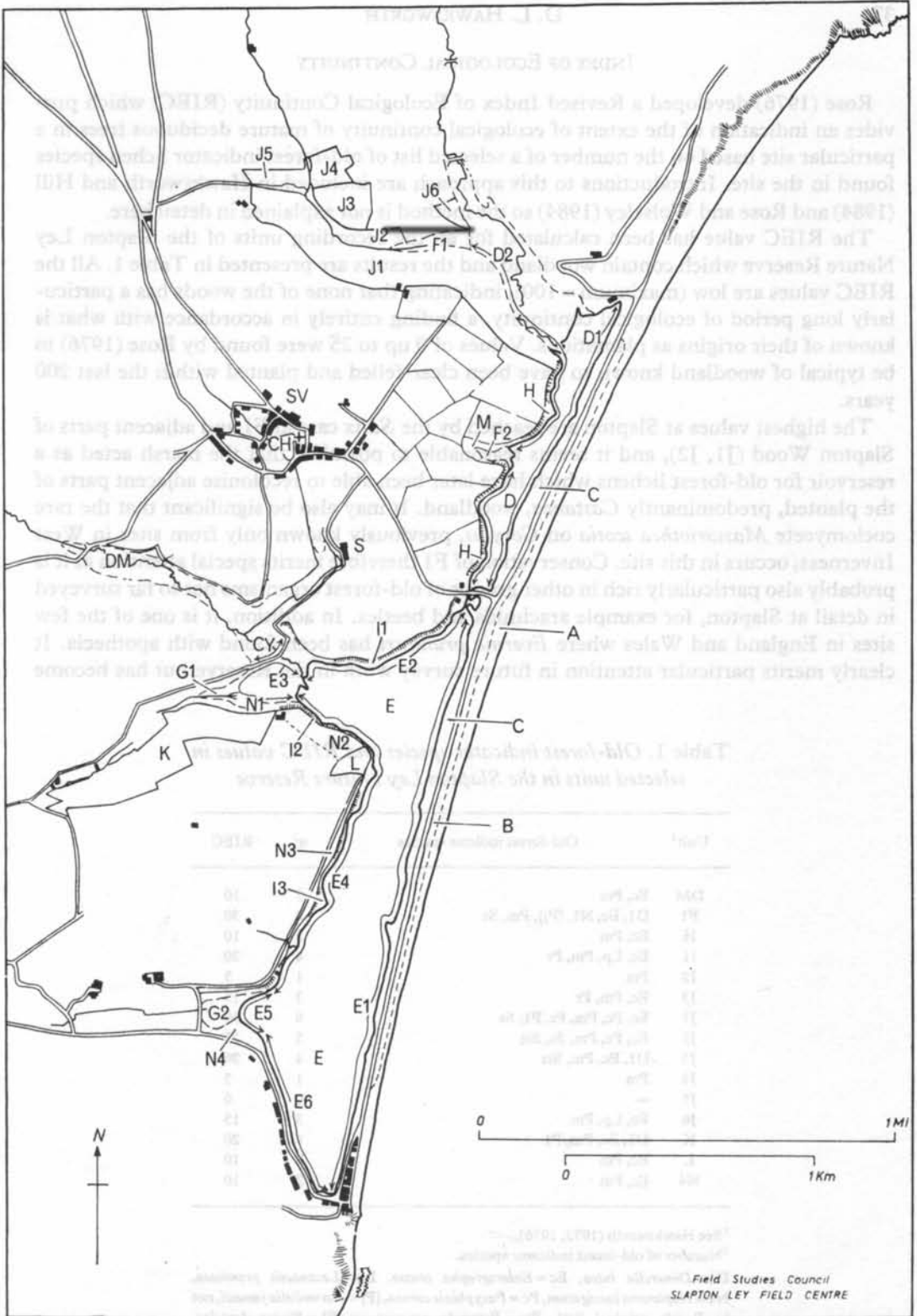


FIG. 2.

The Slapton Ley Nature Reserve showing location of the 38 units used in this study (reproduced from Hawksworth, 1972, p. 539).

## INDEX OF ECOLOGICAL CONTINUITY

Rose (1976) developed a Revised Index of Ecological Continuity (RIEC) which provides an indication of the extent of ecological continuity of mature deciduous trees in a particular site based on the number of a selected list of old-forest indicator lichen species found in the site. Introductions to this approach are included in Hawksworth and Hill (1984) and Rose and Wolseley (1984) so the method is not explained in detail here.

The RIEC value has been calculated for all the recording units of the Slapton Ley Nature Reserve which contain woodland and the results are presented in Table 1. All the RIEC values are low (maximum = 100), indicating that none of the woods has a particularly long period of ecological continuity, a finding entirely in accordance with what is known of their origins as plantations. Values of 0 up to 25 were found by Rose (1976) to be typical of woodland known to have been clear-felled and planted within the last 200 years.

The highest values at Slapton are reached by the *Salix* carr in F1 and adjacent parts of Slapton Wood (J1, J2), and it seems reasonable to postulate that the marsh acted as a reservoir for old-forest lichens which have later been able to recolonise adjacent parts of the planted, predominantly *Castanea*, woodland. It may also be significant that the rare coelomycete *Massariothea scotia* on *Corylus*, previously known only from sites in West Inverness, occurs in this site. Conservation of F1 therefore merits special attention as it is probably also particularly rich in other groups of old-forest organisms not so far surveyed in detail at Slapton, for example arachnids and beetles. In addition, it is one of the few sites in England and Wales where *Evernia prunastri* has been found with apothecia. It clearly merits particular attention in future survey work in the Reserve but has become

Table 1. *Old-forest indicator species and RIEC values in selected units in the Slapton Ley Nature Reserve*

Unit <sup>1</sup>	Old-forest indicator species	n <sup>2</sup>	RIEC
DM	Ec, Pm	2	10
F1	D1, Ec, N1, [Pj], Pm, Ss	6	30
H	Ec, Pm	2	10
I1	Ec, Lp, Pm, Pr	4	20
I2	Pm	1	5
I3	Ec, Pm, Pr	3	15
J1	Ec, Pc, Pm, Pr, P1, Ss	6	30
J2	Ec, Pc, Pm, Ss, Sts	5	25
J3	D1, Ec, Pm, Sts	4	20
J4	Pm	1	5
J5	—	0	0
J6	Ec, Lp, Pm	3	15
K	D1, Ec, Pm, P1	4	20
L	Ec, Pm	2	10
N4	Ec, Pm	2	10

<sup>1</sup>See Hawksworth (1972, 1976).

<sup>2</sup>Number of old-forest indicator species.

D1 = *Dimerella lutea*, Ec = *Enterographa crassa*, Lp = *Lecanactis premnaea*, N1 = *Nephroma laevigatum*, Pc = *Pacyphiale cornea*, [Pj] = *Parmeliella jamesii*, not in Rose's original list, Pm = *Pyrenula macrospora*, P1 = *Porina leptalea*, Pr = *Parmelia reddenda*, Ss = *Sticta sylvatica*, Sts = *Stenocybe septata*.

much overgrown, so much so that in the summers of 1984 and 1985 it was not possible to enter it to confirm the presence of the old-forest species recorded there.

Formerly, the Slapton area certainly had a much richer assemblage of old-forest indicator lichen species. Some evidence for this is the discovery in the herbarium of the British Museum (Natural History) (BM) of six large pieces of *Parmeliella plumbea* collected at Slapton by H. B. Holl in the 1860s. The most likely locality was perhaps ancient *Fraxinus* on the fringes of the Lower Ley, an area rich in extremely rare lichens not covered in the RIEC, including *Cryptolechia carneolutea*, *Opegrapha prosodea*, *Parmelia quercina*, *Physcia tribacioides* and *Wadeana dendrographa*, although some of these are now threatened (see below).

#### CHANGES IN THE FUNGUS AND LICHEN FLORA

The most significant factor affecting the Reserve in the last 10 years has been the impact of *Ceratocystis ulmi*, causal agent of Dutch Elm Disease. In 1975 the disease had not reached Slapton but was present just to the west of Stokenham. The gaps between elms caused a delay in the disease reaching the Slapton Reserve but in 1978 trees in the Peasditch area (N4) started to be affected and this soon spread into Duck Marsh (DM). By the summer of 1980 most of the elms in N4 and the DM margins were completely dead and extensive felling was carried out in that year.

The death of the elms, many of which have produced suckering growth not yet attacked, has led directly to the loss of lichen species which were entirely or largely confined to elm bark, for example *Anaptychia ciliaris*, *Caloplaca flavorubescens*, *Collema furfuraceum*, *C. nigrescens*, *C. subfurvum* and *Opegrapha vermicellifera* s.str. It has also had a major secondary effect as formerly shaded areas became opened up to direct sunlight with a prodigious upgrowth of brambles and herbaceous plants. This led to a change in the microenvironment of ash trees in DM and N4 with a consequent marked reduction in some of the more interesting lichens of the Reserve, including *Bacidia phacodes*, *Cryptolechia carneolutea*, *Gyalecta flotowii*, *Opegrapha prosodea* and *Wadeana dendrographa*. Some of the ash trees themselves have died and others are unhealthy, perhaps partly due to infections with *Daldimia concentrica*.

The impact of Dutch Elm Disease is, regrettably, not the only factor to have affected the lichen flora of the Reserve since I first visited it in 1969, and at least 26 lichens have been lost since serious recording started in the Reserve in 1960 (Table 2); i.e. 9% of the recorded lichens. In addition, many other species are now declining markedly and can be considered endangered in the Reserve. Regrettably, this includes several of the more interesting species present, as noted above. Some expansions are, however, also taking place in species favoured by man's activities, for example *Lecanora conizaeoides* is now widespread on worked timber (especially around the Field Centre and perhaps spread by visitors), and species able to grow on cement and concrete are extending as these materials are used to repair damaged walls, drains and paths.

The habitat changes noted are summarised below:

- (1) **Dutch Elm Disease** (see above).
- (2) **New sea defences.** Following the disastrous storm of January 1979 in which many houses at Torcross were destroyed or severely damaged, extensive new concrete sea defences have been built. This work was completed in August 1980. The new sea wall and associated buildings will eventually become a useful habitat for maritime saxicolous species not at present known in the Reserve, and by 1985 a mosaic with 60% cover in

Table 2. *Lichen species lost from Slapton between 1960 and 1985*

Species	Reason for loss
<i>Acarospora smaragdula</i>	Memorial cleaned 1984
<i>Anaptychia ciliaris</i>	Dutch Elm Disease
<i>Arthonia cinereo-pruinosa</i>	<i>Populus</i> tree died
<i>Buellia schaeferi</i>	Logs in B moved and then burnt
<i>Caloplaca cerinella</i>	Cutting and burning <i>Sambucus</i> scrub
<i>Caloplaca erythrocarpa</i>	Roof of part of Field Centre re-tiled
<i>Caloplaca flavorubescens</i>	Dutch Elm Disease
<i>Cladonia arbuscula</i>	Overgrowth of shingle
<i>C. cervicornis</i> subsp. <i>verticillata</i>	Overgrowth of shingle
<i>C. foliacea</i>	Overgrowth of shingle
<i>C. gracilis</i>	Overgrowth of shingle
<i>C. humilis</i>	Overgrowth of shingle
<i>C. ramulosa</i>	Overgrowth of shingle
<i>Collema furfuraceum</i>	Dutch Elm Disease
<i>C. nigrescens</i>	Dutch Elm Disease
<i>C. subfurvum</i>	Dutch Elm Disease
<i>Foraminella ambigua</i>	Decay or removal of dead <i>Fraxinus</i>
<i>Opegrapha vermicellifera</i>	Dutch Elm Disease
<i>Parmelia omphalodes</i>	Overgrowth of shingle
<i>Peltigera horizontalis</i>	Re-capping of wall outside Field Centre
<i>Physcia tribacia</i>	Removal of logs in B and demolition of barn
<i>P. tribacioides</i>	Reduction in <i>Sambucus</i> scrub
<i>Ramalina cuspidata</i>	Overgrowth of shingle
<i>R. pollinaria</i>	Repointing and demolition of barn
<i>Sphaerophorus fragilis</i>	Collapse of wall
<i>S. globosus</i>	Collapse of wall

parts had developed on the horizontal surface of the wall. The main colonising species are *Caloplaca citrina*, *C. marina*, *Lecania erysibe*, *Lecanora albescens*, *L. atra*, *L. dispersa* and *Xanthoria parietina* (to 2 mm, in crevices).

(3) **Overgrowth of the shingle ridge.** As a direct consequence of the building of the new sea defences, the width of the ridge has increased and the frequency of shingle being thrown over the road into unit C has decreased markedly. Large areas of the formerly-rich lichen heath have already been overgrown by phanerogams and many species, especially of *Cladonia* and *Peltigera*, have been eliminated or now occur at much reduced frequencies. *Cladonia cervicornis* subsp. *verticillata*, *C. foliacea*, *C. gracilis*, *C. humilis* (syn. *C. conista* sensu Dahl) and *C. ramulosa* (syn. *C. pityrea*) had been lost by 1985 and *C. portentosa* and *Coelocaulon aculeatum* are now endangered. The pebble communities are also threatened and the *Evernia prunasti*, *Hypogymnia physodes*, *Parmelia caperata* and *Ramalina cuspidata* formerly present on pebbles and mosses have been lost from this habitat. Many of the elders in C are also dying; these were especially rich in *Xanthorion* lichens. On the positive side, shingle in unit B (the seaward side of the road) has a much enhanced vegetation and may eventually have areas suited to colonisation by many of the terricolous lichens now lost from C.

(4) **Burning and clearing of the elder scrub.** The rich *Sambucus* scrub on the north-east side of I1 and edge of N3 has suffered from cutting back and burning. The *Caloplaca cerina*, *Candelaria concolor* and *Candelariella reflexa* are much reduced and the *Xanthorion* on twigs has lost at least *Caloplaca cerinella* and perhaps also *Lecanora sambuci* and *Physcia tribacioides*.

(5) **Decline of Duck Marsh willow carr.** The marsh has now become much drier due to the clearance of and deepening of the main river channel and water abstraction upstream. This has resulted in a massive upgrowth of herbaceous vegetation. Many of the willows have already died or are dying, due perhaps to a combination of changes in the drainage pattern and also the ravages of *Phyllodecta* species (see Hawksworth, 1976: p. 403). The main effect is the loss of the huge specimens of *Usnea articulata* (to 24.5 cm) and *U. ceratina* (to 42 cm) formerly present, and reductions in *Lecanora jamesii*, *Opegrapha soređiifera*, *Phlyctis agelaea*, *Ramalina calicularis* and *Usnea fulvoreağens*; the latter four species must now be regarded as endangered at Slapton.

(6) **Construction of car parks.** The ruins of the former Slapton Sands Hotel were cleared from the centre of B in 1971 when the central car park was being extended. This led to the loss of calcareous lichen communities formerly present on the remains. The subsequent car park extensions at both the north and south end of the shingle ridge have also caused some reduction in habitats. At the south end of C some of the richest grassland was lost and at the start of the built up area of Torcross in B, the grass where the fungus *Volvariella speciosa* was regularly to be found was gravelled (although the species still occurs in the car park at the north end of C). Some of the more interesting decorticate logs in B were also moved during car park construction; most have now gone or have been severely damaged by fires made during beach parties and *Buellia schaeereri* seems to have been lost. The lines of concrete posts along the A379 designed to prevent parking were completed in about 1977 and boulders of a range of rock types were also judiciously placed for this same purpose in 1980 at the suggestion of Mr A. D. Thomas, partly because they should eventually support luxuriant assemblages of saxicolous lichens otherwise scarce in the Reserve.

(7) **Building and wall repairs.** At the Field Centre itself, retiling of a part of the roof resulted in the loss of *Caloplaca erythrocarpa*, and re-capping a part of the wall at the front of the Centre in the disappearance of *Peltigera horizontalis* (three other species of the genus still occur elsewhere on the wall). The old barn wall at Southgrounds Farm of importance for *Physcia tribacia* and *Ramalina pollinaria* was repointed and later partly demolished in 1982–84; both lichens have now been lost. A boarded lean-to shed opposite the main gate into the churchyard, formerly with abundant *Parmelia soređians*, has been completely demolished, and the stone bridge on The Causeway (CY) is falling away piecemeal with consequent loss of one of the few habitats in the Reserve for siliceous rock lichens.

(8) **Memorial cleaning.** The granite obelisk memorial in B received two particularly rigorous cleanings in 1984 to remove graffiti which eliminated *all* lichen thalli present, including *Acarospora smaragdula* which was not otherwise known in the Reserve.

It is too early to comment on changes in the species of non-lichenised fungi present. Frequent visits over many years are necessary to detect species which may only fruit for a short time and only in years when particular combinations of weather conditions have occurred (Hawksworth, 1974, 1977), and the inventory of species present at Slapton is still incomplete. However, it is of interest to note that some larger fungi continue to re-appear regularly in a few sites, for example the edible *Cantharellus cibarius* has persisted in the same part of J3 for at least 15 years (1970–85) to my knowledge.

Table 3. Numbers of fungi in different groups recorded for the Slapton Ley Nature Reserve and adjacent areas

	Hawksworth (1972, 1976) and Ing (1976)	Present totals (1985)
Mastigomycotina	4	7
Zygomycotina	13	14
Basidiomycotina	336 (1*)	384 (1*)
Ascomycotina	612 (255*)	717 (288*)
Deuteromycotina	239	266
Myxomycota	87	88
Total	1291 (256*)	1476 (289*)

\* = Lichen-forming species, included in the totals for each group.

#### DISCUSSION

The Slapton survey is the first in-depth examination of the fungi of all groups to be found in an area of its size in the British Isles and its results therefore have considerable implications as a guide to the number of species to be found in a single locality. It has also provided some indication as to how such studies may be organised (Hawksworth, 1977).

Hawksworth (1976) estimated that the total number of fungi (excluding Myxomycota and lichen-forming fungi species) in the Reserve might be as high as 1800. The additional 185 species found since that time (Table 3) suggests that even that figure is conservative. A few years of concerted field work over several seasons, emphasising little-recorded habitats or hosts, and making extensive use of the recent splendid identification manual for microfungi by Ellis and Ellis (1985), would, I believe, take the total to over 2000.

The closer scrutiny given to the walls in Slapton village yielded several lichen species of interest, including *Leprocaulon microscopicum*, *Moelleropsis nebulosa*, *Physcia clementei* and *Solenopsis holophaea*, many of which are extremely abundant. The walls in Slapton are extremely old (some perhaps date from the fifteenth century) and are clearly an important habitat meriting conservation. The major threats to these are disturbance of the lichen-heaths on wall-tops and repointing of walls.

It is also of interest that the Reserve has yielded seven further species new to science, bringing the total described as new from it to 31. Some of these seem to be not uncommon, for example *Nectria boothii* on dead *Oenanthe* stems, already collected four times in three different units at Slapton but still unknown elsewhere. The scientific importance of the Reserve for fungi (including lichens) lies both in its richness and the presence of such otherwise little-known species, and management programmes should take into account maintenance of this aspect. At the same time it is sad to note a substantial deterioration in the lichen flora as a result of habitat destruction and modifications (Table 2), even in the absence of air pollution effects which pose the greatest long-term threat (Hawksworth, 1972). The reduction may well be even greater than reported as a detailed re-survey of some parts of the Reserve (e.g. F1) has not been possible in the last few years. That such significant changes can occur in so short a period indicates the vulnerability of lichens to environmental changes.



It will clearly be of interest for comparable surveys to be carried out at intervals in the future in order to both continue to build up the inventory of species present, and monitor the further changes that will undoubtedly occur.

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