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Corticolous Myxomycetes From Switzerland – 2

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Summary – Bark from living trees at 96 sites in 20 cantons, plus one site in Liechtenstein, was sampled during 1996, 1997 and 1998. A total of 70 species of myxomycetes developed on the bark cultures, of which 12 species appear to be new records for Switzerland, and nine are new for Liechtenstein. The biogeographical factors affecting the distribution of corticolous myxomycetes in Switzerland are discussed.

Resumé – De 1996 a 1998, des myxomycètes ont été récoltés sur les écorces d'arbres vivants dans 96 localités de 20 cantons suisses et une au Liechtenstein. Sur les 70 espèces qui se sont développées en culture sur écorce, 12 sont nouvelles pour la Suisse et 9 pour le Liechtenstein. Les facteurs biogéographiques qui influencent la distribution des myxomycètes corticoles sont discutés.

Following on from the first paper on this subject (Ing, 1997) an additional 95 sites in 20 cantons were visited during 1996, 1997 and 1998; all the cantons have now been sampled. Samples were also taken in Liechtenstein and the results represent the first corticolous species from that state. The same general remarks apply to the culture techniques and the ecological strategies used by myxomycetes. However, as a result of the larger data-set of Swiss corticolous myxomycetes now available a number of ecological and geographical analyses may now be attempted. These will be discussed after the list of species.

Localities

The following location codes are cited in the species account – the usual cantonal abbreviations are given. The grid references [yyxx] conform to the notation used in Breitenbach & Kranzlin (1981) and the month and year in which samples were taken is also indicated.

Aargau AG
2 – Aarau, trees in park [2464] (7/97)
3 – Baden, trees in park [2566] (7/97)

Appenzell Ausserrhoden AR
1 – Herisau, roadside trees [2573] (7/96)

Bern BE
33 – Saanenmöser, montane *Picea forest* [1559] (7/96)
34 – Bühlberg, Lenk, montane *Picea forest* [1460] (7/96)
35 – Isch, Brienzersee, montane *Picea forest* [1764] (6/96)
36 – Gwatt, Thunersee, lakeside arboretum [1761] (6/96, 8/98)
37 – Engstligenfälle, Adelboden, montane *Picea forest* [1460] (7/97)
38 – Engstligental: Adelboden, street trees [1460] (7/97)
39 – Kandertal: Frutigen, riverside and street trees [1561] (7/97)
40 – Plain Marmet, roadside trees [2156] (7/97)
41 – Mont Croisin, roadside trees [2256] (7/97)
42 – Bern: Bremgartenwald, mixed lowland forest [2059] (7/97)
43 – Bern: Halen, trees along R. Aare [2059] (7/97)
44 – Giessbach, Brienzersee, mixed submontane forest [1764] (7/97)
45 – Schloss Oberhofen, Thunersee, park trees [1761] (7/97)
46 – Schloss Hünegg, Thunersee, park trees [1761] (7/97)
47 – Hünibach, Thunersee, park trees [1761] (7/97)
48 – Bern: Äussere Enge, riverside trees [2060] (7/97)
49 – Bern: Thormannbodenwald, Aaregg, mixed lowland forest [2060] (7/97)
50 – Biel, lakeside trees [2258] (8/98)
51 – Brienz, park trees [1764] (8/98)
52 – Tramelan, submontane *Picea forest* [2357] (8/98)
53 – Bellelay, park trees [2357] (8/98)
54 – L'Ecorcheresse, roadside trees [2358 (8/98)
55 – Schwarzwaldalp, montane forest [1665] (8/98)
56 – Trummelbach, park trees [1563] (8/98)
57 – Thun: Allmendingen, roadside trees [1761] (8/98)
58 – Thun: Strandbad, Thunersee, park trees [1761] (8/98)

Baselland BL
1 – Liestal, roadside trees [2562] (7/96)

Basel-Stadt BS
1 – Basel, park near Hauptbahnhof [2661] (7/96)
2 – Basel, park near University [2661] (7/96)

Liechtenstein FL
1 – Vaduz, street trees [2275] (8/98)

Fribourg FR
4 – Estavayer-le-Lac, lakeside and street trees [1855] (7/97)
5 – Môtier, street trees [1957] (7/97)

Glarus GL
1 – Linthal, roadside trees [1971] (7/96)
2 – Braunwald-Orenplatte, submontane *Picea forest* [2072] (7/96)
3 – Braunwald-upper, mixed submontane forest [2071] (7/96)
4 – Braunwald-lower, mixed submontane forest [1971] (7/96)

Graubünden GR
7 – Chur, street trees [1975] (7/97)
8 – Reichenau, trees along R. Rhine [1875] (7/97)
9 – Thusis, park trees [1775] (7/97)
10 – Tiefencastel, trees along R. Albula [1776] (7/97)
11 – Filisur, roadside trees [1777] (7/97)
12 – Davos Platz, street trees [1878] (7/97)
13 – Klosters, park and riverside trees [1978] (7/97)
14 – Landquart, riverside trees [2076] (7/97)
15 – Ilanz, mixed forest [1873] (8/98)
16 – Disentis, mixed forest [1770] (8/98)

Jura JU
3 – Les Bois, roadside trees [2255] (7/97)
4 – Goumois, riverside trees [2356] (8/98)
5 – L'Etang de la Gruère, pine bog [2357] (8/98)

Neuchâtel NE
4 – Neuchâtel, park trees [2056] (8/98)

Nidwalden NW
2 – Beckenried, trees in lakeside park [2067] (8/96)

St. Gallen SG
3 – Rapperswil, lakeside trees [2370] (7/96)
4 – St. Gallen, park trees [2574] (7/97)
5 – Rorschach, park trees [2675] (7/97)
6 – Sargans, street trees [2175] (8/98)
7 – Buchs, street trees [2275] (8/98)

Schwyz SZ
1 – Schwyz, roadside trees [2069] (8/96)
2 – Muotathal-Wil, submontane forest [2069] (8/96)
3 – Muotathal, submontane forest [2070] (8/96)
4 – Muotathal-Hintertal, orchards [2070] (8/96)

Thurgau TG
1 – Frauenfeld, riverside trees [2670] (7/96)
2 – Romanshorn, park trees [2774] (7/97)
3 – Weinfelden, street trees [2672] (7/97)

Ticino TI
1 – Lugano: Parco Civico, park trees [0971] (7/98)
12 – Carona, roadside trees [0871] (8/96)
13 – Lugano: Monte San Salvatore, mixed deciduous forest [0971] (8/96)
14 – Lugano: Parco San Michele, park trees [0971] (8/96)
15 – Monte Lema, Castanea forest [0970] (7/97)
16 – Cantine di Gandria, lakeside trees [0972] (7/97, 7/98)
17 – Lugano: Monte Brè, mixed deciduous forest [0972] (8/97)
18 – Monte Tamaro, submontane deciduous forest [1071] (7/98)
19 – Capolago, street trees [0871] (7/98)

Uri UR
1 – Rütli Meadow, mixed forest [2068] (8/96)
2 – Treib, mixed forest [2068] (8/96)
3 – Andermatt, park trees [1668] (8/98)

Vaud VD
6 – Aigle, street trees [1256] (7/97)
7 – Yverdon, park trees [1853] (7/97)
8 – Avenches, street trees [1956] (7/97)
9 – Payerne, street trees [1856] (7/97)
10 – Ste-Croix, park and street trees [1852] (7/97)
11 – Le Chasseron, submontane mixed forest [1853] (7/97)

Valais VS
7 – Martigny, street trees [1057] (7/97)
8 – Sion south, park trees [1159] (7/97)
9 – Sion north, park trees [1259] (7/97)
10 – Sierre, park trees [1260] (7/97)
11 – Brig, street trees [1264] (7/97)

12 – Naters, trees along R. Rhone [1364] (7/97)
13 – Fiesch, roadside trees [1365] (8/98)
14 – Münster, roadside trees [1466] (8/98)

Zug ZG
1 – Zug, lakeside trees [2269] (8/96)

Zurich ZH
3 – Winterthur, park trees [2669] (7/96)
4 – Bülach, mixed lowland forest [2668] (7/97)
5 – Uetliberg, mixed submontane forest [2467] (8/97)

List of species

An asterisk before a species name indicates a probable first record for Switzerland. Letters after the name refer to the ecological strategy – A: obligate corticole, B: facultative corticole, C: casual corticole. Only species of trees yielding bark myxomycetes which are in addition to those reported for that myxomycete in the previous paper are included. General ecological and biogeographical comments are only included for species not considered in the previous paper.

Acrasiomycetes

Pocheina rosea (Cienk.) Loeblich & Tappan (A)
BE 33, 34, 44, 46, 52; **GR** 15, 16; **JU** 4, 5; **SZ** 3; **UR** 3; **VD** 10; VS 9; **ZH** 4.
On *Pinus nigra* and *P. sylvestris*.

Myxomycetes

Arcyria cinerea (Bull.) Pers. (B)
AR 1; **BE** 36, 42, 44; **BS** 1, 2; **NW** 2; **TG** 2, 3; **TI** 14; **VS** 8, 9; **ZG** 1; **ZH** 5.
On *Acer pseudoplatanus, A. saccharinum, Aesculus hippocastanum, Castanea sativa, Liriodendron tulipifera, Picea abies, Platanus×hispanica, Quercus robur, Salix fragilis, Tilia platyphyllos and Ulmus laevis.*

A. minuta Buchet (C)
TG 3.
On *Platanus*. An uncommon lignicolous species not previously recorded anywhere on the bark of living trees; scattered in neighbouring countries.

A. pomiformis (Leers) Rostaf. (B)

AG 3; **AR** 1; **BE** 42, 44, 49–51, 55, 56, 58; **BL** 1; **BS** 1; **FL** 1; **GR** 16; **NE** 4; **NW** 2; **SG** 5; **TG** 2, 3; **TI** 15, 16, 18; **VS** 13; **ZG** 1.

On *Acer saccharinum, Castanea, Juglans nigra, Liriodendron, Picea, Platanus, Prunus avium, Q. robur, Salix* and *Tilia*.

Badhamia affinis Rostaf. (A)

BE 38, 40–42, 50, 51, 55, 56, 58; **FL** 1; **FR** 4; **GR** 13, 16; **JU** 3; **NE** 4; **SG** 5; **SZ** 3; **TG** 2; **TI** 12, 16; **VD** 6, 8, 11; **VS** 9, 12, 13; **ZG** 1.

On *A. negundo, Liriodendron, Platanus, Populus canescens, Prunus, Robinia pseudacacia, Tilia petiolaris* and *T. platyphyllos.*

B. macrocarpa (Ces.)Rostaf. (B)

GL 3.

On *A. pseudoplatanus*. Widespread and frequent in Europe, usually on branches still attached or recently fallen; recorded in all neighbouring countries.

Badhamiopsis ainoae (Yamash.)Brooks & Keller (A)

BE 12; **JU** 4.

The locality was omitted from the first records and is now included. The species must still be regarded as globally rare.

Calomyxa metallica (Berk.)Niewland (A)

BE 33, 51; **GR** 13, 14; **VD** 8, 9, 11.

On *Juglans, Picea, T. petiolaris* and *Ulmus glabra*.

***Clastoderma debaryanum** Blytt (B)

SG 7.

On *A. pseudoplatanus.* A common species in the tropics, where it occurs on fallen fruit and nuts, but never common in Europe although widely scattered. Recorded from Austria and Germany. [Slide in Hb. Ing.]

***C. pachypus** Nann.-Bremek. (A)

GL 2.

On *Picea.* Widespread but generally rare except in Atlantic Europe where it mostly occurs on species of *Quercus*. Recorded from France and Germany. [Slide in Hb. Ing.]

Colloderma oculatum (Lipp.)G. Lister (B)

NE 4; **TI** 19; **VD** 8.

On *Aesculus* and *Tilia×vulgaris*.

Comatricha laxa Rostaf. (B)
SZ 2.

C. nigra (Pers.)Schröt. (C)
AR 1; **BE** 34, 45; **GL** 4; **GR** 12, 15, 16; **SG** 3; **SZ** 2; **ZH** 3.
On *A. saccharinum, Aesculus* and *Pinus sylvestris.*

C. rigidireta Nann.-Bremek. (A)
BE 34; **GR** 12.
On *Picea.* Clearly less rare than previously supposed.

Cribraria violacea Rex (B)
AG 3; **BE** 44, 50, 51, 53; **JU** 4; **SZ** 3, 4; **TI** 14, 19; **UR** 1; **ZH** 5.
On *Aesculus, Juglans, Malus domestica, Ostrya carpinifolia, Populus nigra, Quercus petraea, Salix alba, T. platyphyllus* and *Ulmus.*

Diderma chondrioderma (de Bary & Rostaf.)G. Lister (A)
BE 56; **FR** 4; **ZH** 5.
On *S. fragilis* and *Ulmus.*

D. effusum (Schw.)Morg. (C)
BS 2; **SZ** 2.
On *Picea* and *U. laevis.*

Didymium difforme (Pers.)S.F. Gray (C)
VS 14; **ZG** 1.
On *Fraxinus* and *Platanus.*

D. squamulosum (Alb. & Schw.)Fr. (C)
VS 9.
On *Platanus.*

***D. synsporon** Keller & Brooks (A)
GR 10; **VS** 12.
On *Aesculus* and *Juglans.* This rare species is characterised by inconspicuous, flattened small plasmodiocarps with clustered spores. These are the first records outside north America, and thus for Europe. [Hb. Ing 97081, 97113.]

***Echinostelium apitectum** Whitney (A)
VS 10.
On *Pinus*. This small species is generally regarded as rare but is well scattered across Europe, being recorded in France, Spain, Great Britain and the eastern Mediterranean. [Slides in Hb. Ing.]

***E. arboreum** Keller & Brooks (A)
VS 9.
On *Aesculus*. This rare species has only recently been recorded in Europe, from Spain, Montenegro and Scotland. [Hb. Ing 97082.]

Echinostelium brooksii Whitney (A)
AR 1; **BE** 33, 37; **GL** 4; **GR** 10, 15, 16; **JU** 5; **SG** 3; **SZ** 3; **UR** 3; **VS** 10, 11.
On *Aesculus, Cedrus libani* and *P. sylvestris*.

E. colliculosum Whitney & Keller (A)
AR 1; **BE** 33, 34, 40; **GL** 3, 4; **GR** 9, 10, 14–16; **SG** 3; **SZ** 2, 3; **VS** 14.
On *Betula pendula*. The closely related *E. vanderpoelii* Nann.-Brem., Mitchell, Lakhanpal & Chopra has been confused with *colliculosum* – it has now been synonymised with *apitectum* and is recorded from Switzerland under the latter name – see above.

E. corynophorum Whitney (A)
BE 50; **GR** 14; **TI** 16; **VS** 10.
On *Pinus, Platanus* and *Populus nigra*.

***E. elachiston** Alexopoulos (A)
GR 9; **VD** 9.
On *T. petiolaris* and *Ulmus*. A rare species described from Greece and known from a few other parts of Europe, such as France, Spain, Turkey and Great Britain, but always rare. [Hb. Ing 97085.]

E. fragile Nann.-Bremek. (A)
BE 58; **GR** 15; **SG** 3, 4; **ZG** 1.
On *Betula, Liriodendron, Platanus* and *Salix*.

E. minutum de Bary (A)
AG 2, 3; **BE** 36, 37; **BS** 2; **GL** 3, 9; **GR** 9, 10, 15; **SG** 3; **TI** 13, 15; **VS** 8, 10, 11; **ZH** 5.
On *Castanea, Cedrus, Ostrya, P. sylvestris* and *U. laevis*.

Enerthenema papillatum (Pers.)Rostaf. (B)
AG 3; **GR** 12, 16; **SG** 4; **VD** 8; **VS** 12; **ZH** 4.
On *Robinia* and *Sequoiadendron giganteum*.

Licea belmontiana Nann.-Bremek. (A)
AG 2; **TG** 2; **TI** 14; **ZG** 1.
On *Acer campestre* and *Liriodendron*.

L. biforis Morgan (A)
BS 1; **SG** 7; **TI** 1, 12, 14, 16; **VS** 7.
On *Acer pseudoplatanus, Juglans, Ostrya, Platanus, Q. pubescens* and *T. platyphyllos*.

L. bryophila Nann.-Bremek. (A)
BE 44; **NW** 2.
On *Q. robur*.

L. castanea G. Lister (B)
GR 13, 16; **SG** 3; **SZ** 3.
On *Aesculus, Fraxinus* and *Salix alba*. Widespread but uncommon on bark, rare on hepatics on rotten wood (as at **GL** 4); scattered in Europe, recorded from Austria and Germany.

L. denudescens Keller & Brooks (A)
AG 2; **BE** 40, 41; **GR** 8, 9; **SG** 3, 5; **TG** 2; **TI** 14, 17; **VD** 9–11; VS 5, 9; **ZG** 1.
On *A. negundo, Betula, Liriodendron, Ostrya* and *Q. pubescens*.

***Licea eleanorae** B. Ing (A)
SG 7; **TI** 16.
On *Platanus*. Described from Cantine de Gandria (Ing, 1999) and known elsewhere from two coastal sites in Scotland, where it occurs on *Ulmus*, and a park in Central London, on *Tilia*. The distinctive shape of the sporangium is sufficient to separate it from non-operculate forms of *operculata*, which are taller, and the stalk is much longer than in *scyphoides*, which in any case dehisces by an equatorial, not terminal, fissure. During development *operculata* forms a distinct stalk with a globose blob at the apex, while *eleanorae* has a clearly cylindrical blob and is much paler, almost yellow, at this stage. The species is named after the author's wife, who much admires the distant view of the type locality *Platanus* tree across the waters of Lago di Lugano. [Hb. Ing Nos. 96058, 97047.]

L. gloeoderma Dobbler & Nann.-Bremek. (A)
BE 44.
On *Tilia*.

L. inconspicua Brooks & Keller (A)
GR 10, 15; **TG** 2; **TI** 14; **VS** 9; **ZG** 1; **ZH** 5.
On *A. campestre, A. pseudoplatanus, Liriodendron, Pinus sylvestris* and *S. fragilis*.

L. kleistobolus Martin (A)
AG 2, 3; **AR**; **BE** 33–37, 42, 44, 45, 48, 49; **BL** 1; **BS** 1, 2; **FR** 4; **GL** 2, 4; **GR** 7, 9, 10, 12, 13, 15; **SG** 3; **SZ** 1, 2, 4, 5; **TG** 1, 3; **TI** 13–15; **UR** 2, 3; **VD** 6, 9–11; **VS** 8–10, 13; **ZG** 1; **ZH** 3–5.
On *A. saccharinum, Juglans, Liriodendron, Ostrya, P. sylvestris, Platanus, Prunus avium, Q. pubescens* and *S. giganteum*.

L. marginata Nann.-Bremek. (A)
AR 1; **BE** 34, 54, 57; **FL** 1; **GR** 9; **SG** 3; **TI** 18; **VS** 14; **ZG** 1.
On *A. saccharinum, Castanea, Pinus nigra*, and *Salix alba*.

L. minima Fr. (B)
BE 38; **BL** 1; **SG** 3, 7; **ZG** 1.
On *A. pseudoplatanus, Betula, Liriodendron* and *Tilia*.

L. operculata (Wingate) Martin (A)
BE 36; **GR** 15; **SG** 5; **TI** 13.
On *Picea, Platanus* and *Ostyra*.

L. parasitica (Zukal) Martin (A)
AG 2, 3; **AR** 1; **BE** 33, 34, 36, 38–44, 46, 47, 49, 53, 54, 56, 57; **BL** 1; **BS** 1; **FL** 1; **FR** 4, 5; **GL** 1, 3, 4; **GR** 7–11, 13–16; **JU** 3; **NE** 4; **NW** 2; **SG** 3–7; **SZ** 1, 3, 4; **TG** 1–3; **TI** 12–14, 17, 18; **UR** 1; **VD** 7–11; **VS** 7–13; **ZG** 1; **ZH** 3, 5.
On *A. campestre, A. negundo, A. saccharinum, Alnus incana, Betula, Carpinus betulus, Juglans, Liriodendron, Ostrya, Platanus, Prunus avium* and *Salix caprea*.

L. pedicellata (H.C. Gilb.) H.C. Gilb. (A)
BE 34, 57; **TI** 15.
On *Castanea, Picea* and *Populus nigra*.

L. pusilla Schrad. (B)
BE 33, 41; **GR** 15; **SG** 5; **TG** 2.
On A. *pseudoplatanus, Picea, Platanus* and *S. fragilis.* Widespread and frequent on bark but also not uncommon on fallen conifer branches (as at **GL** 4) and occasionally on moribund bracket fungi. Recorded in all neighbouring countries.

L. pygmaea (Meylan)B. Ing (A)
GL 3; **SG** 5.
On *Salix*. Also found on hepatics on fallen bark at **GL** 4.

L. scyphoides Brooks & Keller (A)
BE 36; **GL** 4.
On *Aesculus* and *Picea*.

***L. tenera** Jahn (A)
JU 4.
On *Tilia*. A rare species in Europe (Britain and Germany) and North America, characterised by its yellow sporangia and spore mass. [Slide in Hb. Ing.]

***L. testudinacea** Nann.-Bremek. (A)
AG 3; **BE** 44; **JU** 3; **SG** 3; **TG** 3; **TI** 17; **VD** 8, 10; **ZG** 1.
On *Aesculus, Betula, Castanea, Pinus nigra, Platanus, Q. pubescens, Q. robur* and *Tilia×vulgaris*.
Widespread but nowhere common on bark, especially of *Quercus* species; recorded in Austria and Germany. [Slides in Hb. Ing.]

Macbrideola cornea (G. List. & Cran)Alex. (A)
BE 36, 38, 39, 41, 43, 44, 50, 51, 53–58; **FL** 1; **FR** 4; **GL** 1, 3; **GR** 14–16; **JU** 3, 4; **NE** 4; **SG** 4; **SZ** 3, 4; **TG** 1, 2; **TI** 12, 14, 19; **UR** 1, 2; **VD** 11; **VS** 14; **ZG** 1.
On *A. campestre, A. saccharinum, Liriodendron, Malus, Ostrya, P. canescens* and *Robinia*.

M. macrospora (Nann.-Bremek.)B. Ing (A)
GL 3.
On A. *pseudoplatanus*.

***M. oblonga** Pando & Lado (A)
VS 13.
On *Prunus avium*. This species is characteristic of the bark of *Quercus ilex* in Spain, from where it was described. It has recently been found on *Q. pubescens*

in Greece (Ing & Zervakis, in press) and may be more widespread than suspected. Its presence in the warmest region of Switzerland is, perhaps, less surprising in the context of current climatic changes. [No. 98059 in Hb. Ing.]

Paradiacheopsis cribrata Nann-Bremek. (A)
BE 36, 43, 51; **FL** l; **GL** 2; **GR** 15; **SG** 7; **TG** 3; **VS** 7, 10; **ZH** 4.
On *Cedrus, Fraxinus, P. sylvestris, Platanus, Salix caprea* and *Tilia.*

***P. erythropodia** (B. Ing)Nann.-Bremek. (A)
SG 4.
On *Platanus.* This species was described from Nigeria in 1964 and had not been seen again by the author until 1997. It has a reddish brown fibrous stalk which separates it from other members of the genus and also from the superficially similar *Macbrideola cornea.* The original material was on a fallen branch but it is quite a common feature of corticolous myxomycetes that they persist for a while on recently fallen bark. If a tentative identification from Germany is not confirmed this will be the first record for Europe. [No. 97098 in Hb. Ing.]

P. fimbriata (G. List. & Cran)Hertel (A)
AG 2, 3; **AR** 1; **BE** 34–36; **BS** 1; **FL** 1; **GL** 1, 2; **GR** 13, 16; **SG** 4, 5; **TG** 2, 3; **UR** 2; **VD** 6, 9–11; **VS** 7; **ZG** 1; **ZH** 3–5.
On *A. saccharinum, Carpinus, Pinus nigra, Platanus, Populus nigra, Q. petraea,* and *Salix.*

***P. microcarpa** (Meylan)Mitchell (A)
BE 36.
On *Aesculus.* A rare species known from the British Isles and a few scattered areas of Europe, especially on conifer bark. [Slide in Hb. Ing.]

P. solitaria (Nann.-Bremek.)Nann.-Bremek. (A)
AG 3; **BE** 36, 41, 43, 45, 51, 55, 57; **FL** 1; **FR** 4; **GL** 2–4; **GR** 10, 12–16; **JU** 3; **SG** 4, 5; **SZ** 4; **TG** 3; **TI** 12, 15; **UR** 1, 2; **VD** 8, 11; **VS** 12; **ZG** 1; **ZH** 5.
On *A. platanoides, A. saccharinum, Juglans, Platanus, Salix caprea* and *Ulmus.*

Perichaena chrysosperma (Currey)List. (B)
BE 35, 36, 44, 50, 51, 54, 57; **FL** 1; **FR** 4; **GL** 1, 3; **GR** 8–10, 13–15; **JU** 4; **SG** 4; **SZ** 1, 4; **TG** 2; **TI** 1, 12, 14, 19; **UR** 1, 2; **VD** 9; **VS** 7, 9, 10, 13.
On *A. campestre, A. negundo, Castanea, M. domestica, Picea, Platanus, Prunus avium, Robinia* and *Salix.*

P. vermicularis (Schw.)Rostaf. (B)
GR 14; **VS** 9.
On *A. negundo* and *Populus nigra*. Widespread in leaf litter but nowhere common, occasional on bark, especially after some weeks in culture; recordered in all neighbouring countries.

Physarum auriscalpium Cooke (B)
BE 38, 39; **GR** 14; **SG** 5; **TI** 1 ; **VS** 12, 1 3.
On *A. pseudoplatanus, Platanus, Prunus avium* and *Robinia.*

P. bethelii Macbr. (B)
SG 3; **ZG** 1.
On *Liriodendron* and *Platanus.*

P. compressum Alb. & Schw. (C)
AR 1; **GR** 10; **SG** 4.
On *Platanus* and *Tilia.*

P. crateriforme Petch (B)
BE 48, 49; **FL** 1; **SG** 7.
On *Acer pseudoplatanus, Aesculus, Q. petraea* and *Robinia.*

P. decipiens Curtis (B)
BE 38, 51, 53, 54, 56, 57; **FR** 4; **GR** 7, 9, 11, 13–15; **NE** 4; **VD** 6; **VS** 9.
On *Populus nigra, Salix alba, T. petiolaris* and *U. glabra.*

P. lakhanpalii Nann.-Bremek. & Yamamoto (A)
FR 4.
On *Populus nigra*. This rare species closely resembles *decipiens* and *auriscalpium* but differs in having clustered spores. In the original description (Nannenga-Bremekamp & Yamamoto, 1987) it is recorded from Japan and from the canton of Fribourg (without locality); it has subsequently been found in India, Tenerife and Germany. [Hb. Ing 97086.]

P. nutans Pers. (C)
SG 7.
On Acer *pseudoplanatus*, mixed with *P. crateriforme*. A very common lignicolous species but occasionally found in bark cultures. Cosmopolitan.

P. psittacinum Ditm. (B)
SZ 2; **TI** 13.
On *Ostrya* and *Picea*. This beautiful species is characteristically found on mossy stumps in ancient woodland but is sufficiently frequently found in bark cultures to allow it to be regarded as more than a casual corticole. Widespread, but nowhere common, it is found in all neighbouring countries.

P. pusillum (Berk. & Curt.)G. List. (B)
GR 10.
On *Tilia*.

P. serpula Morgan (B)
GR 7.
On *Aesculus*.

Stemonitis nigrescens Rex (A)
SZ 2.
On *Picea*. This taxon is characteristic of bark and resembles a small development of *Stemonitis fusca* Roth in spore size and typical reticulations, but is darker, neater and much smaller. Castillo et al. (1997) have examined much material, including types, and regard *nigrescens* as a synonym of *fusca* but they do not discuss ecological factors in their otherwise thorough account. It may be that the reduced nutritional opportunities on bark have produced a regularly stunted form or that there are at least two ecotypes or that they are specifically distinct. Pending further experimentation I prefer to keep them as separate species. In view of these observations the distribution of *nigrescens* in adjacent countries is not clear.

T. munda (List.)Meylan (B)
BE 44; **GL** 4.
On A. *pseudoplatanus* and *Castanea*.

Discussion

Although the collection of bark samples has been limited by itineraries planned to facilitate research on snowline myxomycetes and to vacations, a broad coverage of Switzerland from north to south and from east to west has been attempted. From the records presented here it is clear that some species are to found almost everywhere within the forest zone whereas others are rare and perhaps associated with either southern or more oceanic locations. It is

also clear that non-indigenous trees planted for ornament, shelter or timber are just as useful in providing substrates for bark myxomycetes as native species. Roughness, water holding capacity and pH are probably more important than species of tree bark in determining the suitability for myxomycete growth.

The effect of altitude is easy to demonstrate, only 16 species are found above 1700 m and only 9 above 1800 m, while above 2000 m a single species, *Comatricha nigra*, has been found and this is not an obligate corticole. At these altitudes only coniferous trees are found and, overall, they support only 7.8 species per tree genus, compared to 13.9 species per angiosperm tree genus. At lower altitudes there is no correlation with height and species diversity. A number of species are only known from the Mittelland, in each case with too few records to be of statistical significance, indeed all species with a pattern which suggests that they are limited to the Jura, the Alps, Ticino or the lowlands are rare and no satisfactory correlation can be made. However, in spite of the number of samples studied, it is notable that the common species *Pocheina rosea* has not yet been found in Ticino.

The effect of tree species is much more significant and, even allowing for a possible lack of uniformity in sampling, certain trees are far more productive than others. *Acer, Tila, Quercus* and *Aesculus* all support more than thirty species of corticolous myxomycetes and *Ulmus, Salix, Populus* and *Platanus* all carry between 20 and 30 species. The only conifer to reach these levels is *Picea*, with 24 species. The role of planted, introduced species in parks and gardens is shown by the large number of species recorded from city parks and, especially the contribution made by street trees such as *Aesculus* and *Platanus*. Either the level of atmospheric pollution is insufficient to inhibit myxomycetes or the bark has become neutralised and eutrophicated by the guano from roosting birds. In general the calcareous species in *Badhamia, Diderma* and *Physarum*, are confined to angiosperm bark, with the exception of *B. affinis* on *Larix*. Only *Comatricha rigidireta* is confined to conifers, although this species occurs on *Platanus* in Central London; possibly this is an acidtolerant species. Of the more widespread species, *Cribraria violacea* has only been found on angiosperm bark and those species of *Licea* associated with epiphytic hepatics are more likely to be found on angiosperms. The explanation may lie in the more acid character of coniferous bark.

Two species are of interest in terms of climatic change. *Licea biforis*, which is becoming much more widespread in north-west Europe has increased its known Swiss sites from 1 to 8 between 1995 and 1998. It is now quite common in the London area. Thirty years ago this was generally regarded as a tropical or subtropical species. *Macbridolea oblonga* is characteristic of the evergreen oak woodlands of Spain and, until recently, was thought to be confined to them. However in 1998 it was found on *Quercus pubescens* bark in northern

Greece and now has appeared on bark of *Prunus avium* on south-facing slopes of the Valais. It is interesting to note that this is claimed as the sunniest area of Switzerland in most guide books and may well provide Mediterranean conditions for corticolous myxomycetes. Other rare species found on the south-facing alpine slopes are *Echinostelium arboreum*, also known from Montenegro, close to the sea, and also from Scotland, in a site which is completely different climatically, and *Didymium synsporon*, which is otherwise known from *Juniperus* bark in the mid-west of the United States. Whether the changing patterns of climate are reflected in the spread of corticolous myxomycetes remains to be confirmed but the kind of detailed distribution data presented here will allow future comparisons.

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