

MYXOMYCETES FROM THE BARK OF THE EVERGREEN OAK *QUERCUS ILEX*

by

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Resumen

WRIGLEY DE BASANTA, D. (1998). Myxomycetes de la corteza de *Quercus ilex*. *Anales Jard. Bot. Madrid* 56(1): 3-14 (en inglés).

Se presentan los resultados de 81 cultivos en cámara húmeda de corteza de *Quercus ilex* vivo. Se citan 37 táxones, que amplían a 55 el número de especies de mixomicetes encontrados sobre este sustrato. Se confirma la presencia en la Península Ibérica de *Licea deplanata*, y se incluyen siete nuevas citas para la provincia de Madrid. Se aportan datos sobre frecuencia de aparición y tiempos de incubación de algunas especies.

Palabras clave: Mixomicetes corticícolas, Madrid, *Quercus ilex*, cultivo en cámara húmeda.

Abstract

WRIGLEY DE BASANTA, D. (1998). Myxomycetes from the bark of the evergreen oak *Quercus ilex*. *Anales Jard. Bot. Madrid* 56(1): 3-14.

The results of 81 moist chamber cultures of bark from living *Quercus ilex* trees are reported. A total of 37 taxa are cited, extending the number of species found on this substrate to 55. The presence of *Licea deplanata* on the Iberian Peninsula is confirmed. Seven new records are included for the province of Madrid. Some data are contributed on species frequency and incubation times.

Key words: Corticolous myxomycetes, Madrid, *Quercus ilex*, moist chamber culture.

INTRODUCTION

Quercus ilex L. is one of the most characteristic trees of the Iberian Peninsula. It has dark grey bark with shallow irregular fissures, and as the tree ages, the bark surface fractures into many small plaques. This provides an ideal microenvironment for the development and fruiting of myxomycetes creating areas between and beneath the outer surface which retain moisture. LADO (1993a) stresses how productive the substrates from *Quercus ilex* are, citing over 90 species collected from Spanish territories fruiting in

leaf litter, on fallen and decaying wood, on leaves and twigs as well as on bark. The bark however presents a special ecological situation (BROOKS, 1967) and is an important habitat for many species, some of which appear nowhere else (ING, 1997). Table 1 shows the species that have been recorded in the literature from the bark of living *Q. ilex* trees in Spain, either in the field or from moist chamber cultures. This paper presents the combined results of 81 moist chamber cultures of the bark of living trees sampled at various intervals over a period of 13 years (WRIGLEY DE BASANTA, 1987, 1996a, 1996b).

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TABLE 1

LIST OF MYXOMYCETES REPORTED IN THE LITERATURE FROM THE BARK OF LIVING *QUERCUS ILEX* IN PENINSULAR SPAIN

<i>Arcyria cinerea</i> (Bull.) Pers.	PANDO, 1997b (Cu)
<i>A. incarnata</i> (Pers. ex J.F. Gmel.) Pers.	MORENO & al., 1990 (Cc)
<i>Badhamia foliicola</i> Lister	HONRUBIA & al., 1985 (Mu)
<i>B. versicolor</i> Lister	PANDO, 1997b (Cu)
<i>Badhamiopsis ainoae</i> (Yamash.) T.E. Brooks & H.W. Keller	CARILLA & GRÀCIA, 1991 (Hu)
<i>Comatricha laxa</i> Rostaf.	WRIGLEY, 1987 (M)
<i>Craterium minutum</i> (Leers) Fr.	GRÀCIA & al., 1980 (Mu)
<i>Cribraria violacea</i> Rex	PANDO, 1997b (Se)
<i>Didymium squamulosum</i> (Alb. & Schwein) Fr.	CARILLA & GRÀCIA, 1991 (Hu); OLTRA, 1995 (V)
<i>D. trachysporum</i> G. Lister	PANDO, 1997b (Se)
<i>Echinostelium brooksii</i> K.D. Whitney	LLISTOSELLA & AGUASCA, 1986 (B)
<i>E. coelocephalum</i> T.E. Brooks & H.W. Keller	PANDO, 1997b (Cu)
<i>E. colliculosum</i> K.D. Whitney & H.W. Keller	LLISTOSELLA & AGUASCA, 1986 (B)
<i>E. fragile</i> Nann.-Bremek.	WRIGLEY, 1987 (M)
<i>E. minutum</i> De Bary	WRIGLEY, 1987 (M); PANDO, 1997b (CR)
<i>Enerthenema papillatum</i> (Pers.) Rostaf.	CARILLA & GRÀCIA, 1991 (Hu)
<i>Lamproderma scintillans</i> (Berk. & Broome) Morgan	OLTRA, 1995 (V)
<i>Licea castanea</i> G. Lister	PANDO, 1997b (Se)
<i>L. denudescens</i> H.W. Keller & T.E. Brooks	PANDO, 1997b (Cu)
<i>L. kleistobolus</i> G.W. Martin	PANDO, 1997b (Cu, Se)
<i>L. minima</i> Fr.	LLISTOSELLA & AGUASCA, 1986 (B)
<i>L. nannengae</i> Pando & Lado	PANDO, 1997b (Se)
<i>L. parasitica</i> (Zukal) Martin	WRIGLEY, 1987 (M); PANDO, 1997b (Z)
<i>L. perexigua</i> T.E. Brooks & H.W. Keller	PANDO, 1997b (Cu)
<i>L. scyphoides</i> T.E. Brooks & H.W. Keller	PANDO, 1997b (Cu, Se)
<i>Macbrideola cornea</i> (G. Lister & Cran) Alexop.	WRIGLEY, 1987 (M); PANDO, 1997b (Cu, Se, Z)
<i>M. oblonga</i> Pando & Lado	CARILLA & GRÀCIA, 1991 (Hu); PANDO, 1997b (CR, Z)
<i>M. synsporos</i> (Alexop.) Alexop.	WRIGLEY, 1987 (M)
<i>Paradiacheopsis fimbriata</i> (G. Lister & Cran) Hertel ex Nann.-Bremek.	LLISTOSELLA & AGUASCA, 1986 (B)
<i>Perichaena vermicularis</i> (Schwein.) Rostaf.	PANDO, 1997b (Cu, Se)
<i>Physarum auriscalpium</i> Cooke	PANDO, 1997b (Se)
<i>Ph. cinereum</i> (Batsch) Pers.	PANDO, 1997b (Cu)
<i>Ph. compressum</i> Alb. & Schwein	CARILLA & GRÀCIA, 1991 (Hu)
<i>Ph. decipiens</i> M.A. Curtis	CARILLA & GRÀCIA, 1991 (Hu); PANDO, 1997b (Cu)
<i>Ph. leucophaeum</i> Fr.	LÓPEZ-SÁNCHEZ & al., 1986 (Mu)
<i>Ph. nutans</i> Pers.	VIDAL-FRIGOLA & GRÀCIA, 1990 (Ge); CARILLA & GRÀCIA, 1991 (Hu)
<i>Ph. oblatum</i> T. Macbr.	LLISTOSELLA & AGUASCA, 1986 (B)
<i>Ph. pusillum</i> (Berk. & Curt.) G. Lister	CARILLA & GRÀCIA, 1991 (Hu)
<i>Ph. serpula</i> Morgan	CARILLA & GRÀCIA, 1991 (Hu)
<i>Ph. straminipes</i> Lister	OLTRA, 1997 (M)
<i>Trichia contorta</i> var. <i>karstenii</i> (Rostaf.) Ing	PANDO, 1997b (Cu)

Key to Provinces Listed: B, Barcelona; Cc, Cáceres; Cu, Cuenca; CR, Ciudad Real; Ge, Gerona; Hu, Huesca; M, Madrid; Mu, Murcia; Se, Sevilla; V, Valencia; Z, Zaragoza.

METHOD

The trees chosen were large mature trees growing in various places in the Province of Madrid. Samples were taken from the North to North Western side of each tree at a height of 0.5-1.5 m, and put in labelled envelopes. They were then placed in moist chamber culture following the procedure used by MITCHELL (1977), and watered every few days as required to maintain the humidity for the whole observation period of at least a month. The bark of 25 of the cultures was soaked and kept moist with deionised water or solutions at pH 3.0, 4.0, 5.0, and 6.0, and were kept for three months as they formed part of a another study. Details of the number and type of fructification and incubation times were recorded, and permanent slides with Hoyer's medium or PVA, or boxed herbarium samples were made of each. Records are added of some taxa which were also found fruiting directly on the bark of the living trees.

All cited numbers refer to specimens kept in the author's collection (dwb). Locality, UTM grid reference, and the date of collection from the culture (day-month-year) are given for each.

RESULTS

Arcyria cinerea (Bull.) Pers.

MADRID: Casa de Campo, 30TVK3575, 8-XII-1994, dwb 1396; ibidem, 28-XII-1994, dwb 1404. El Retiro, 30TVK4274, 24-V-1997, dwb 1520; ibidem, 26-V-1997, dwb 1534; ibidem, 31-V-97, dwb 1549; ibidem, 6-VI-1997, dwb 1572, 1543; ibidem, 14-VI-1997, dwb 1571.

In the cultures of bark from Madrid, El Retiro, this species was found fruiting alongside *Echinostelium apitectum* in all cultures.

Badhamia affinis Rostaf.

MADRID: Casa de Campo, 30TVK3575, 29-XI-1994, dwb 1389; ibidem, 3-XII-1994, dwb 1392; ibidem, 11-XII-1994, dwb 1393; ibidem, 8-XII-1994, dwb 1399; ibidem, 18-XII-1994, dwb 1408.

Badhamia foliicola Lister

MADRID: Casa de Campo, 30TVK3577, 29-V-1984, dwb 158. Olmeda de las Fuentes, 30TVK8068, 14-V-1997, dwb 1483.

Badhamia macrocarpa (Ces.) Rostaf.

MADRID: Casa de Campo, 30TVK3575, 1-XI-1994, dwb 1336.

Badhamia panicea (Fr.) Rostaf.

MADRID: Casa de Campo, 30TVK3575, 15-XI-1994, dwb 1295.

Badhamia versicolor Lister

MADRID: Nuevo Baztán, 30TVK7969, 12-V-1997, dwb 1471; ibidem, 24-V-1997, dwb 1511. Valdelaguna, 30TVK6946, 17-V-1997, dwb 1484, 1485; ibidem, 24-V-1997, dwb 1516; ibidem, 6-VI-1997, dwb 1539.

Badhamiopsis ainoae (Yamash.) T.E. Brooks & H.W. Keller

MADRID: Casa de Campo, 30TVK3575, 28-I-1994, dwb 1231; ibidem, 5-II-1994, dwb 1245, 1248. Olmeda de las Fuentes 30TVK8068, 24-V-1997, dwb 1521.

This is the first record for Madrid Province. This species has also been recorded from Huesca, Segovia and Soria (LADO, 1993b).

Comatricha ellae Härk.

MADRID: Casa de Campo, 30TVK3577, 19-X-1984, dwb 191.

Comatricha laxa Rostaf.

MADRID: Casa de Campo, 30TVK3577, 22-V-1984, dwb 155; ibidem, 15-X-1984, dwb 180. Las Rozas, dehesa de Navalcarbón, 30TVK2584, 16-V-1997, dwb 1504.

Comatricha nigra (Pers. ex J.F. Gmel.) J. Schröt.

MADRID: Casa de Campo, 30TVK3575, 10-XI-1994, dwb 1353; ibidem, 22-XII-1994, dwb 1405.

Echinostelium apitectum K.D. Whitney

MADRID: Casa de Campo, 30TVK3575, 27-I-1994, dwb 1220; ibidem, 29-I-1994, dwb 1225, 1226; ibidem, 31-I-1994, dwb 1241; ibidem, 28-XI-1994, dwb 1374. Casa de Campo, 30TVK3576, 11-V-1997, dwb 1468; ibidem, 12-V-1997, dwb 1474. El Retiro, 30TVK4274, 11-V-1997, dwb 1467; ibidem, 12-V-1997, dwb 1469, 1475; ibidem, 13-V-1997, dwb 1478, 1480, 1519;

ibidem, 17-V-1997, dwb 1489, 1490, 1491; ibidem, 31-V-1997, dwb 1535; ibidem, 14-VI-1997, dwb 1544; ibidem, 24-V-1997, dwb 1526, 1518; ibidem, 26-V-1997, dwb 1534a; ibidem, 31-V-1997, dwb 1535; ibidem, 14-VI-1997, dwb 1544. Las Rozas, dehesa de Navalcarbón, 30TVK2584, 10-V-1997, dwb 1458.

From the numerous specimens (> 300 sporocarps) appearing, those examined all showed similar characters to those reported from Guadalajara (PANDO & LADO, 1990; PANDO, 1997a). The spores are smaller than those described by WHITNEY (1980) as they measured 6-8 µm. This character was also described for Iberian specimens by OLTRA (1994) who found this species on other substrates in Valencia. The sporocarps have a white colour when they are fresh, but the pink to pinkish brown colour described by Whitney when they are completely dry. An interesting variety of form was observed. The spore-like covering of the columella was sometimes attached to the peridial collar but often separated from it by a portion of the columella. Some specimens had a rudimentary capillitium which pierced the spore-like body projecting above it as a tapering thread (fig. 1) in the same way as those described by LADO & PANDO (1997).

This is the first record of this species for Madrid Province. It has only been recorded from Guadalajara, Huelva and Valencia in Peninsular Spain.

***Echinostelium elachiston* Alexop.**

MADRID: Casa de Campo, 30TVK3576, 17-V-1997, dwb 1501.

Has only previously been recorded in Spain from Guadalajara (LADO & PANDO, 1997).

***Echinostelium fragile* Nann.-Bremek.**

MADRID: Casa de Campo, 30TVK3577, 22-VI-1985, dwb 260. Puente Retamar, 30TVK2186, 5-XI-1987, dwb 500.

***Echinostelium minutum* De Bary**

MADRID: Casa de Campo, 30TVK3577, 4-X-1984, dwb 179. Casa de Campo, 30TVK3576, 13-V-1997, dwb 1481. Puente Retamar, 30TVK2186, 5-XI-1987, dwb 501, 502; ibidem, 6-XI-1987, dwb 503; ibidem, 18-XI-1987, dwb 518; ibidem, 5-XI-1994, dwb 1342, 1343; ibidem, 13-XI-1994, dwb 1354.

***Enerthenema papillatum* (Pers.) Rostaf.**

MADRID: Puente Retamar, 30TVK2186, 16-XI-1987, dwb 509. Casa de Campo, 30TVK3575, 22-II-1997, dwb 1274; ibidem, 25-X-1994, dwb 1331.

***Licea castanea* G. Lister**

MADRID: Casa de Campo, 30TVK3577, 20-III-1984, dwb 132; ibidem, 30-I-1994, dwb 1230, 1237, 1280; ibidem, 12-II-1994, dwb 1253; ibidem, 1-II-1994, dwb 1285; ibidem, 15-XI-1994, dwb 1367. Casa de Campo, 30TVK3575, 31-I-1994, dwb 1242, 1244. Casa de Campo, 30TVK3675, 23-VI-1997, dwb 1569. Las Rozas, dehesa de Navalcarbón, 30TVK2584, 26-V-1997, dwb 1532; ibidem, 15-VI-1997, dwb 1557.

This was also collected already fruited from the bark of living *Quercus ilex* trees in Madrid: Las Rozas, dehesa de Navalcarbón, 30TVK2584, 30-IX-1997, dwb 1588.

***Licea denudescens* H.W. Keller & T.E. Brooks**

MADRID: Las Rozas, dehesa de Navalcarbón, 30TVK2584, 20-V-1997, dwb 1505a.

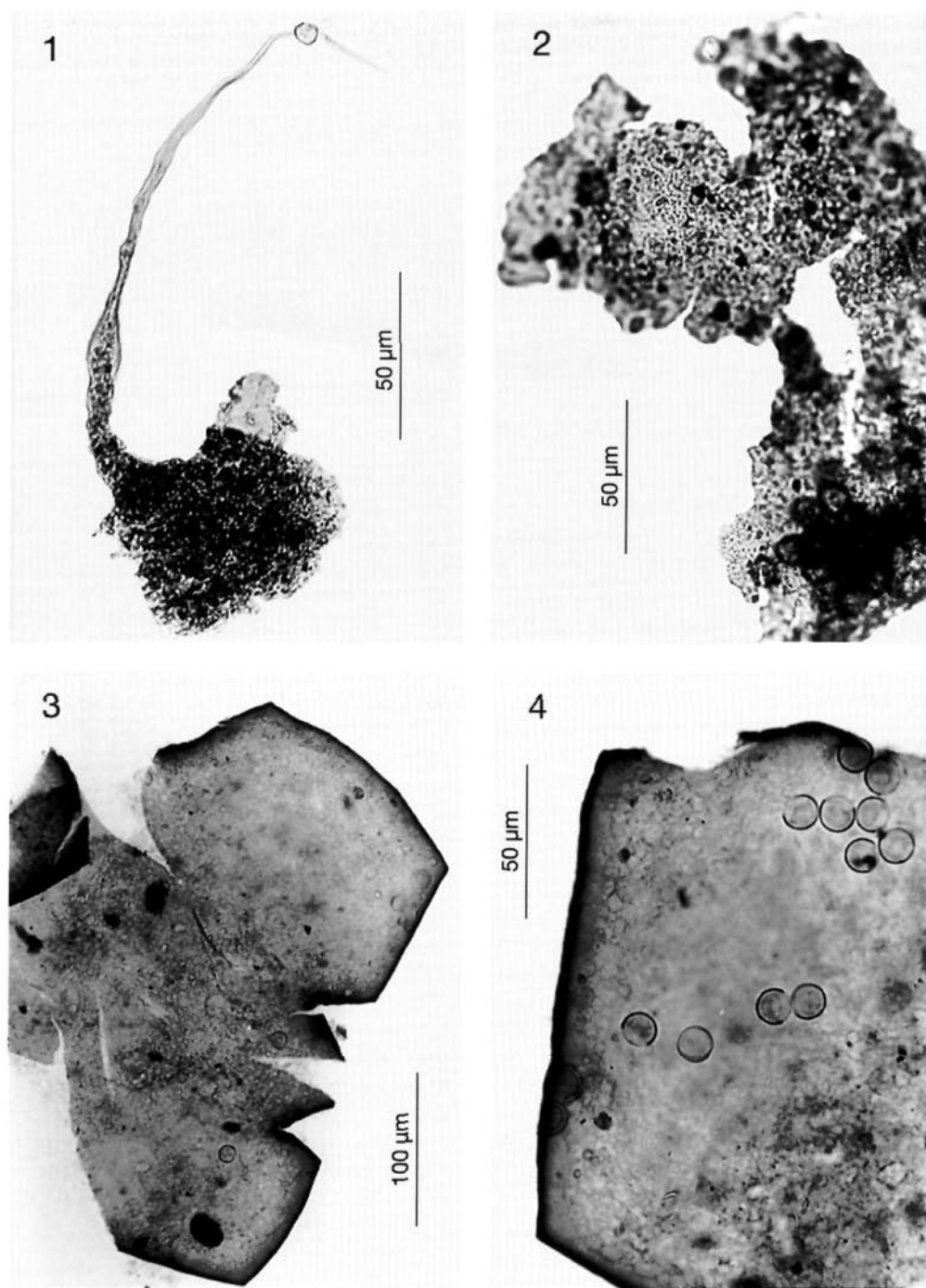
This was also collected already fruited from the bark of living *Quercus ilex* trees in Madrid: Las Rozas, dehesa de Navalcarbón, 30TVK2584, 30-IX-1997, dwb 1582. It is probably more common than these records suggest, but it is inconspicuous on this substrate until the bark is completely dry, and so easily overlooked. This was commented on by ING (1997). The ornamental inner peridial layer however, is clearly visible in preparations by transmitted light (fig. 2).

This is the first record of this species for Madrid Province. It has been recorded from Cádiz, Cuenca, Jaén and Toledo in Peninsular Spain (LADO, 1993b; PANDO, 1997b).

***Licea deplanata* Kowalski**

MADRID: Casa de Campo, 30TVK3575, 9-I-1995, dwb 1407.

This collection was listed in the abstract volume of ICSEM II (WRIGLEY DE BASANTA, 1996b) as *Licea belmontiana* Nann.-Bremek. Further examination and comparison with type specimens leads us to believe that this is *L. deplanata*, since the sporocarps have an angular appearance with very obvious dark shiny lines between peridial lobes when dry.



Figs. 1-4.—1, *Echinostelium apitectum* (dwb 1478): showing spore-like body with rudimentary capillitium. 2, *Licea denudescens* (dwb 1582): portion of peridium showing ornamented inner surface. 3, 4, *L. deplanata* (dwb 1407): 3, portion of peridium showing smooth dark margins; 4, portion of peridium with spores showing large germinative pore.

By transmitted light these can be seen as dark smooth margins to the lobes of dehiscence (fig. 3) without obvious papillae, but the spores are smooth with a large germinative pore (fig. 4).

This is the second Iberian record of this taxon. CABO (1995) reported it on *Hedera helix* (MA-Fungi 34043) from La Coruña, and it was previously only known from California on decayed leaves of *Eucalyptus* (KOWALSKI, 1970, 1972). This is the first time it has been collected on bark.

Licea kleistobolus G.W. Martin

MADRID: Casa de Campo, 30TVK3575, 27-I-1994, dwb 1232; ibidem, 19-II-1994, dwb 1270; ibidem, 1-III-1994, dwb 1286.

Licea nannengae Pando & Lado

MADRID: Casa de Campo, 30TVK3575, 5-III-1994, dwb 1282; ibidem, 12-III-1994, dwb 1291; ibidem, 21-III-1994, dwb 1298; ibidem, 2-XII-1994, dwb 1385; ibidem, 2-I-1995, dwb 1401. Casa de Campo, 30TVK3675, 14-VI-1997, dwb 1561; ibidem, 23-VI-1997, dwb 1567, 1570. Dehesa de Navalcarbón, 30TVK2584, 14-VI-1997, dwb 1558; ibidem, 15-VI-1997, dwb 1554, 1555.

The collections were usually of numerous sporocarps and spread over a wide area. The translucent membranous inner layer of the peridium visible at the margins was a constant character, making this species readily distinguishable from the other small *Liceas* by transmitted light. The average incubation time of 45 days on this substrate was rather longer than that reported by PANDO & LADO (1988). This is the first record for Madrid Province. This taxon has previously been recorded from various other provinces (LADO, 1993b; PANDO, 1997b).

Licea parasitica (Zukal) G.W. Martin

MADRID: Casa de Campo, 30TVK3577, 5-III-1984, dwb 100; ibidem, 19-X-1984, dwb 200. Ctra. de Majadahonda a Boadilla del Monte, 30TVK2878, 30-XI-1988, dwb 602; ibidem, 30-XI-1988, dwb 602a; ibidem, 11-XII-1988, dwb 603; ibidem, 3-XII-1988, dwb 608, 609. Casa de Campo, 30TVK3575, 29-I-1994, dwb 1222; ibidem, 12-II-1994, dwb 1259; ibidem, 17-II-1994, dwb 1263, 1271; ibidem, 19-II-1994, dwb 1266; ibidem, 25-X-1994, dwb 1325, 1329. Casa de Campo, 30TVK3576, 12-V-1997, dwb 1470; ibidem, 17-V-1997, dwb 1495, 1496; ibidem, 14-VI-1997, dwb 1562; ibidem, 15-VI-

1997, dwb 1545, 1546; ibidem, 23-VI-1997, dwb 1559, 1560, 1565, 1566, 1574. El Retiro, 30TVK4274, 12-V-1997, dwb 1476. Las Rozas, dehesa de Navalcarbón, 30TVK2584, 17-V-1997, dwb 1503; ibidem, 20-V-1997, dwb 1505; ibidem, 15-VI-1997, dwb 1556; ibidem, 23-VI-1997, dwb 1552, 1553. Olmeda de las Fuentes, 30TVK8068, 23-VI-1997, dwb 1573.

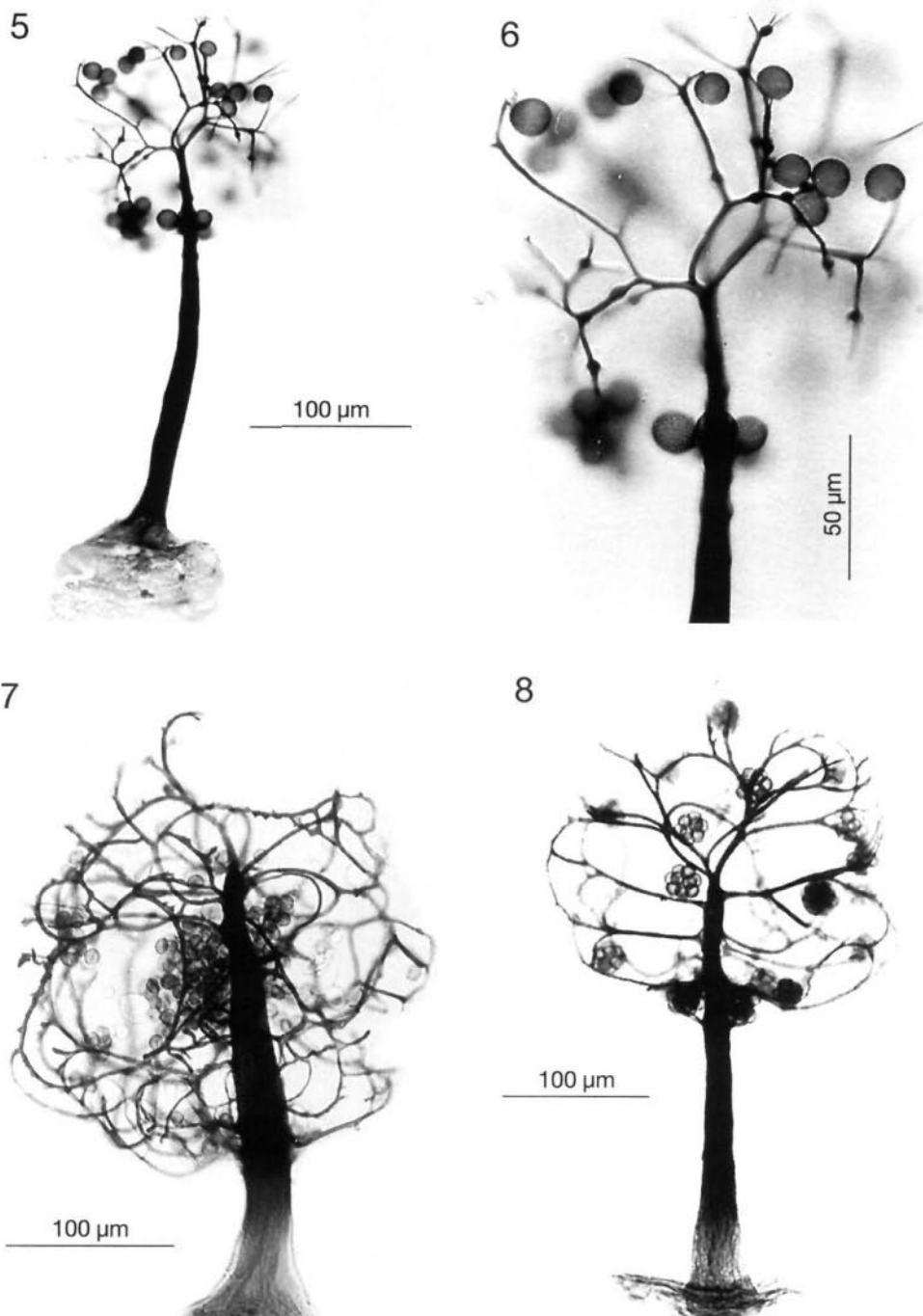
This very common species was also found already fruited on the bark of living *Quercus ilex* trees from Madrid: Las Rozas, dehesa de Navalcarbón, 30TVK2584, 30-XI-1997, dwb 1589. Many of the pieces of bark collected for culture had mature or empty sporocarps.

Macbrideola cornea (G. Lister & Cran) Alexop.

MADRID: Casa de Campo, 30TVK3577, 10-III-1984, dwb 122; ibidem, 12-III-1984, dwb 130; ibidem, 20-III-1984, dwb 131, 140; ibidem, 7-V-1984, dwb 150; ibidem, 10-V-1984, dwb 151. Casa de Campo, 30TVK3575, 27-I-1994, dwb 1255; ibidem, 29-I-1994, dwb 1238, 1227; ibidem, 30-I-1994, dwb 1243; ibidem, 31-I-1994, dwb 1235; ibidem, 4-II-1994, dwb 1265; ibidem, 5-II-1994, dwb 1240; ibidem, 12-II-1994, dwb 1250, 1252, 1273, 1277, 1278, 1279, 1290; ibidem, 17-II-1994, dwb 1262; ibidem, 22-II-1994, dwb 1272; ibidem, 24-II-1994, dwb 1276; ibidem, 13-III-1994, dwb 1288, 1289; ibidem, 26-X-1994, dwb 1320, 1364; ibidem, 27-X-1994, dwb 1323, 1351; ibidem, 29-X-1994, dwb 1378; ibidem, 1-XI-1994, dwb 1346, 1347, 1362; ibidem, 13-XI-1994, dwb 1355, 1373. Las Rozas, dehesa de Navalcarbón, 30TVK2584, 10-V-1997, dwb 1459, 1460, 1461, 1462, 1463; ibidem, 11-V-1997, dwb 1464, 1465, 1472, 1473; ibidem, 17-V-1997, dwb 1492, 1493, 1494, 1500; ibidem, 18-V-1997, dwb 1499; ibidem, 20-V-1997, dwb 1527, 1529; ibidem, 24-V-1997, dwb 1509, 1514. Puente Retamar, 30TVK2186, 7-XI-1987, dwb 504; ibidem, 11-XI-1987, dwb 507. Ctra. de Majadahonda a Boadilla del Monte, 30TVK2878, 11-XII-1988, dwb 615, 616.

Some specimens of *Macbrideola cornea* had vesicular expansions along the length of the capitial filaments (figs. 5, 6) similar to those commented on by PANDO (1994). They were collected among typical specimens however, and showed otherwise typical characteristics of *M. cornea*, and so were assigned to this taxon. Also, following the arguments and observations reported by PANDO (1994), specimens with either abundant or scant capillitium previously separated into *M. cornea* and *M. decapillata* were all assigned to *M. cornea*.

This was also collected already fruited



Figs. 5-8.—*Macbrideola cornea* (dwb 1265): 5, whole sporocarp; 6, vesicular expansions on the capillitial filaments. 7, *M. oblonga* (dwb 607): whole sporocarp with oblong shape and free spores. 8, *M. synsporos* (dwb 605): whole sporocarp with clustered spores.

from the bark of living *Quercus ilex* trees from Madrid: Las Rozas, dehesa de Navalcarbón, 30TVK2584, 30-XI-1997, dwb 1585, 1587.

Macbrideola macrospora (Nann.-Bremek.) Ing

MADRID: Casa de Campo, 30TVK3575, 29-X-1994, dwb 1379; ibidem, 1-XI-1994, dwb 1370.

This taxon has been recorded from Barcelona and Cáceres (LADO, 1993b). This is the first record for Madrid Province.

Macbrideola oblonga Pando & Lado

MADRID: Casa de Campo, 30TVK3577, 18-III-1986, dwb 301. Casa de Campo, 30TVK3575, 29-I-1994, dwb 1236, 1247; ibidem, 30-I-1994, dwb 1229; ibidem, 12-II-1994, dwb 1258; ibidem, 25-X-1994, dwb 1322, 1330; ibidem, 27-X-1994, dwb 1334; ibidem, 29-X-1994, dwb 1345, 1350, 1376, 1377; ibidem, 1-XI-1984, dwb 1348, 1359, 1363, 1371, 1372, 1381, 1383, 1384; ibidem, 10-XI-1994, dwb 1358, 1365; ibidem, 28-XI-1994, dwb 1387; ibidem, 6-XII-1994, DWB 1391. Ctra. de Majadahonda a Boadilla del Monte, 30TVK2878, 27-XI-1988, dwb 601; ibidem, 30-XI-1988, dwb 606, 607; ibidem, 8-XII-1988, dwb 614. Olmeda de las Fuentes, 30TVK8068, 6-VI-1997, dwb 1537. El Retiro, 30TVK4274, 24-V-1997, dwb 1522, 1524. Las Rozas, dehesa de Navalcarbón, 30TVK2584, 11-V-1997, dwb 1466; ibidem, 16-V-1997, dwb 1502; ibidem, 17-V-1997, dwb 1497; ibidem, 24-V-1997, dwb 1507, 1508, 1513.

The sporocarps of this species are very common on this substrate and can appear within the first two days of a culture. Their characteristic oblong shape, wide hypothallus and their free spores (fig. 7) are distinctive and aid in identification.

Macbrideola synsporos (Alexop.) Alexop.

MADRID: Casa de Campo, 30TVK3577, 10-III-1984, dwb 101; ibidem, 12-III-1984, dwb 121; ibidem, 19-X-1984, dwb 190; ibidem, 20-III-1986, dwb 304. Casa de Campo, 30TVK3575, 27-I-1994, dwb 1221, 1228; ibidem, 29-I-1994, dwb 1223, 1224, 1233, 1234, 1246; ibidem, 3-II-1994, dwb 1284; ibidem, 12-II-1994, dwb 1260; ibidem, 26-X-1994, dwb 1332; ibidem, 1-XI-1994, dwb 1335. Casa de Campo, 30TVK3576, 24-V-1997, dwb 1512. Las Rozas, dehesa de Navalcarbón, 30TVK2584, 10-V-1997, dwb 1456, 1457; ibidem, 13-V-1997, dwb 1482; ibidem, 24-V-1997, dwb 1506, 1510. Ctra. de Majadahonda a Boadilla del Monte, 30TVK2878, 30-XI-1988, dwb 604, 605; ibidem, 3-XII-1988, dwb 610; ibidem, 4-XII-1988, dwb 611. El Retiro, 30TVK4274, 11-V-1997, dwb 1525; ibidem, 17-V-1997, dwb 1486, 1487; ibidem, 24-V-1997, dwb 1523.

This was also collected already fruited from the bark of living *Quercus ilex* trees from Madrid: Las Rozas, dehesa de Navalcarbón, 30TVK2584, 30-XI-1997, dwb 1584. It is common on this substrate, and the characteristic clustered spores (fig. 8) are often discernible under a good dissecting microscope in dry specimens. Spores of this species have been observed germinating while still together in the cluster.

Paradiacheopsis solitaria (Nann.-Bremek.) Nann.-Bremek.

MADRID: Puente Retamar, 30TVK2186, 6-XI-1987, dwb 506; ibidem, 12-XI-1987, dwb 508; ibidem, 16-XI-1987, dwb 510; ibidem, 16-XI-1987, dwb 514; ibidem, 27-XI-1987, dwb 516; ibidem, 27-XI-1987, dwb 517.

Perichaena corticalis (Batsch) Rostaf.

MADRID: Casa de Campo, 30TVK3675, 14-VI-1997, dwb 1568, 1563, 1542. Las Rozas, dehesa de Navalcarbón, 30TVK2584, 26-V-1997, dwb 1533.

Perichaena depressa Lib.

MADRID: Casa de Campo, 30TVK3575, 18-XII-1994, dwb 1403; ibidem, 9-I-1995, dwb 1406, 21-I-1995, dwb 1412.

This is the first record for Madrid Province. This taxon has been recorded from many other provinces in Spain on a variety of other substrates (LADO, 1993b).

Perichaena vermicularis (Schwein.) Rostaf.

MADRID: Casa de Campo, 30TVK3575, 14-III-1994, dwb 1294; ibidem, 21-III-1994, dwb 1299.

Physarum compressum Alb. & Schwein

MADRID: Casa de Campo, 30TVK3575, 22-XII-1994, dwb 1402.

Physarum decipiens M.A. Curtis

MADRID: Casa de Campo, 30TVK3577, 5-III-1984, dwb 110. Casa de Campo, 30TVK3575, 9-II-1994, dwb 1249, 1254; ibidem, 17-II-1994, dwb 1264, 1267; ibidem, 26-II-1994, dwb 1287; ibidem, 5-III-1994, dwb 1281; ibidem, 12-III-1994, dwb 1293; ibidem, 29-X-1994, dwb 1338, 1380; ibidem, 5-XI-1994, dwb 1356; ibidem, 10-XI-1994, dwb 1369; ibidem, 11-XI-1994, dwb 1397; ibidem, 21-XI-1994, dwb 1388; ibidem, 3-XII-1994, dwb 1390; ibidem, 2-I-1995, dwb 1394. Casa de Campo, 30TVK3576, 26-V-1997, dwb 1530. El Retiro, 30TVK4274, 31-V-1997, dwb 1548; ibidem, 6-VI-1997, dwb 1540. Las Rozas, dehesa de Navalcarbón,

30TVK2584, 17-V-1997, dwb 1498. Ctra. de Majadahonda a Boadilla del Monte, 30TVK2878, 8-XII-1988, dwb 613; ibidem, 26-XII-1988, dwb 617.

***Physarum leucophaeum* Fr.**

MADRID: Casa de Campo, 30TVK3575, 22-II-1994, dwb 1275.

***Physarum nutans* Pers.**

MADRID: El Retiro, 30TVK4274, 24-VI-1997, dwb 1547.

***Physarum pusillum* (Berk. & Curt.) G. Lister**

MADRID: Casa de Campo, 30TVK3678, 25-XI-1987, dwb 512.

***Physarum serpula* Morgan**

MADRID: Ctra. de Majadahonda a Boadilla del Monte, 30TVK2878, 7-XII-1988, dwb 618; ibidem, 8-XII-1988, dwb 613; ibidem, 11-XII-1988, dwb 619, 620. Casa de Campo, 30TVK3575, 19-II-1994, dwb 1269.

***Physarum* sp.**

MADRID: Olmeda de las Fuentes, 30TVK8068, 6-VI-1997, dwb 1538; ibidem, 24-V-1997, dwb 1515. Las Rozas, dehesa de Navalcarbón, 30TVK2584, 26-V-1997, dwb 1531.

These records have not been assigned to a specific taxon until spore to spore cultures have been attempted to check the reliability of the observed characteristics. Macroscopically they are similar to *Physarum nudum* T. Macbr. as described by MARTIN & ALEXOPOULOS (1969) but slightly larger. The sporocarps are scattered to grouped, sessile, 0.5-8 mm in diameter subglobose or pulvinate and pale tan in colour. Capillitium is scant and physaroid and the spores are 11.5-14 µm, lilac and minutely warted, sometimes with small clusters of warts. One very obvious characteristic common to all the specimens recorded was the lines of dehiscence of the sporocarps visible from the early stages of their development, and reminiscent of the score marks on freshly baked bread. A common feature of these sporocarps was also the scant lime. *Physarum nudum* T. Macbr. has previously been recorded from Guadalajara (LADO, 1993b).

***Trichia contorta* var. *karstenii* (Rostaf.) Ing.**

MADRID: Las Rozas, dehesa de Navalcarbón, 30TVK2584, 13-V-1997, dwb 1479.

This was also collected already fruited from the bark of living *Quercus ilex* trees from Madrid: Las Rozas, dehesa de Navalcarbón, 30TVK2584, 30-XI-1997, dwb 1579, 1580, 1583. Specimens showed hemitrichoid capillitium with branches and fewer free tips. Most of the tips are blunt and the capillitium has irregular swellings as described by LISTER (1894) for *Hemitrichia karstenii* Rostaf.

DISCUSSION

The fact that several species were collected in the field from bark as natural fruitings in situ, and from one of the same sites as bark samples collected for culture, supports the fact that these are species which grow normally on the bark of living trees, and are not mere opportunists of the favourable conditions of moist chambers (BROOKS, 1967; KELLER, 1971; ING, 1994, 1997). *Dianema harveyi* Rex was not found in moist chamber culture but was collected already fruited from the bark of living *Quercus ilex* trees MADRID: Las Rozas, dehesa de Navalcarbón, 30TVK2584, 30-XI-1997, dwb 1586. It has previously been reported from the wood of *Q. ilex* and from other substrates in Madrid, Toledo, Guadalajara and Soria (LADO, 1993b).

The majority of the species previously recorded by others on the bark of living *Quercus ilex* trees in Spain (table 1), have also been recorded here. Missing taxa were mostly found in the more Eastern provinces of Spain, and may reflect different local conditions. Fourteen taxa have been added to the list of myxomycetes previously found on this substrate. Eight new records have been cited for Madrid Province, one being a second record for Spain.

The uniform methodology used for the 25 of the cultures from La Casa de Campo, Madrid (30TVK3575) enables some tentative comparisons of species frequency to be made,

and shows a typical frequency curve (fig. 9). It is possible that the pH treatment used for these cultures could have affected the results.

There is a marked frequency of the genus *Macbrideola* on this substrate. Four species were recorded. Two of these, *M. cornea* and *M. oblonga* were the most numerous species found in terms of records from different cultures, or collected from the same culture more than 5 days apart. The number of individual sporocarps was even higher.

The data on incubation times (fig. 10) are relative, as the exact culture conditions and the stage of development of each organism at the time of culture vary. Many may be in the

form of microcysts or sclerotia which will probably activate more quickly than spores. This is most probably the reason for the rapid appearance of *Badhamiopsis ainoae* (average 10 days). A similar case was reported by LADO (1993a) for *Didymium sturgisii* and by PANDO (1994) who commented on the development of *D. anellus* from sclerotia in 24 hours. It is also possible that smaller sporocarps were missed the first time and longer incubation times reflect the next generation fruiting. In spite of this it is evident from the average data that the smaller true corticoles *Echinostelium apitectum* and *E. minutum* and the species of *Macbrideola*

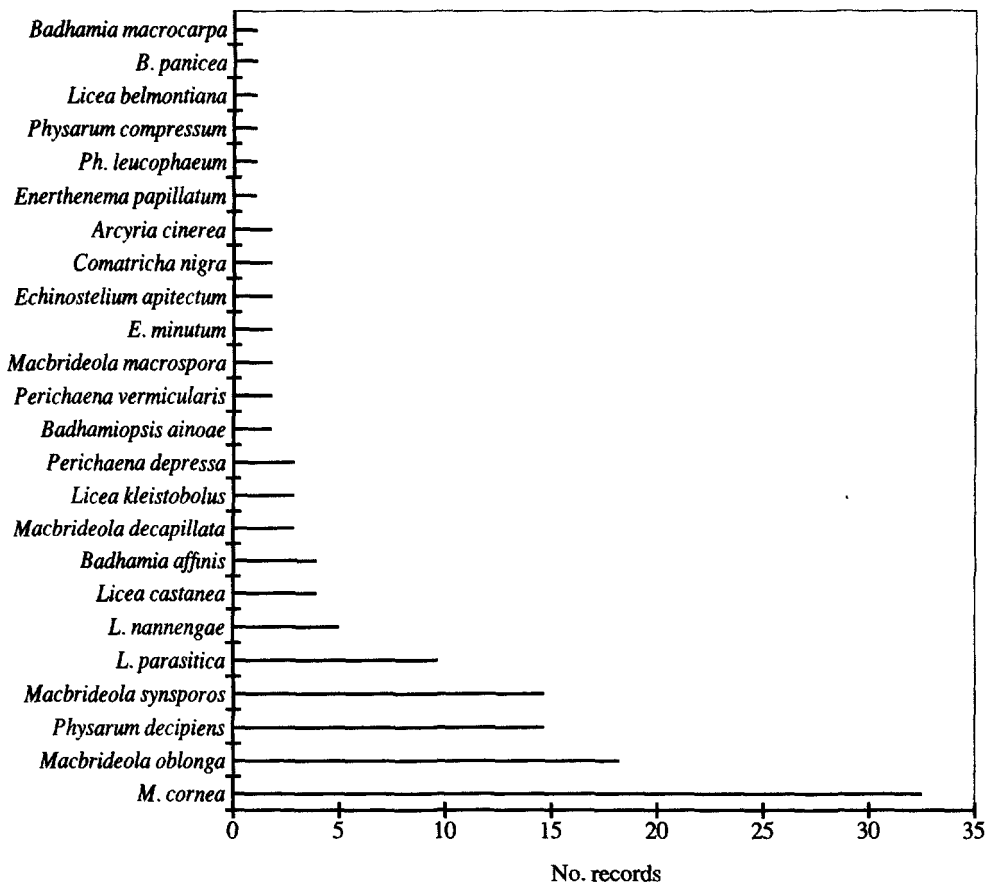


Fig. 9.—Relative frequency of various species from 25 cultures. (Note: To enable comparisons to be made between different species, the term record has been used to arbitrarily denote the appearances of the taxon in a culture separated by more than 5 days.)

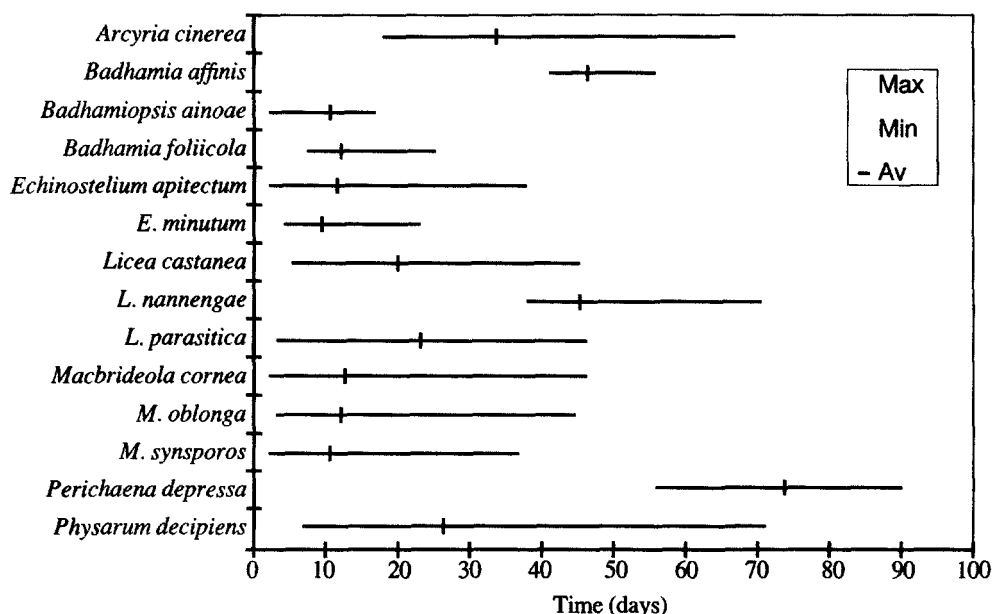


Fig. 10.—Incubation times of some common species.

are the fastest to produce fruiting bodies in these moist chamber cultures, as pointed out by ING (1994), and that others (*Perichaena depressa*, *Licea nannengae*) take more than 40 days to develop. The collection of *Licea deplanata* took 79 days to appear. These times suggest possible modifications in the amount of time cultures are kept.

The species variety on this substrate can be seen from the 37 species from 12 genera that have appeared in these cultures. The taxa listed here have extended the number of species found on the bark of living *Quercus ilex* to 55.

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