

***Sclerotiniaceae* (Discomycetes) collected in the former Federal Republic of Yugoslavia**

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Abstract: Collections by the first two authors during 1964-1968 and in 1993, and the third author in 1988-1993, augmented by several received from other workers, produced 27 species of *Sclerotiniaceae*, mostly common but including some rarely collected or reported: *Ciboria gemmincola*, *Ciborinia bresadolae*, *Lambertella corni-marais*, *Lanzia elatina*, *Monilinia johnsonii* and *Pycnopeziza sejournei*.

Zusammenfassung: Aufsammlungen der beiden Erstautoren in den Jahren 1964-1968 und des Drittautors von 1988-1993, zusammen mit einigen Funden, die von Dritten beigesteuert worden sind, ergaben 27 Arten von *Sclerotiniaceae*. Die meisten davon sind häufig, aber es sind auch einige selten gefundene bzw. gemeldete Arten dabei: *Ciboria gemmincola*, *Ciborinia bresadolae*, *Lambertella corni-marais*, *Lanzia elatina*, *Monilinia johnsonii* und *Pycnopeziza sejournei*.

Sažetak: Uzorkovani materijal sa područja bivše Jugoslavije koji su prikupili prvi i drugi autor u razdoblju od 1964 do 1968 i tokom 1993 godine, treći autor u razdoblju od 1988 do 1993 godine, te dodatni materijal koji su dostavili drugi kolege sastoji se od ukupno 27 vrsta iz porodice *Sclerotiniaceae*. Većinom su to rasprostranjene i česte vrste, osim vrsta: *Ciboria gemmincola*, *Ciborinia bresadolae*, *Lambertella corni-marais*, *Lanzia elatina*, *Monilinia johnsonii* i *Pycnopeziza sejournei*.

Apart from the phytopathological species, no special study has been made of the *Sclerotiniaceae* occurring in former Yugoslavia. The present work arises from the first two authors' several joint collecting trips, mainly in the republics of Croatia and Slovenia, but also in Bosnia-Herzegovina, with additions by the second author, including Macedonia, from where two collections were received from Professor C. HINKOVA of Sofia, Bulgaria. In addition, further collections by the third author, together with or by some of his colleagues during 1988-1993, mainly in Croatia, have been a valuable addition.

27 species of *Sclerotiniaceae* are listed with ten belonging to the genus *Ciboria*, only two of which appear to have been previously reported from Yugoslavia. Most, however, are common species in Europe although often rarely reported but *Ciboria*

gemmincola, *Ciborinia bresadolae*, *Lambertella corni-marisi*, *Lanzia elatina*, *Monilinia johnsonii* and *Pycnopeziza sejournei* require particular comment.

Historical review

The early Slovenian records use the German names of the Austro-Hungarian empire: Laibach = Ljubljana, where Tivoli was a park and Laibacher Schloßberg is the hill known as Grad, Ulrichsberg = Šenturska gora and Veldes = Bled. VOSS (1887) reported *Ciboria carniolica* REHM in VOSS as occurring in large numbers on exposed, possibly *Quercus* roots in June 1884 at Tivoli, later repeated in VOSS (1891) with the substrate given as coniferous roots and on rhizomes of *Brachypodium sylvaticum* (HUDS.) P. BEAUV. as well as *Carex spec.* REHM (1893) considered it a synonym of *Ciboria pygmaea* (FR.) REHM [= *Dasyscyphus pygmaeus* (FR.) SACC., see DENNIS 1968].

Further species listed by VOSS (1891) were:

(1) *Sclerotinia baccarum* (SCHROET.) REHM [= *Monilinia baccarum* (SCHROET.) WHETZ.] as mummified berries of *Vaccinium myrtillus* L. in the forests of Grad in the autumn,

(2) *Sclerotinia tuberosa* (HEDW.: FR.) FÜCKEL = [*Dumontinia tuberosa* (HEDW. ex MÉRAT) KOHN] on grassy places of Grad and woods at Tivoli in spring in VOSS (1892), which RANOJEVIĆ (1902) also reported on the rhizomes of *Anemone nemorosa* L. at Blato near Pirot, Serbia. In addition, VOSS (1892) reported the two common conidial stages of the "brown-rot" fungi:

(3) *Monilia fructigena* PERS. as generally distributed on rotting apples and pears with

(4) *M. laxa* (WALLR.) SACC. & VOGL. as not rare on ripe or nearly ripe plums, *Prunus domestica* L., and ripe fruits of the cornelian cherry, *Cornus mas* L. at Blato. The latter may possibly have referred to the stromatal state of the perhaps not so rare *Lambertella corni-marisi* VON HOEHN., which, however, has no conidial stage.

(5) The ubiquitous *Botrytis cinerea* PERS., generally considered to be the conidial stage of *Botryotinia fuckeliana* (DE BARY) WHETZ., as not rare at Ljubljana on stalks of *Artemisia*, *Galeopsis versicolor* L., *Gentiana asclepiadea* L., *Chaerophyllum* and *Heracleum*.

(6) *Sclerotium pustula* DC., producing the apothecia of *Peziza candolleana* LÉV. [= *Ciborinia candolleana* (LÉV.) WHETZ.] on dry leaves of *Quercus sessiliflora* SALISB. [= *Q. petraea* (MATT.) LIEBL.] near Ljubljana and Grad.

(7) *Sclerotium nervale* FR. is also mentioned as occurring along the nerves of decaying leaves of *Castanea vesca* GÄRTN. (= *C. sativa* MILLER) and *Robinia pseud-acacia* L. at Ljubljana and of *Betula alba* L. and *Rubus spec.* on Grad, which could represent several species of *Ciboria* and *Rutstroemia*, including *R. sydowiana* on *Castanea* leaves.

PICBAUER (1936) published *Rutstroemia elatina* (A. & S.) REHM [= *Lanzia elatina* (A. & S.) BARAL & KRIEGLST.] on needles of *Abies alba* MILLER, at Stambolčić near Sarajevo, Bosnia, with part of the collection in SARA studied by the first author and included in the present work because of its rarity.

MIJUŠKOVIĆ (1950) reported *Sclerotinia cydoniae* SCHELLENB. [= *Monilinia linhartiana* (PRILL. & DELACR.) BUCHW.] on quince fruits, *Cydonia oblonga* MILLER, in Montenegro.

PERIŠIĆ (1950) subsequently reported:

(a) *Sclerotinia fructigena* ADERH. & RUHL. [= *Monilinia fructigena* (ADERH. & RUHL.) WHETZEL] on apples (as *Pyrus malus* L.) and pears (as *P. communis* L.) from Kungota, Maribor, Petrovci, Svečina and Zgornja in Slovenia;

(b) *Sclerotinia cinerea* ADERH. & RUHL. [= *Monilinia laxa* (ADERH. & RUHL.) HONEY ex WHETZEL] on plums (as *Prunus domestica* L.) in Kungota, Maribor, Svečina and Zgornja;

(c) *Sclerotinia libertiana* FÜCKEL [= *Sclerotinia sclerotiorum* (LIB.) DE BARY] on *Phaseolus vulgaris* L. (french beans) and *Helianthus annuus* L. (sunflower) in Kungota, Maribor, Svečina and Zgornja.

However, only *Dumontinia tuberosa* and *Sclerotinia sclerotiorum* of the preceding species were collected during the present survey although the conidial stages of the *Monilinia* spp. were observed on fallen apples in several localities.

Nomenclature

Considerable changes in the names of the *Sclerotiniaceae* have taken place during recent years with more likely to follow: *Rutstroemia* KARSTEN was divided by DUMONT (1972, 1976) into *Ciboria* FÜCKEL, *Lanzia* SACCARDO, *Moellerodiscus* P. HENNINGS and *Poculum* VELENOVSKÝ but *Rutstroemia* is currently being conserved against *Poculum* and it is clear that further changes will be made. In addition, *Sclerotinia* is now confined to a relatively few species, including the important pathogen *Sclerotinia sclerotiorum* (KOHN 1979), with the species previously included currently dispersed into *Botryotinia* WHETZEL, *Ciborinia* WHETZEL, *Monilinia* HONEY and *Myriosclerotinia* BUCHWALD. Therefore, whilst using the currently considered valid name but avoiding an often long list of synonyms, we have mostly also indicated the name by which the fungus has been more generally known and probably more familiar to non-specialist readers.

Areas visited (Table 1)

Joint collections were mostly made during autumnal visits of the first author to the former Federal Republic of Yugoslavia with many being made in Croatia, particularly on Mt Medvednica, north of Zagreb, with an extended trip through Slovenia and a shorter, mainly touristic visit to Bosnia-Herzegovina. Independent collections by the second author, often represented by only one or two apothecia, were made in Croatia and Macedonia. The third author collected throughout the year, mainly in Croatia but also Slovenia. Included, in this study, however, is a collection of *Lanzia elatina* from Bosnia-Herzegovina, preserved in Herb. SARA, kindly made available by SADETA MEHANOVIĆ, formerly of that institute, two samples of *Castanea sativa* burrs collected in Macedonia, which produced up to three species and sent to the first author by Professor C. HINKOVA of Sofia, Bulgaria, and three collections of apothecia on *Picea alba* cones made in Slovenia by Dr D. VRŠČAJ of Ljubljana.

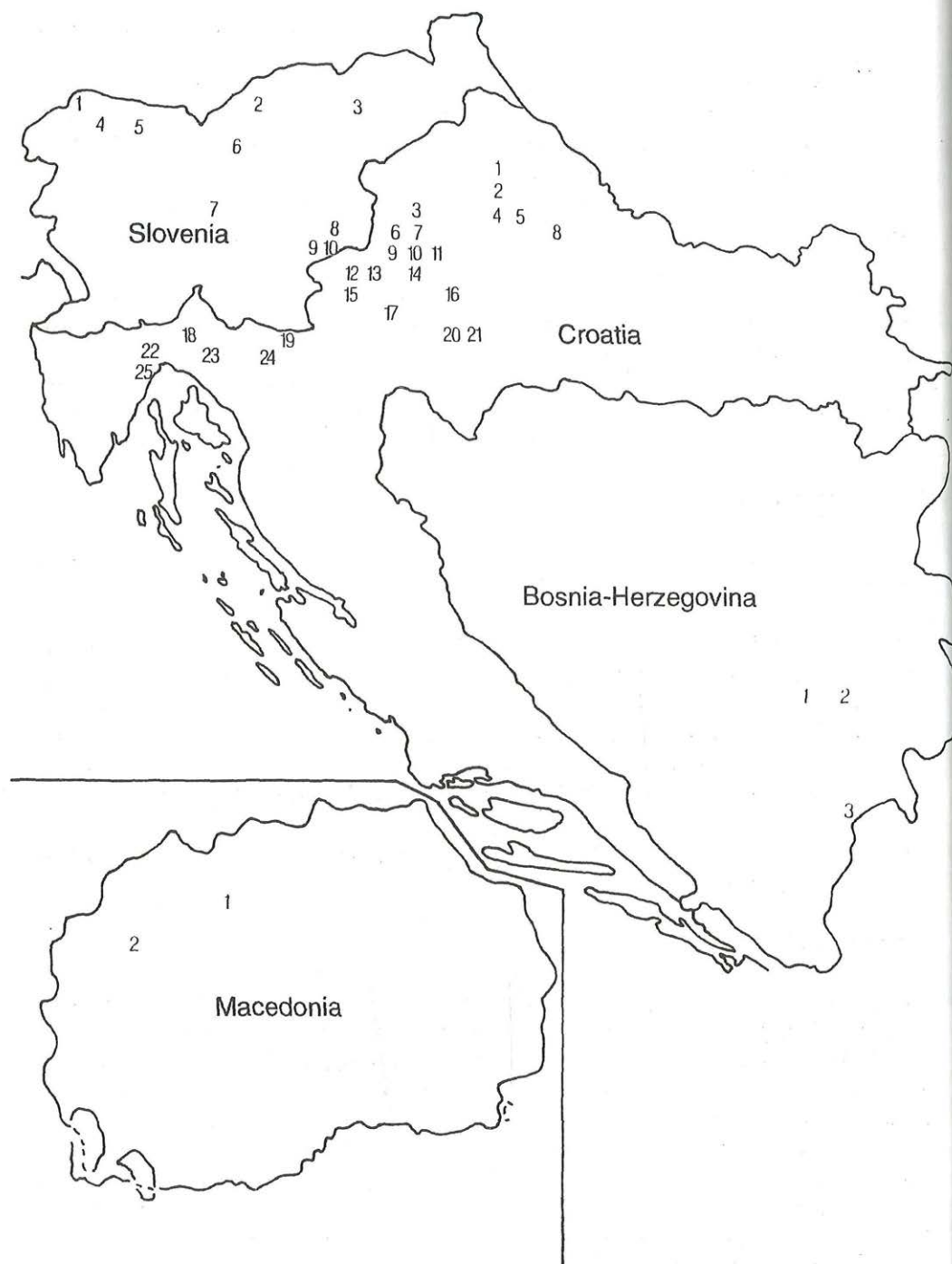


Fig. 1. Collection sites in Bosnia-Herzegovina (1-3), Croatia (1-25), Macedonia (1-2) and Slovenia (1-10).

Table 1. Localities of the collections

| City or town | Locality | Altitude m | UTM | Map |
|-----------------------------------|--|-------------|------|-----|
| <u>Bosnia-Herzegovina:</u> | | | | |
| Foča | Perućica Virgin Forest in the Sutjeska National Park near Tjentište | ca. 1300 | CN19 | 3 |
| Sarajevo | Within city area | 540 | BP95 | 1 |
| | Vratca | 600-700 | " | " |
| | Near Stambulčić | 940 | CP15 | 2 |
| <u>Croatia:</u> | | | | |
| Bjelovar | Bedenik Forest | 130 | XL48 | 8 |
| Delnice | Lazac area near Risnjak peak in the Risnjak National Park | 1070 | VL63 | 18 |
| | Leska area near Crni Lug (forest) | 687 m | VL72 | 23 |
| | Smrekvac area near Risnjak peak in the Risnjak National Park | ca. 1100 | " | " |
| Donja Stubica | Golubovec | ca. 200 | WL79 | 3 |
| Gornja Bistra | Gornji Kraljev vrh Forest | 340 | WL78 | 7 |
| Jastrebarsko | Lijevo Sredičko near Jamnička Kiselica | ca. 160 | WL64 | 17 |
| Karlovac | Draganička šuma (forest) | 110 | WL45 | 15 |
| Križevci | Brezina Forest | 160 | XM10 | 2 |
| | Lug Forest near Špiranec | 115 | XL19 | 4 |
| | Ratarska šuma (forest) | 160-170 | XL29 | 5 |
| Petrinja | Vranilec peak on Mt Kalnik | 540 | XM11 | 1 |
| | Cepeliš | ca. 200 | WL93 | 20 |
| | Mostac | ca. 100 | " | " |
| Rijeka | Kotar Forest | 100 | XL03 | 21 |
| | Lovran | 0 | VL41 | 25 |
| | Opatija | 0 | VL42 | 22 |
| Samobor | Mali Lipovec in Samoborsko gorje | ca. 460 | WL46 | 12 |
| | Veliki dol in Samoborsko gorje near Rude | 400 | " | " |
| Velika Gorica | Turopoljski Lug (forest) near Lekenik | 98 | WL95 | 16 |
| Vrbovsko | Gorica forest near Gomirje | 400-460 | WL02 | 24 |
| | Severin on the River Kupa | 180 | WL13 | 19 |
| | Družanica area on Mt Medvednica | 460 | WL67 | 9 |
| Zagreb | River Sava at Podsused | 120 | " | " |
| | Vrabečka dolina on Mt Medvednica | ca. 150 | " | " |
| | River Sava at Jakuševac | 105 | WL76 | 14 |
| | Botanic Gardens | ca. 120 | WL77 | 10 |
| | Dotraščina Park | 170-130 | " | " |
| | Maksimirk Park | ca. 130-150 | " | " |
| | Medveščina area on Mt Medvednica, lower slopes (upper limit of oaks) | 600-650 | " | " |
| | Mikulička gora on Mt Medvednica | ca. 350 | " | " |
| | Petruševac, near River Sava | 105 | " | " |
| | Sv. Duh | 150 | " | " |
| | Šestine, near Kraljevec brook (lower) | 300-320 | " | " |
| | Šestinski Dol | 160 | " | " |
| | Gračec peak on Mt Medvednica | ca. 528 | WL78 | 7 |
| | Medveščina area on Mt Medvednica higher slopes (limit of chestnuts) | ca. 700 | " | " |
| | upper slopes, below Sljeme peak | ca. 1000 | " | " |

| City or town | Locality | Altitude m | UTM | Ma |
|-------------------|---|-------------|------|----|
| Zagreb | Puntijarka peak on Mt Medvednica | 960 | WL78 | 7 |
| | Sljeme peak on Mt Medvednica | 800-960 | " | " |
| | Stol peak on Mt Medvednica | 820 | " | " |
| | Šestine, near Kraljevec brook (upper) | 330-340 | " | " |
| | Varoško rebro on Mt Medvednica | 410-458 | " | " |
| | Pionirski Park | 150 | WL87 | 11 |
| Zaprešić | Dubravica on the River Sutla | ca. 150 | WL68 | 6 |
| Macedonia: | | | | |
| Gostivar | Above town | ca. 600 | DM92 | 2 |
| Skopje | Mt Vodno | ca. 700-800 | EM34 | 1 |
| Slovenia: | | | | |
| Bled | Northeastern side of Blejsko jezero (lake) | 500 | VM33 | 5 |
| | Near Mrzli studenec on Pokljuka Moor, Julian Alps | 1220 | VM13 | 4 |
| Kamnik | Menina planina (mountain) | 1200 | VM82 | 6 |
| Kranjska Gora | Source of River Sava between Podkoren and Rateče | 750 | VM05 | 1 |
| Krško | Krakovski gozd (forest) near Kostanjevica na Krki | 150 | WL38 | 8 |
| Ljubljana | Šmarje | 340 | VL79 | 7 |
| Maribor | Ruška Koča on Mt Pohorje | 1220 | WM44 | 3 |
| Šentjernej | Pleterje | ca. 200 | WL27 | 9 |
| Šoštanj | Slopes of the Gorjanci mountain range | 750 | WL37 | 10 |
| | Spodnje Sljeme | ca. 1030 | VM94 | 2 |

Table 2. Plants and galls as hosts or substrates

| | |
|--|---|
| <i>Abies alba</i> MILLER | <i>Eriophorum vaginatum</i> L. |
| <i>Acer pseudoplatanus</i> L. | <i>Fagus sylvatica</i> L. |
| <i>Alnus glutinosa</i> (L.) GÄRTN. | <i>Hedera helix</i> L. |
| <i>Alnus spec.</i> | <i>Helianthus tuberosus</i> L. (?) |
| <i>Andricus quercuscalicis</i> (BURGSD.) | <i>Juncus effusus</i> L. |
| <i>Anemone nemorosa</i> L. | <i>Malus prunifolia</i> BORKH. |
| <i>Carex brizoides</i> L. | <i>Picea abies</i> (L.) KARST. |
| <i>Carex nigra</i> (L.) REICHARD | <i>Prunus domestica</i> L. |
| <i>Carex ? pendula</i> HUDS. | <i>Quercus cerris</i> L. |
| <i>Carex spec.</i> | <i>Quercus frainetto</i> TEN. |
| <i>Carpinus betulus</i> L. | <i>Quercus humilis</i> MILL. (= <i>Q. pubescens</i> WILLD.) |
| <i>Castanea sativa</i> MILL. | <i>Quercus petraea</i> (MATTUSCHKA) LIEBL. |
| <i>Cornus mas</i> L. | <i>Quercus robur</i> L. |
| <i>Corylus avellana</i> L. | <i>Quercus spec.</i> |
| <i>Crataegus spec.</i> | <i>Solidago spec.</i> (?) |
| <i>Eriophorum angustifolium</i> HONCK. | <i>Sorbus aucuparia</i> L. |

Material and methods

Hosts and substrates are listed in Table 2. Anamorphic stages, such as sclerotia, as well as some stromatized substrates for which more or better apothecia were desired, were kept moist in closed plastic boxes on the first author's return to England, sometimes for over six months, for the production of apothecia, which were harvested as they matured. Some of the more interesting species were also cultured on potato dextrose agar (P. D. A.) by exposing suspended apothecia over P. D. A. slopes until a spore deposit was obtained. Subcultures of the rarely collected *Lambertella corni-marit* were further inocu-

lated into rosaceous fruits, which subsequently mummified within plastic boxes and later produced apothecia.

All collections were dried and are preserved in the herbaria of the first author (J. T. P.) or the third author (MAT.) with duplicates in Herb. J. T. P., usually only a few apothecia or a half apothecium, where only one exists. For uniformity, asci and spore measurements of the third author's collections are cited by the J. T. P. herbarium number. Duplicates from Herb. J. T. P. will, however, be deposited in an institute in Croatia when the international situation is finally resolved.

Samples from each collection have been examined microscopically by the first author, using a variety of instruments over the years with reagents including Erythrosin B in 10% ammonia, H₂O, KOH and Melzer. Line drawings of microscopical characters were made by the first author, initially using a camera lucida on a monocular light microscope but, subsequently, a drawing attachment on an Olympus binocular microscope fitted with a phase contrast turret condenser. Measurements of asci and ascospores, which are by the first author, are preceded by the number measured enclosed in parentheses, using an oil immersion objective for the latter and similar minute structures. However, whether measurements were of fresh or dried material was not recorded.

Collectors are indicated by their initials: A. M. = A. MĚŠIĆ, C. H. = C. HINKOVA, Đ. ME. = Đ. MEŠČAR, D. MR. = D. MRVOŠ, D. V. = D. VRŠČAJ, I. F. = I. FOCHT, J. T. P. = J. T. PALMER, M. T. = M. TORTIĆ, N. M. = N. MATOČEC, S. M. = S. MEHANOVIĆ, S. T. = S. TORTIĆ and Z. T. = Z. TKALČEĆ.

Collections studied

Ciboria amentacea (BALBIS: FR.) FÜCKEL s. MATHEIS, Mitt. Thurgau. Naturf. Gesellsch. 43: 142, 1979.

Corylus avellana - single apothecium on an old, fallen, mummified male catkin:

Croatia: near Zagreb, Gračec peak on Mt Medvednica, (3968) leg. M. T. & S. T., 18. 2. 1968.

| Coll. | Asci | Ascospores |
|-------|----------------------------------|-----------------------------------|
| 3968 | (10) 97-110-122 x 6.1-7.2-8.1 μm | (20) 5.5-7.4-9.2 x 3.7-4.5-5.5 μm |

Ciboria amentacea, described from Italy on fallen male catkins of *Alnus* in the spring and common throughout Europe, has been the subject of considerable conjecture and is currently considered a synonym of *Ciboria caucis* (REBENTISCH: FR.) FÜCKEL. SCHUMACHER (1978) separated as form species apothecia occurring on the male catkins of *Alnus*, *Populus* and *Salix* but appeared, however, to be only aware of the larger spored *Ciboria coryli* on the male catkins of *Corylus avellana*.

MATHEIS (1979) reported a smaller spored species, which he referred to *Ciboria amentacea*, as widely distributed in Switzerland, stating that it was the commonest of the two species with an occurrence ratio of 20 : 1. The first author has collected a similar small-spored fungus on male catkins of *C. avellana* at Norley, Cheshire, on 1. 3. 1987, J. T. P. 4327 whilst CLARK (1980) reported a single collection as *C. amentacea* from Warwickshire, England.

This specimen was part of a collection identified in the field and received by the first author as *Ciboria coryli* with the much smaller spores of *C. amentacea* later found on microscopical examination.

Ciboria americana DURAND, Bull. Torrey Bot. Club 29: 461-462, 1902.

Common synonym: *Rutstroemia americana* (DUR.) WHITE.

Type locality: USA, Ithaca, Enfield Ravine, on decaying involucre (burrs) of *Castanea vesca* GÄRTN. (= *C. dentata* BORKH.).

Castanea sativa - apothecia on old, fallen burrs:

Croatia: near Zagreb, Medveščina area, higher slopes (limit of chestnuts) of Mt Medvednica, (3537) leg. J. T. P. & M. T., 12. 9. 1969; - Zagreb, Sv. Duh, (4853, MAT. 2/1636) leg. N. M. & Z. T., 29. 9. 1990. - - (4854, MAT. 2/1564) leg. N. M. & Z. T., 4. 10. 1991.

Macedonia: 50 km sw of Skopje, above Gostivar, (2918 & 2919) leg. C. H., 18. 10. 1965.

Quercus humilis - apothecia on old, fallen cupules:

Croatia: near Zagreb, Gračec peak on Mt Medvednica, (3287) leg. J. T. P. & M. T., 18. 8. 1967 with apothecia harvested 5. 10. 1967.

Quercus humilis - apothecia on mummified cotyledon of old, fallen acorn:

Croatia: near Zagreb, Gračec peak on Mt Medvednica, (3545) leg. J. T. P. & M. T., 13. 9. 1969.

Quercus petraea - apothecia on old fallen cupules:

Croatia: near Zagreb, Medveščina area, lower slopes (upper limit of oaks) of Mt Medvednica, (3555) leg. J. T. P. & M. T., 12. 9. 1969 with further apothecia developed in natural culture and harvested 3. 8.-8. 9. 1970; - near Bjelovar, Bedenik Forest, (4839, MAT. 2/1280) leg. N. M., 27. 5. 1990.

| Coll. | Asci | Ascospores |
|-------|--|---|
| 2918 | (10) 92-98-104 x 6.0-6.9-8.0 μm | (20) 8.0-9.9-11.2 x 3.0-3.4-3.8 μm |
| 2919 | None observed | (10) 8.4-9.8-12.8 x 3.2-4.2-5.6 μm |
| 3287 | (10) 69-76-92 x 4.3-5.6-6.7 μm | (10) 5.5-6.7-7.3 x 2.7-2.8-3.0 μm |
| 3537 | (10) 70-77-82 x 4.6-6.4-7.6 μm | (20) 7.4-8.9-11.1 x 2.8-3.5-3.8 μm |
| 3545 | (10) 71-75-78 x 5.5-5.8-6.1 μm | (20) 5.5-6.8-8.3 x 2.8-3.1-3.7 μm |
| 3555 | (10) 63-80-98 x 6.3-7.3-8.1 μm | (20) 5.5-6.7-7.3 x 2.7-2.8-3.6 μm |
| 4839 | (10) 63-70-80 x 5.0-5.6-6.0 μm | (20) 7.2-9.0-12.0 x 3.2-3.9-4.8 μm |
| 4853 | (10) 90-99-110 x 5.0-6.0-8.0 μm | (20) 6.8-7.9-9.5 x 2.4-3.2-3.6 μm |
| 4854 | (10) 56-73-84 x 5.0-5.3-6.0 μm | (20) 5.4-7.1-8.8 x 1.7-2.8-4.0 μm |

Although described from the United States, there are no recent North American records owing to the virtual extinction of the tree by chestnut blight, *Endothia parasitica* (MURR.) ANDERSON & ANDERSON. Recombined as *Rutstroemia americana* (DUR.) WHITE, it was first reported for Europe by PALMER (1965), where it is not only common on burrs and mainly immature chestnuts of *C. sativa* but known from Belgium, the Czech Republic, France, Germany, Great Britain including the Irish Republic, Greece, Hungary, Italy, The Netherlands, Poland, Portugal, Romania, Slovakia, Spain and Switzerland, as well as Georgia and European Turkey (PALMER 1994). Lesser collections have been made on oak cupules, chiefly *Quercus cerris* L. (Austria, France and England) but also *Q. humilis* (Croatia) including acorn cuticles of the latter (PALMER 1993), *Q. ilex* (France and Spain), *Q. petraea* (Austria, Croatia and France). The wide variation in spore dimensions, with the addition of its apparent occurrence on *Quercus* cupules and mummified acorns, as well as chestnut burrs and nuts, suggests that more than one species may be involved.

***Ciboria batschiana* (ZOPF) BUCHW.**, Friesia 3: 255-257, 1947.

Common synonym: *Stromatinia pseudo-tuberosa* (REHM) BOUD.

Type locality: Germany, Berlin, on cotyledons of *Quercus pedunculata* EHRH. (= *Q. robur* L.)

Castanea sativa - apothecia on mummified chestnuts:

Croatia: near Petrinja, Mostac, (3273) leg. J. T. P. & M. T., 19. 8. 1967; - near Zagreb, Gračec peak on Mt Medvednica, (3548) leg. J. T. P. & M. T., 13. 9. 1969.

Quercus cerris - developing apothecia on mummified cotyledon:

Croatia: Zagreb, Maksimir Park, (4818) leg. J. T. P. & M. T., 12. 9. 1993.

Quercus humilis - apothecia on mummified cotyledons:

Croatia: near Zagreb, Gračec peak on Mt Medvednica, (3547) leg. J. T. P. & M. T., 13. 9. 1969.

Quercus robur - apothecia on mummified cotyledons:

Croatia: Zagreb, Pionirski Park, (3550) leg. J. T. P. & M. T., 13. 9. 1969; - Zagreb, Maksimir Park, (3553) leg. J. T. P. & M. T., 13.9.1969; - (4828, MAT. 2/593), leg. N. M., 7. 9. 1988.

| Coll. | Asci | Ascospores |
|-------|-----------------------------------|------------------------------------|
| 3273 | (10) 102-119-135 x 5.5-6.3-7.5 µm | (10) 8.2-9.4-11.1 x 3.9-4.4-4.9 µm |
| 3547 | (10) 112-116-122 x 5.1-6.4-7.5 µm | (20) 6.9-8.5-10.1 x 3.7-4.5-6.0 µm |
| 3548 | (10) 106-118-127 x 7.9-8.7-9.5 µm | (20) 7.8-9.0-11.0 x 3.8-4.7-5.5 µm |
| 3550 | (10) 114-122-132 x 5.8-6.7-8.3 µm | (20) 7.8-8.7-10.1 x 4.0-4.8-5.5 µm |
| 3553 | (10) 110-119-124 x 6.8-7.2-7.8 µm | (20) 6.5-9.0-10.2 x 3.0-4.4-5.5 µm |
| 4818 | (10) 106-116-124 x 6.0-6.7-8.0 µm | (20) 7.2-9.1-11.2 x 3.2-4.3-5.5 µm |
| 4828 | (10) 114-124-139 x 6.0-6.3-7.2 µm | (20) 7.2-8.5-9.6 x 3.6-4.5-4.8 µm |

Widely distributed throughout Europe, also reported from the USA and India, *C. batschiana* is more commonly found on mummified acorns with the host species, when mentioned, as either *Q. petraea* or *Q. robur* with *Q. humilis* apparently not previously reported. The fungus is less frequent recorded on *C. sativa* mummified chestnuts with PEYRONEL (1920) reporting it as an important pathogen in the chestnut cultivating areas of southern Europe. Apart from the apothecia, the mummified cotyledons of *C. batschiana* can readily be distinguished by their strongly corrugated to deteriorated appearance whereas those of *C. americana* mummies remain entire with little sign of deterioration.

***Ciboria bolaris* (BATSCH: FR.) FUCKEL**, Symbolae mycologicae p. 311, 1870.

Common synonym: *Rutstroemia bolaris* (BATSCH: FR.) REHM.

Type locality: Germany, Webicht (wood on outskirts of Weimar), on decaying branches as *Peziza bolaris*.

Carpinus betulus - apothecia on old, fallen twigs:

Croatia: near Zagreb, Vrabečka dolina on Mt Medvednica, (3169) leg. M. T. & S. T., 2. 4. 1966; - (3170) leg. M. T. & S. T., 3. 4. 1967; - Podsused, near bridge over River Sava, (4822, MAT. 2/447) leg. N. M., 12. 4. 1988. - Križevci, ca.500 m north of Vranilec Peak on Mt Kalnik, (4831, MAT. 2/791) leg. N. M., 12. 2. 1989; - near Zagreb, Šestine, 1 km SE of Medvedgrad Castle, (4844, MAT. 2/1692) leg. N. M. & D. MR., 16. 3. 1992; - near Zagreb, Družanica area on Mt Medvednica, (4858, MAT. 2/1915) leg. N. M., 23. 1. 1993; - near Zagreb, Kraljevec brook (lower) near Šestine, (4859, MAT. 2/1917) leg. N. M., 24. 1. 1993; - (4861, MAT. 2/1922), leg. N. M., 26. 2. 1993; - Križevci, Brezine Forest, (4863, MAT. 2/1957) leg. N. M., 12. 4. 1993; - Velika Gorica, Turopoljski Lug near Lekenik, (4866, MAT. 2/1950) leg. N. M., 23. 3. 1993.

Fagus sylvatica - single apothecium on fallen twig:

Croatia: Zagreb, Dotršćina Park (4850, MAT. 2/256) leg. I. F., 16. 2. 1990.

| Coll. | Asci | Ascospores |
|-------|--------------------------------------|--------------------------------------|
| 3169 | (02) 131-157 x 12.7-14.3 µm | (10) 15.7-18.0-21.1 x 6.1-7.6-8.4 µm |
| 3170 | (10) 144-161-170 x 9.0-10.5-12.3 µm | (10) 16.0-18.6-21.6 x 6.8-7.5-8.5 µm |
| 4822 | (10) 130-140-150 x 8.0-12.2-16.0 µm | (20) 13.6-19.2-24.8 x 5.6-7.3-8.8 µm |
| 4831 | (10) 132-145-154 x 10.0-13.8-20.0 µm | (20) 12.8-16.6-24.0 x 5.6-7.0-8.8 µm |
| 4844 | (10) 130-150-162 x 8.0-9.8-12.0 µm | (20) 12.2-18.6-21.6 x 6.4-7.6-9.2 µm |
| 4850 | (10) 156-171-180 x 10.0-11.4-12.0 µm | (20) 11.2-17.0-21.6 x 5.6-7.1-9.0 µm |
| 4858 | (10) 144-158-176 x 9.0-10.9-16.0 µm | (20) 15.2-17.3-20.0 x 4.4-6.2-8.4 µm |
| 4859 | (10) 127-146-162 x 9.0-12.0-14.0 µm | (20) 15.2-18.8-22.4 x 4.8-6.5-8.0 µm |
| 4861 | (10) 126-135-144 x 9.0-10.2-11.0 µm | (20) 12.8-16.8-20.8 x 5.6-6.4-8.8 µm |

| Coll. | Asci | Ascospores |
|-------|--------------------------------------|--------------------------------------|
| 4863 | (10) 133-148-160 x 10.0-11.2-14.0 µm | (20) 15.2-18.0-20.2 x 5.6-7.1-8.5 µm |
| 4866 | (10) 164-176-186 x 10.0-11.2-13.0 µm | (20) 15.2-18.7-22.4 x 5.6-7.4-9.6 µm |

Originally described on twigs in Germany, FÜCKEL (1870) specified *Carpinus* and doubtfully *Fagus* with later reports on twigs and branches of various trees, the species is now considered to be confined to *C. betulus*. It has been reported from Austria, the Czech Republic, Denmark, France, Germany, Italy, Poland and Switzerland, as well as on twigs of *Carpinus caroliniana* WALT. in the USA. Twigs in mixed woodland were assumed to be *C. betulus*, when the tree was present.

***Ciboria bulgarioides* (RABENH. in KALCHBR.) BARAL & KRIEGLST.,** Beih. Z. Mykol. 6: 11 & 13, 1985.

Common synonym: *Piceomphale bulgarioides* (RABENH. in KALCHBR.) SRVČEK.

Type locality: Slovakia, Spisske Vlchy (formerly Austro-Hungary, Wallendorf), on cones of *Picea abies* as *Peziza bulgarioides*.

Picea abies - apothecia on old, fallen cones:

Slovenia: near Šoštanj, Spodnje Sleme, (3567) leg. D. V., 27. 4. 1969; - near Maribor, Ruska Koca on Mt Pohorje, (3568) leg. D. V., 2. 5. 1969; - near Kamnik, Menina planina, (3569) leg. D. V., 22. 5. 1969.

| Coll. | Asci | Ascospores |
|-------|---------------------------------|------------------------------------|
| 3567 | (10) 88-97-108 x 5.9-6.5-7.5 µm | (20) 6.6-9.7-11.0 x 3.5-4.3-5.7 µm |
| 3568 | (10) 80-90-94 x 5.5-6.2-6.7 µm | (20) 5.4-7.7-9.8 x 3.2-4.2-4.6 µm |
| 3569 | (10) 82-90-102 x 5.9-7.2-8.8 µm | (20) 6.6-8.0-10.1 x 2.9-3.5-3.7 µm |

The fungus has a wide distribution throughout Europe (Austria, the Czech Republic, Denmark, Finland, Germany, Sweden and Switzerland) and is also reported on the host species in North America as well as *Picea mariana* (MILL.) B. S. & P. in Canada and *Picea jezoensis* CARR. in Japan. Variouslly placed in *Chlorosplenium*, *Ciboria*, *Humaria*, *Piceomphale* and *Rutstroemia*, the species has been confused with *Ciboria rufofusca* which, whilst mainly growing on *Abies* cones, has also been reported on those of *Picea*.

***Ciboria caucus* (REBENT.: FR.) FÜCKEL,** Symbolae mycologicae. - Jahrb. Nassau Ver. Naturk. 23-24: 311, 1870, non sensu MATHEIS (1979).

Common synonym: *Ciboria amentacea* (BALB.: FR.) FÜCKEL.

Type locality: Germany, Oestricher Wald, on decayed male catkins of *Populus tremula* L.

Alnus spec. - apothecia on overwintered male catkins:

Croatia: Križevci, Ratarska šuma (forest), 2.5 km westerly of main church, (4836, MAT. 2/1208) leg. N. M., 3. 2. 1990; - near Zagreb, Mikulićka gora on Mt Medvednica, (4842, MAT. 2/1665) leg. Z. T., 10. 3. 1985; - near Zagreb, Varoško rebro on Mt Medvednica with both *Alnus* and *Populus* present, (4860, MAT. 2/1920) leg. N. M., 20. 2. 1993; - (4862, MAT. 2/1953) leg. N. M., 4. 4. 1993.

| Coll. | Asci | Ascospores |
|-------|------------------------------------|------------------------------------|
| 4836 | (10) 128-134-144 x 7.0-8.3-10.0 µm | (20) 6.4-8.3-9.6 x 4.0-4.6-6.4 µm |
| 4842 | (10) 100-109-124 x 7.0-8.4-10.0 µm | (20) 6.4-7.2-8.2 x 3.2-4.0-4.9 µm |
| 4860 | (10) 112-123-132 x 7.0-8.1-9.0 µm | (20) 7.2-8.8-10.4 x 3.6-4.6-5.0 µm |
| 4862 | (10) 92-104-120 x 6.0-7.2-9.0 µm | (20) 5.6-7.7-8.8 x 3.2-4.2-5.2 µm |

The species is common on overwintered male catkins of *Alnus* throughout Europe and North America but is also found or reported on the male catkins of *Populus* and *Salix*, with SCHUMACHER (1978) erecting the separate form species *alnicola*, *populi* and *salicis*.

***Ciboria conformata* (KARST.) SRVČEK**, Česká Mykol. 36: 152, 1982.

Common synonym: *Rutstroemia conformata* (KARST.) NANNF. in LUND. & NANNF.

Type locality: Finland, Mustiala, on nerves of decaying *Alnus* leaves as *Peziza conformata* KARSTEN.

Alnus glutinosa - apothecia on stromatized veins of old, often skeletonized leaves:

Croatia: near Zagreb, Vrabčeka dolina on Mt Medvednica, (3399) leg. M. T. & S. T., 28. 4. 1968.

Coll. Asci

Ascospores

3399 (05) 79-100 x 6.9-8.5 µm

(10) 9.6-10.5-11.1 x 3.9-4.5-5.3 µm

The species is common throughout Europe on old, fallen alder leaves: British Isles, Austria, the Czech Republic, Finland, Germany, Norway, Poland, Sweden and Switzerland.

***Ciboria coryli* (SCHELLENB.) WHETZEL**, Mycologia 37: 676 & 710, 1945.

Common synonym: *Sclerotinia coryli* SCHELLENB.

Type locality: Switzerland, Poschiavo, as *S. coryli* on male catkins of *Corylus avellana*.

Alnus spec. ? (*C. avellana* not observed) - apothecium on mummified male catkin:

Croatia: near Zagreb, Kraljevec brook (upper) near Šestine, (4868, MAT. 2/1945) leg. N. M., 20. 3. 1993.

Corylus avellana - apothecia on mummified male catkins:

Croatia: near Zagreb, Gračec peak on Mt Medvednica, (3396) leg. M. T. & S. T., 18. 2. 1968; - - (3397) leg. M. T. & S. T., 25. 2. 1968; - Samobor, near Mali Lipovec in Samoborsko gorje, (3398) leg. M. T. & S. T., 10. 3. 1968.

Slovenia: Šenternej, Pleterje, (4175) leg. M. T., 29. 3. 1970.

Coll. Asci

Ascospores

3396 (10) 118-131-144 x 6.9-8.2-9.5 µm

(20) 11.1-13.2-14.8 x 5.1-6.0-6.7 µm

3397 (10) 121-129-145 x 7.1-8.7-9.9 µm

(20) 10.1-12.3-14.2 x 4.6-5.5-6.4 µm

3398 (10) 141-148-155 x 7.6-8.7-11.4 µm

(10) 10.1-12.2-13.8 x 5.0-5.7-6.8 µm

4175 (04) 120-150 x 11.0-12.0 µm

(20) 10.0-12.9-16.0 x 4.8-6.1-7.2 µm

4868 (10) 144-163-180 x 10.0-11.0-12.0 µm

(20) 7.2-12.1-16.8 x 3.4-5.4-7.2 µm

The fungus is apparently less common than the smaller spored *C. amentacea* on *C. avellana* male catkins in Europe with published records sighted for Bulgaria, the Czech Republic, Denmark, Germany, Norway, Russia, Sweden and Switzerland but has not yet been reported from Great Britain. It is well distinguished from other amenicolous species by its large ascospores. Some doubt must, however, be expressed about the identity of the single male catkin of 4868 referred to *Alnus* spec., which was present, as *Corylus avellana* was not observed by the collector.

***Ciboria gemmincola* REHM in WAGNER, Hedwigia 34: 211-212, Figs. 1-4, 1895.**Common synonym: *Rutstroemia gallincola* VELENOVSKÝ.Type locality: Germany, Lower Saxony, near Bad Schandau, Groß Winterberg, on stromatized, old, fallen cynipid galls of *Andricus fecundatrix* (HARTIG) (as *Cynips gemmae*).*Andricus quercuscalicis* - apothecia on old, fallen, moist galls beneath *Quercus robur*:

Croatia: Zaprešić, Dubravica near the River Sutla, (3532) leg. J. T. P. & M. T., 9. 9. 1969 with further apothecia developed in natural culture and harvested 14. 9.-18. 10. 1969 and 14.-22. 10. 1970; - - (3533) leg. J. T. P. & M. T., 9. 9. 1969 with further apothecia developed in natural culture and harvested 23. 7.-7. 10. 1970 and 13. 10. 1971; - Zagreb, Pionirski Park, (3551) leg. J. T. P. & M. T., 13. 9. 1969 with further apothecia developed in natural culture and harvested 3. 8.-25. 9. 1970; - Zagreb, Maksimir Park, (3554) leg. J. T. P. & M. T., 13. 9. 1969 with further apothecia developed in natural culture and harvested 25. 9. 1969 and 22. 7. 1970.

| Coll. | Asci | Ascospores |
|-------|---------------------------------|------------------------------------|
| 3532 | (20) 69-83-102 x 5.1-6.1-7.9 µm | (40) 6.5-8.2-9.6 x 2.7-3.3-3.8 µm |
| 3533 | (20) 73-85-99 x 4.3-6.3-7.7 µm | (30) 6.0-8.7-10.6 x 2.3-3.5-4.1 µm |
| 3551 | (10) 75-86-108 x 4.5-5.8-6.5 µm | (20) 5.5-7.5-9.7 x 2.8-3.3-3.8 µm |
| 3554 | (10) 68-80-96 x 3.5-5.8-6.4 µm | (40) 6.0-8.2-11.1 x 2.8-3.4-3.9 µm |

This apparently rare species, previously only known from the type collection on *A. fecundatrix*, belongs to the *Ciboria americana* complex and for which the occurrence on very wet ground is unusual. It is so far known from single collections in Austria on *Andricus lignicola* and *A. quercuscalicis*, with two in the Czech Republic as *R. gallincola*, and several in England on *A. quercuscalicis*, also the holotypus on *A. fecundatrix*, as well as *A. quercuscalicis*, in Germany, with the latter collection given in SCHIEFERDECKER (1954) as *Sclerotinia* spec. (PALMER 1990, 1991).

***Ciboria rufofusca* (WEBERB.) SACC., Sylloge fungorum 8: 203, 1889.**Type locality: Poland (as Silesia), Ladek-Zroj (as Landeck), as *Peziza rufofusca* WEBERB. on fallen needles and cones of *Picea abies* (as *Pinus picea* L.) and *Abies alba* (as *A. excelsa* POIR.).*Abies alba* - apothecia on cone scales:

Croatia: Vrbovsko, Gorica Forest near Gomirje, (4823, MAT. 2/473) leg. N. M., 7. 5. 1988; - - (4824, MAT. 2/483) leg. N. M., 14. 5. 1988; - W of the Gomirje Monastery, (4833, MAT. 2/874), leg. N. M., 22. 3. 1989.

Picea abies - apothecia on old, fallen cones:

Croatia: Delnice, Lazac area near Risnjak peak in the Risnjak National Park, (3400) leg. M. T., 17. 5. 1968; - Delnice, Smrekovac area near Risnjak peak in the Risnjak National Park, (3564) leg. M. T., 16. 5. 1968.

| Coll. | Asci | Ascospores |
|-------|--------------------------------|-----------------------------------|
| 3400 | (10) 67-75 x 3.9-5.1 µm | (10) 4.6-5.3-6.4 x 2.1-2.6-2.8 µm |
| 3564 | (10) 60-71-80 x 4.0-4.7-6.0 µm | (10) 4.0-5.1-6.4 x 1.6-1.9-2.5 µm |
| 4823 | (10) 66-73-80 x 3.5-4.9-7.0 µm | (20) 4.0-5.3-6.5 x 2.4-2.6-4.0 µm |
| 4824 | (10) 66-73-78 x 4.0-4.7-6.0 µm | (20) 4.8-5.3-7.2 x 2.4-2.8-3.4 µm |
| 4833 | (10) 66-72-82 x 4.0-4.4-6.0 µm | (20) 4.9-6.0-7.2 x 2.4-2.6-2.8 µm |

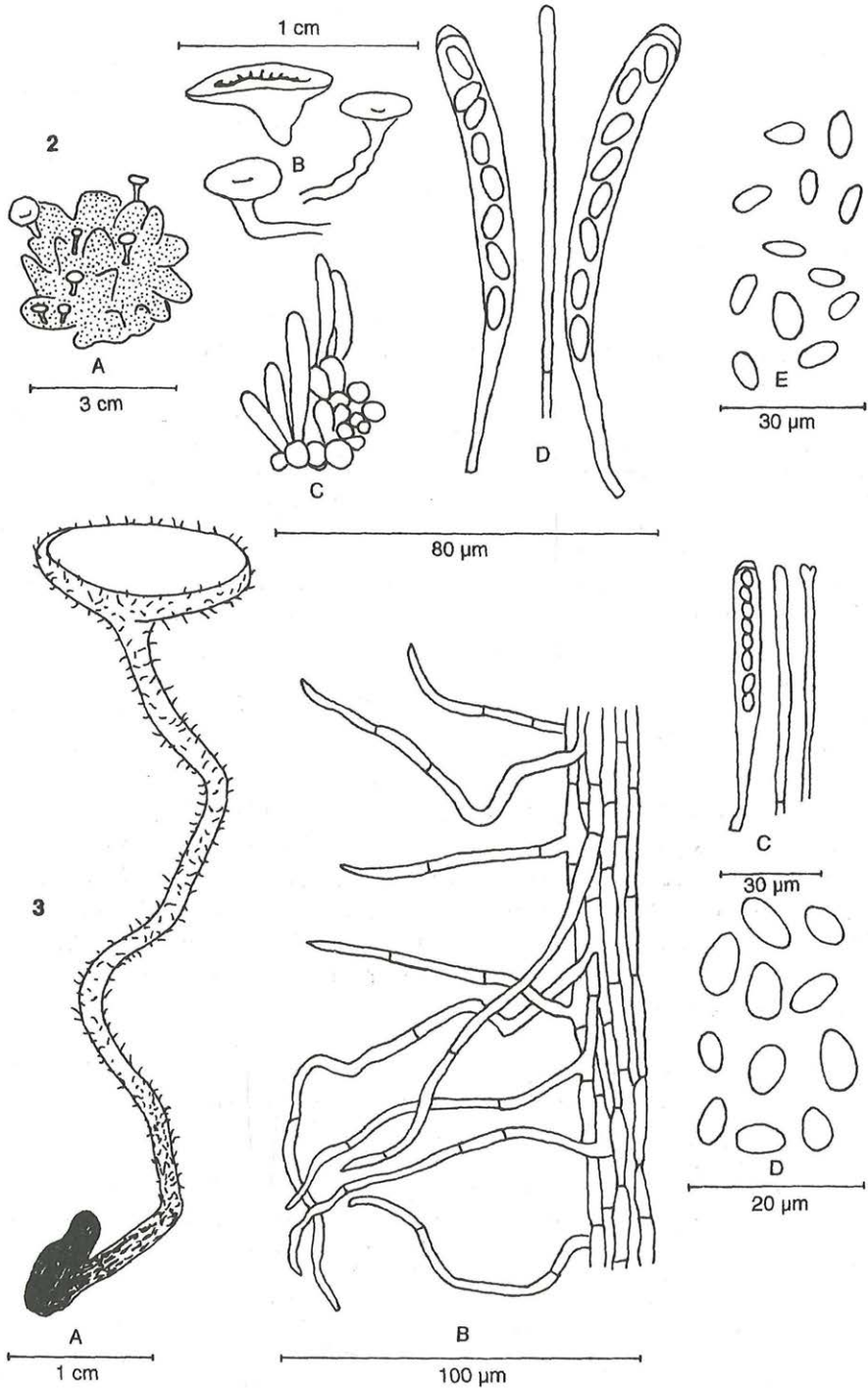


Fig. 2. *Ciboria gemmincola* (3533): A *Andricus quercuscalicis* gall with developing apothecia; B loose apothecia; C excipular cells; D asci and paraphysis; E ascospores. - Fig. 3. *Ciborinia bresadolae* (4838): A apothecium attached to sclerotium; B section of stipe wall with septate, hyaline hairs; C asci and paraphysis; D ascospores.

The species is mainly reported on cones of *Abies alba*, less frequently of *Picea abies* (BARAL & KRIEGLSTEINER 1985) in Europe (Austria, the Czech Republic, Denmark, France, Germany and Poland), *Abies pinsapo* BOISS. in southern Spain (GALÁN 1985), and other *Abies* spp. in Canada, Denmark, Japan and the USA, as well as *Picea* spp. in Alaska and Canada and *Pseudotsuga taxifolia* (POIR.) BRITTON in Canada (GROVES & ELLIOTT 1969). However, the fungus has been confused with *Ciboria bulgarioides*, from which it is readily recognized by its smaller spores.

***Ciborinia bresadolae* (RICK) J. T. PALMER**, *Persoonia* 14: 475-481, 1992.

Common synonym: *Ciborinia hirtella* (BOUD.) BATRA & KORF.

Type locality: The Netherlands, Limburg, Valkenburg, on galls of *Biorhiza pallida* (OLIV.) (as *Dryoteras terminalis*) and fallen buds of *Quercus robur* as *Sclerotinia bresadolae* RICK.

Fagus sylvatica - apothecia on sclerotia embedded in fallen petioles and leaves:

Croatia: Vrbovsko, Gorica Forest near Gomirje, 2.5 km westerly of Gomirje Monastery, (4838, MAT. 2/1252) leg. N. M. & D. MR., 30. 3. 1990.

Quercus humilis - sclerotia on an old, fallen cupule:

Croatia: near Zagreb, Gračec peak on Mt Medvednica, (3866) leg. J. T. P. & M. T., 18. 8. 1967 with 2 apothecia later developing from small sclerotia on cupule scales in natural culture and harvested 9. 5. 1968.

| Coll. | Asci | Ascospores |
|-------|--------------------------------|-----------------------------------|
| 3866 | (10) 69-72-75 x 5.5-6.0-6.9 µm | (20) 6.4-7.0-7.5 x 2.7-3.2-2.7 µm |
| 4838 | (10) 64-76-84 x 5.0-5.8-7.4 µm | (20) 4.8-6.3-7.6 x 2.2-3.2-4.0 µm |

Rarely found on the oak-apple gall, *B. pallida* (PALMER 1990), the fungus has occasionally been reported as *C. hirtella* on twigs, leaves etc. of *Castanea sativa*, *Quercus*, with a report on *Pinus* (PALMER 1992) and *Acer pseudoplatanus* fruits (MATHEIS 1985). The collection on *F. sylvatica* petioles and leaves adds a further substrate. *C. bresadolae*, which has been reported from England, France, Germany, The Netherlands and Switzerland, is well-characterized by the flexuose, hyaline, septate hairs clothing the exterior of the apothecium.

***Dumontinia tuberosa* (HEDWIG ex MÉRAT) KOHN**, *Mycotaxon* 9: 432-434, 1979.

Common synonym: *Sclerotinia tuberosa* (HEDWIG ex MÉRAT) FÜCKEL.

Type locality: Germany as *Octospora tuberosa* HEDWIG.

Anemone nemorosa - apothecia on rhizomes:

Croatia: Delnice, Lazac area near Risnjak peak in the Risnjak National Park, (3401) leg. M. T., 17. 5. 1968, beneath *Picea abies* with no sign of *Anemone*; - Donja Stubica, Golubovec, (4492) leg. M. T., 17. 3. 1974; - Zagreb, Botanic Gardens, (4493) leg. M. T., 10. 4. 1987; - Križevci, Lug Forest near Špiranec, (4821, MAT. 2/421) leg. N. M., 25. 3. 1988; - Zagreb, Šestinski Dol, (4843, MAT. 2/1685), leg. N. M. & A. M., 22. 3. 1992; - near Zagreb, Puntijarka peak on Mt Medvednica, 500 m northwest of Rauhova lugarnica, (4845, MAT. 2/1700) leg. N. M. & A. M., 19. 4. 1992; - Vrbovsko, Severin on the River Kupa, 850 m northeast of Glavica peak, (4846, MAT. 2/1701) leg. N. M. & Z. T., 4. 4. 1992; - near Zagreb, Stol peak on Mt Medvednica, (4847, MAT. 2/1723) leg. Z. T. & Đ. ME., 19. 4. 1992; - Križevci, Brezine Forest, (4864, MAT. 2/1959) leg. N. M., 12. 4. 1993; - near Zagreb, Kraljevec brook (lower) near Šestine, (4867, MAT. 2/1966) leg. N. M., 17. 4. 1993.

Slovenia: Šenternej, slopes of the Gorjanci mountain range above Kostanjevica na Krki, (3872) leg. M. T., 26. 3. 1972.

| Coll. | Asci | Ascospores |
|-------|-------------------------------------|--------------------------------------|
| 3401 | (10) 119-131-140 x 6.3-8.9-9.1 µm | (10) 11.2-12.7-13.9 x 4.9-5.8-7.4 µm |
| 3872 | (10) 120-150-168 x 8.0-9.3-11.0 µm | (10) 9.6-11.1-13.6 x 4.8-6.1-7.2 µm |
| 4492 | (10) 136-154-170 x 8.0-10.0-12.0 µm | (10) 9.6-11.9-12.8 x 3.8-5.0-6.4 µm |
| 4493 | (10) 110-149-162 x 8.0-8.9-10.0 µm | (20) 11.2-12.5-17.6 x 4.4-5.4-6.4 µm |
| 4821 | (10) 136-156-170 x 8.0-9.3-11.0 µm | (20) 9.6-12.7-13.6 x 4.0-5.4-6.8 µm |
| 4843 | (10) 104-117-130 x 7.0-8.2-10.0 µm | (20) 10.0-11.6-12.8 x 3.6-4.7-5.6 µm |
| 4845 | (10) 122-134-156 x 8.0-8.6-10.0 µm | (20) 11.2-13.3-15.4 x 4.4-5.7-7.2 µm |
| 4846 | (10) 104-138-150 x 8.0-9.0-10.0 µm | (20) 11.2-12.1-12.8 x 4.8-5.4-7.2 µm |
| 4847 | (10) 136-144-154 x 8.0-9.4-10.0 µm | (20) 9.7-12.6-15.2 x 4.8-5.7-7.2 µm |
| 4864 | (10) 126-141-151 x 8.0-8.8-11.0 µm | (20) 10.4-12.3-14.4 x 4.0-5.5-6.8 µm |
| 4867 | (10) 124-135-152 x 7.0-8.9-10.0 µm | (20) 10.4-13.1-15.2 x 4.0-5.4-6.4 µm |

Often found developing from sclerotia buried in the soil, as reported by BULLIARD (1791), this widely distributed parasite of *Anemone* tubers, which it often destroys, although mainly reported on *A. nemorosa* in Europe, has also been recorded on cultivated *A. blanda* and *A. ranunculoides*, *A. amkurensis* in Siberia and *A. coronaria* in Japan. During a recent survey of the national park fungi in northern Greece, the first author found it locally common on *A. blanda* on Mt Olympus.

All had *Anemone nemorosa* adjacent except for 3401, which was beneath *Picea abies* with no sign of the host.

Lambertella corni-maris VON HOEHNEL, Sitzungsber. kaiserl. Akad. Wiss. Wien sect. 1, 127: 375, 1918.

Type locality: Austria, Niederösterreich, Waidhofen an der Ybbs, St. Georgen in der Klaus, on blackened, fallen fruit of *Cornus mas*.

Cornus mas - apothecia on old, fallen mummified drupes:

Croatia: near Zagreb, Gračec peak on Mt Medvednica, (3163) leg. J. T. P., M. T. & S. T., 18. 8. 1967 with further apothecia developed in natural culture and (3414) harvested 9. 8. 1968.

Subcultures from a mass spore deposit on a P. D. A. slope were inoculated into various mature roseaceous fruits with apothecia developing in natural culture:

(3509) *Malus prunifolia* apples: harvested 18. 8-1. 10. 1969.

(3510) *Prunus domestica* drupes: harvested 18. 9. 1969.

(3631) *Malus prunifolia* apples: harvested 22. 6. 1970.

(3632) *Malus prunifolia* apple stalk: harvested 16. 7. 1970.

(3637) *Sorbus aucuparia* berries: harvested 28. 7.-19. 8. 1970.

| Coll. | Asci | Ascospores |
|-------|-----------------------------------|-------------------------------------|
| 3163 | (20) 99-104-124 x 7.2-8.3-9.9 µm | (30) 7.8-10.1-11.6 x 3.4-4.8-5.5 µm |
| 3414 | (04) 98-108 x 5.8-6.3 µm | (40) 9.2-10.5-12.1 x 3.8-4.7-5.5 µm |
| 3509 | (10) 88-97-108 x 7.0-7.8-9.9 µm | (10) 8.8-10.2-12.0 x 4.0-5.4-7.2 µm |
| 3510 | (10) 78-94-104 x 7.0-8.7-11.0 µm | (20) 6.4-10.0-12.0 x 4.0-5.0-7.2 µm |
| 3631 | (10) 92-105-120 x 7.0-8.6-10.0 µm | (10) 9.7-11.0-12.8 x 4.1-4.8-5.8 µm |
| 3632 | None measurable observed | (20) 8.8-10.5-12.8 x 4.2-4.8-6.5 µm |
| 3637 | (10) 88-97-110 x 7.5-8.7-9.4 µm | (20) 9.2-10.3-12.0 x 4.7-5.2-5.6 µm |

The species is currently only recorded in Europe from the type collection on mummified drupes of *Cornus mas* in Austria in October, 1917, and collections on mummified apples (*Malus domestica* ?) at Véige near Brügg, Canton Aargau, Switzerland, in August, 1931 and pears between Freiburg and Baden Baden, Germany [HARRISON & EL-HELALY 1934 (1935)].

There is, however, a collection in PRM under Flora bohémica No. 173830 on *Cornus mas* berries from Srbsko, Bohemia, Czech Republic, 25. 9. 1949, collected and described by V. VACEK (1950) as *Sclerotinia corni*, which has been studied by the first author, who considers it a synonym of *L. corni-maris*:

| | Asci | Ascospores |
|--------------|--------------------------------|-----------------------------------|
| VACEK (1950) | 70-108 x 5.5-8 µm | 6-10 x 3.5-5 µm |
| J. T. P. | (20) 77-88-98 x 4.9-5.4-6.3 µm | (40) 6.4-7.3-8.7 x 2.7-3.2-3.7 µm |

Elsewhere, the species is reported from mummified apricots in New South Wales, Australia (HARRISON 1935) and often single collections on stromatized fruitbodies of *Cyttaria gunnii* BERK. on *Nothofagus* in Victoria, Australia, unknown nuts in Colombia, apples in Japan, fruits and husks of *Carya ovata* K. KOCH in the USA (DUMONT 1971), on an unidentified petiole on La Palma, Canary Islands, with four instead of the usual eight spores in the asci (KOHN 1982) and an unknown (? tree) fruit in Sichuan, China (KORF & ZHUANG 1985). Although not previously found in nature, the development of apothecia on inoculated fruits of *Prunus domestica* and *Sorbus aucuparia* are additional hosts for this species.

DUMONT (1971) cited the Zagreb collection of *Lambertella corni-maris* in his monograph of the genus and used subcultures from the first author in his study of North American material of *Lambertella hicoloriae* WHETZEL, which he found to be identical and therefore a synonym.

Lanzia echinophila (BULL.: FR.) KORF, Mycotaxon 14: 1, 1982

Common synonym: *Rutstroemia echinophila* (BULL.: FR.) VON HOEHNEL.

Type Locality: France, on burrs of *Castanea sativa* as *Peziza echinophila* BULL.: FR.

Castanea sativa - apothecia on mummified or cuticles of old, fallen chestnuts, with the latter often immature and showing line stromata:

Croatia: near Zagreb, Varoško rebro on Mt Medvednica, (3285) leg. J. T. P. & M. T., 15. 8. 1967; - Gračec peak on Mt Medvednica, (3546) leg. J. T. P. & M. T., 13. 9. 1969; - near Petrinja, Mostac, (3863) leg. J. T. P. & M. T., 19. 8. 1967; - Zagreb, Sv. Duh, (4841, MAT. 2/1636) leg. N. M. & Z. T., 29. 9. 1990; - - (4840, MAT. 2/1564) leg. N. M. & Z. T., 14. 10. 1991.

Castanea sativa - apothecia on old, fallen burrs:

Croatia: near Petrinja, Cepeliš, (2946) leg. M. T., Autumn, 1965; - near Zagreb, Gračec peak on Mt Medvednica, (2946) leg. M. T., Autumn, 1965. - - (3295) leg. J. T. P. & M. T., 18. 8. 1967; - - (3549) leg. J. T. P. & M. T., 13. 9. 1969; - - (3566) leg. M. T., 8. 9. 1968; - near Zagreb, Varoško rebro on Mt Medvednica, (3271) leg. J. T. P. & M. T., 15. 8. 1967; - near Zagreb, Medveščina area near slopes of Mt Medvednica, (3536) leg. J. T. P. & M. T., 12. 9. 1969; - near Petrinja, Mostac, (3862) leg. J. T. P. & M. T., 19. 8. 1967; - near Zagreb, Kraljevec brook (upper) near Šestina on Mt Medvednica, (4826, MAT. 2/556) leg. N. M., 15. 8. 1988; - - (lower) (4827, MAT. 2/574) leg. N. M., 25. 8. 1988; - Gornja Bistra, Gornji Kraljev vrh Forest, 700 m from castle, (4848, MAT. 2/1863) leg. N. M. & D. MR., 10. 10. 1992.

Macedonia: 50 km sw of Skopje, above Gostivar, (2916) leg. C. H., 18. 10. 1965; - near Skopje, Mt Vodno, (3107) leg. M. T., 25. 10. 1966.

Slovenia: Bled, northeastern side of Blejsko jezero, (3527) leg. J. T. P. & M. T., 7. 9. 1969.

Quercus cerris - apothecia on old, fallen cupules:

Croatia: Zagreb, Maksimir Park, (4852, MAT. 2/2153) leg. N. M., 7. 9. 1988; - - (4819) leg. J. T. P. & M. T., 12. 9. 1993.

Quercus humilis (= *Q. pubescens*) - apothecia on a mummified, fallen acorn cotyledon:

Croatia: near Zagreb, Gračec peak on Mt Medvednica, (3544) leg. J. T. P. & M. T., 13. 9. 1969.

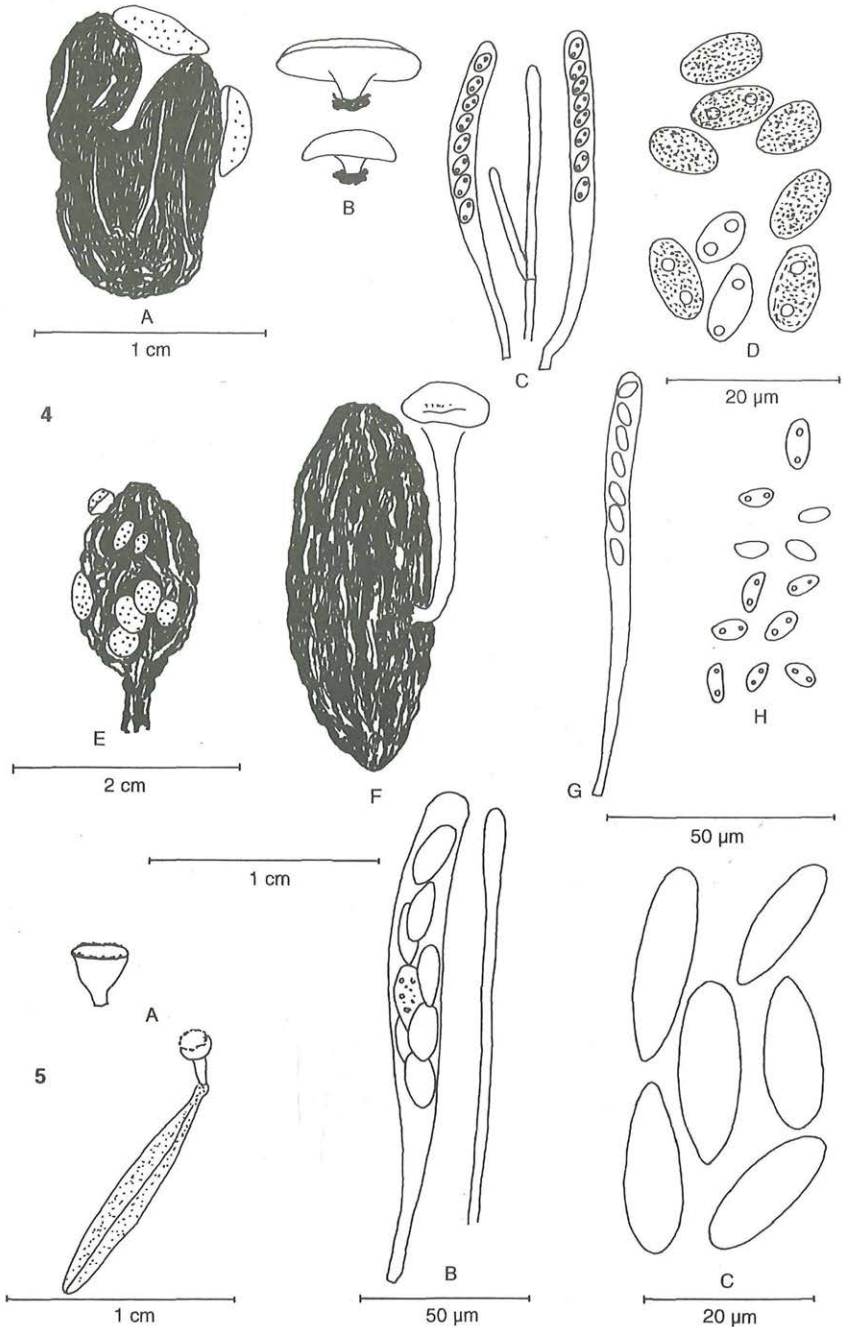


Fig. 4. *Lambertella corni-maris* (3163): A apothecia on mummified *Cornus mas* drupe; B loose apothecia, *Malus prunifolia* (3509); C asci and paraphysis; D ascospores; (3631): E apothecia on mummified apple; holotypus of *Sclerotinia corni* PRM 173830; F apothecium on mummified *Cornus mas* drupe; G ascus; H ascospores. - Fig. 5. *Lanzia elatina* (4171): A apothecium attached to *Abies alba* leaf; B ascus and paraphysis; C ascospores.

Quercus humilis (= *Q. pubescens*) - apothecia on old, fallen cupules:

Croatia: near Zagreb, Gračec peak on Mt Medvednica, (3543) leg. J. T. P. & M. T., 13. 9. 1969.

Quercus petraea - old, fallen, stromatized cupules:

Croatia: near Zagreb, Medveščina area on lower slopes of Mt Medvednica, (3821) leg. J. T. P. & M. T., 12. 9. 1969 with apothecia developed in natural culture and harvested 19. 8. 1970.

| Coil. | Asci | Ascospores |
|-------|--------------------------------------|--------------------------------------|
| 2916 | (04) 110-145 x 9.8-13.9 µm | (10) 13.7-16.7-19.2 x 4.1-4.8-5.5 µm |
| 2946 | (01) 124 x 10.0 µm | (03) 15.6-16.4 x 4.0-4.8 µm |
| 2947 | None observed | (10) 15.2-16.0-17.6 x 4.0-4.5-5.4 µm |
| 3107 | (10) 100-110-126 x 8.0-9.4-10.0 µm | (10) 12.4-15.1-16.6 x 3.7-4.4-5.1 µm |
| 3271 | (10) 104-113-137 x 9.4-11.1-13.7 µm | (10) 14.7-15.4-16.6 x 3.7-4.4-5.1 µm |
| 3285 | (10) 107-119-125 x 8.1-9.5-10.1 µm | (10) 14.7-16.1-20.5 x 3.8-4.8-5.5 µm |
| 3295 | (10) 113-121-133 x 10.8-12.3-14.6 µm | (10) 14.8-16.5-18.3 x 4.6-5.0-5.6 µm |
| 3527 | (10) 120-125-134 x 9.8-10.9-12.2 µm | (20) 14.7-16.2-19.2 x 3.7-4.7-6.5 µm |
| 3536 | (10) 108-117-130 x 8.8-10.8-13.5 µm | (20) 14.7-16.9-19.2 x 4.3-5.0-6.5 µm |
| 3543 | (10) 114-121-141 x 5.9-10.0-11.8 µm | (20) 15.6-16.9-18.6 x 3.8-4.8-5.5 µm |
| 3544 | (10) 114-119-124 x 6.8-8.4-10.2 µm | (20) 13.0-15.8-19.2 x 3.8-4.4-4.6 µm |
| 3546 | (10) 110-122-133 x 8.8-11.1-13.3 µm | (20) 15.6-18.1-24.0 x 3.7-4.8-6.0 µm |
| 3549 | (10) 106-115-129 x 6.9-11.5-12.9 µm | (20) 15.6-17.5-19.4 x 4.6-5.4-6.0 µm |
| 3566 | (10) 106-115-129 x 6.9-11.5-12.9 µm | (20) 12.9-16.6-18.8 x 3.7-4.6-5.4 µm |
| 3821 | (10) 100-115-126 x 8.0-10.0-12.0 µm | (10) 14.4-15.8-17.6 x 3.0-4.5-5.8 µm |
| 3862 | (10) 100-118-126 x 8.0-11.0-12.0 µm | (10) 13.6-15.4-16.8 x 4.0-4.1-4.8 µm |
| 3863 | None observed | (20) 12.8-16.3-17.6 x 3.8-4.5-4.8 µm |
| 4819 | (10) 100-111-128 x 7.0-8.9-11.0 µm | (20) 14.4-15.5-17.3 x 3.3-4.5-6.4 µm |
| 4826 | (10) 106-111-117 x 8.0-9.3-11.0 µm | (20) 14.4-15.8-17.6 x 3.2-4.1-4.8 µm |
| 4827 | (10) 110-130-150 x 8.0-9.2-11.0 µm | (20) 14.4-16.8-20.0 x 3.8-4.6-6.4 µm |
| 4840 | (10) 114-123-134 x 8.0-9.8-13.0 µm | (20) 12.0-15.4-17.6 x 4.0-4.7-5.6 µm |
| 4841 | (10) 100-119-136 x 8.0-9.8-12.0 µm | (20) 15.2-16.6-18.8 x 4.0-4.7-5.6 µm |
| 4848 | (10) 127-136-144 x 6.0-8.9-10.0 µm | (20) 12.8-15.0-16.8 x 4.0-4.8-6.0 µm |
| 4852 | (10) 106-110-130 x 8.0-10.0-12.0 µm | (20) 15.2-17.1-20.0 x 4.0-4.6-6.4 µm |

The fungus is common on old chestnut burrs, but with an apparent northern limit, wherever *C. sativa* occurs and, prior to the collection of *Ciboria americana* (PALMER 1965), was considered to be the sole member of the *Sclerotiniaceae* developing on this substrate in Europe although *Rutstroemia sydowiana* and several other species are now also known to occur. The fungus has been collected as far north as Northwest England, east as Georgia and south as Algeria (PALMER 1994). In addition, it is also reported on old cupules of *Quercus cerris* in Austria (VON HOEHNEL 1917), Bulgaria (KUTHAN & KOTLABA 1988) and the Czech Republic (PALMER 1968), as well *Q. castaneifolia* C. MEYER in Azerbaijan (PALMER 1968, RAITVIIR 1968) with further collections on cupules of *Q. ilex* L. (France), *Q. macrolepis* KOTSCHY (Greece), *Q. petraea* (France) and *Q. suber* L. (Corsica, France and Spain), listed in PALMER (1993). The collection on a mummified acorn of *Q. humilis*, an additional host species, is extremely interesting and indicates possible pathogenicity. The only other similar collection known to the first author was on a partly mummified cotyledon of *Q. cerris* in England.

***Lanzia elatina* (ALB. & SCHW.) BARAL & KRIEGLST.**, Beih. Z. Mykol. 6: 20, 1985.
Common synonym: *Rutstroemia elatina* (A. & S.) REHM.

Type locality: Germany, Sachsen, Eulenburg, Niesky (as *Peziza elatina* A. & S.) on dead branches of *Picea abies* (as *Pinus peicea*).

Abies alba - apothecia on old, fallen twigs or branches, usually with attached needles, and occasionally also fallen needles:

Bosnia-Herzegovina: near Sarajevo, Stambulčić, in woods, (4171, SARA), leg. K. MALY, 24. 3. 1935.

| Coll. | Asci | Ascospores |
|-------|----------------------------|--------------------------------------|
| 4171 | (05) 142-174 x 8.0-12.0 µm | (12) 16.0-20.0-24.0 x 5.6-6.7-8.0 µm |

Reported also on *Picea abies*, the fungus is generally considered to be specific to *Abies alba* and, whilst not common, is reported from the Czech Republic, Denmark, France, Germany, Poland, Romania, Russia and Switzerland. PICBAUER (1936) published this collection as *Rutstroemia elatina* "ad ramulos acusque *Abietis albae* prope Stambulčić" without further details and, as his report has been overlooked by recent authors, it is herewith included.

***Lanzia luteovirescens* (ROB. in DESMAZ.) DUMONT & KORF in KORF & GRUFF, Mycotaxon 7: 185, 1978.**

Common synonym: *Rutstroemia luteovirescens* (ROB. in DESMAZ.) WHITE.

Type locality: France, Caen, as *Peziza luteo-virescens* on old petioles of *Tilia* leaves, less frequently *Platanus* and other trees very rarely.

Acer pseudoplatanus - apothecia on petioles of old, fallen leaves:

Croatia: near Zagreb, upper slopes of Sljeme vrh on Mt Medvednica, (3539) leg. J. T. P. & M. T., 12. 9. 1969; - - 350 m east of peak (4830, MAT. 2/634) leg. N. M., 21. 9. 1988.

| Coll. | Asci | Ascospores |
|-------|-------------------------------------|--------------------------------------|
| 3539 | (10) 108-121-128 x 9.9-11.3-12.1 µm | (20) 12.8-14.1-15.6 x 4.6-6.5-7.9 µm |
| 4830 | (10) 128-138-156 x 6.0-8.5-12.0 µm | (20) 11.2-13.0-15.2 x 4.8-6.9-9.0 µm |

The fungus is common in Europe, with records sighted for Austria, Belgium, British Isles, Czech Republic, France, Germany, Greece, The Netherlands and Russia, on stromatized petioles of *A. pseudoplatanus* but is cited by WHITE (1941) from North America on *Acer sacharum* L. The first author has also made unpublished collections on *A. campestre* L. in Spain and *A. platanoides* L. in Finland. VON HOEHNEL (1918) gave the only subsequent report for *Tilia* but MATHEIS (1976) also records it on petioles of *Aesculus hippocastanum* L. and *Populus x canadensis* MOENCH. in Germany as well as *Carpinus betulus* in France. PALMER (1994) reports a small collection, which appears to be this species, on deteriorated spines of a *Castanea sativa* burr in England.

***Lanzia serotina* (PERS.: FR.) KORF & ZHUANG, Mycotaxon 22: 506-507, 1985.**

Common synonym: *Hymenoscyphus serotinus* (PERS.: FR.) PHILL.

Type locality: Germany.

Fagus sylvatica (?) - blackened branches:

Croatia: Vrbovsko, Gorica Forest near Gomirje, (4834, MAT. 2/1148) leg. N. M. & D. MR., 30. 9. 1989; - near Zagreb, Puntijarka peak on Mt Medvednica, (4835, MAT. 2/1167) leg. N. M., D. MR. & I. F., 28. 10. 1989; - Samobor, Veliki dol in Samoborsko gorje near Rude, (4869, MAT. 2/1891) leg. N. M., 29. 11. 1992.

| Coll. | Asci | Ascospores |
|-------|------------------------------------|--------------------------------------|
| 4834 | (10) 108-122-130 x 5.0-6.8-7.0 µm | (10) 16.8-20.6-24.0 x 3.2-3.5-4.0 µm |
| 4835 | (10) 102-115-140 x 7.0-8.1-10.0 µm | (20) 17.6-22.3-28.0 x 2.8-3.2-3.6 µm |
| 4869 | None observed | (20) 20.0-24.4-28.0 x 2.0-3.8-4.8 µm |

Common throughout Europe and reported from North America, KORF & ZHUANG (1985) made the transfer to *Lanzia* on the basis of the "very evident stroma" found in the host tissue whilst dealing with collections from China. However, BARAL (pers. comm.) expressed his view that European material belongs to *Hymenoscyphus*, stating that the North American fungus is something different. This fungus requires further investigation to ascertain its true position.

***Monilinia johnsonii* (ELLIS & EVERH.) HONEY**, Amer. J. Bot. 23: 105, 1936.

Common synonym: *Sclerotinia johnsonii* (ELLIS & EVERH.) REHM.

Anamorph (Conidial): *Monilia crataegi* DIEDICKE.

Type locality: USA, Michigan, Ann Arbor, on fruits of *Crataegus* as *Ciboria johnsoni* (sic).

Crataegus spec. - mummified haws (fruits):

Croatia: near Zagreb, 1.5 km north of church in Jakuševac on bank of the River Sava, (4832, MAT. 2/827) leg. N. M. & D. MR., 28. 4. 1989.

| Coll. | Asci | Ascospores |
|-------|-----------------------------------|-------------------------------------|
| 4832 | (10) 112-132-158 x 6.0-7.6-9.0 µm | (20) 9.6-11.8-14.4 x 4.0-5.1-6.4 µm |

Although probably common, apothecia are rarely reported, no doubt due to the early and restricted fruiting period. The ascospores infect the leaves at time of bud-break, which develop a greyish growth of sweet-smelling conidia which, in turn, infect the flowers with subsequent mummification of the haws.

BATRA (1991) reports its distribution on a large number of *Crataegus* spp. in North America, western Europe, Sweden and the former USSR. Additional published reports sighted for Europe are the British Isles, the Czech Republic, Denmark, France, Germany, Poland and Russia.

***Myriosclerotinia curreyana* (BERK. in CURR.) BUCHW.**, Friesia 3(4): 291-296, 1947.

Common synonym: *Sclerotinia curreyana* (BERK. in CURR.) KARST.

Anamorphs (Microconidial): *Myrioconium tenellum* VON HOEHNEL.

(Sclerotial): *Sclerotium juncinum* DESMAZ.

Type locality: England, Paul's Cray Common, near Chislehurst, Kent, in culms of probably *Juncus conglomeratus* L.

Juncus effusus - apothecia on sclerotia within previous year's culms:

Croatia: near Karlovac, Draganička šuma (forest), (4174) leg. M. T. as sclerotia within culms, 16. 10. 1977, with apothecia developed in natural culture and harvested 15-31. 3. 1978.

| Coll. | Asci | Ascospores |
|-------|--------------------------------|------------------------------------|
| 4174 | (10) 50-53-60 x 4.0-4.2-5.0 µm | (20) 8.0-9.1-10.4 x 0.8-1.1-1.6 µm |

The species, which is distinguished by its narrow, allantoid ascospores from the very similar *Myriosclerotinia juncifida* (NYL.) J. T. PALMER, which has ellipsoid

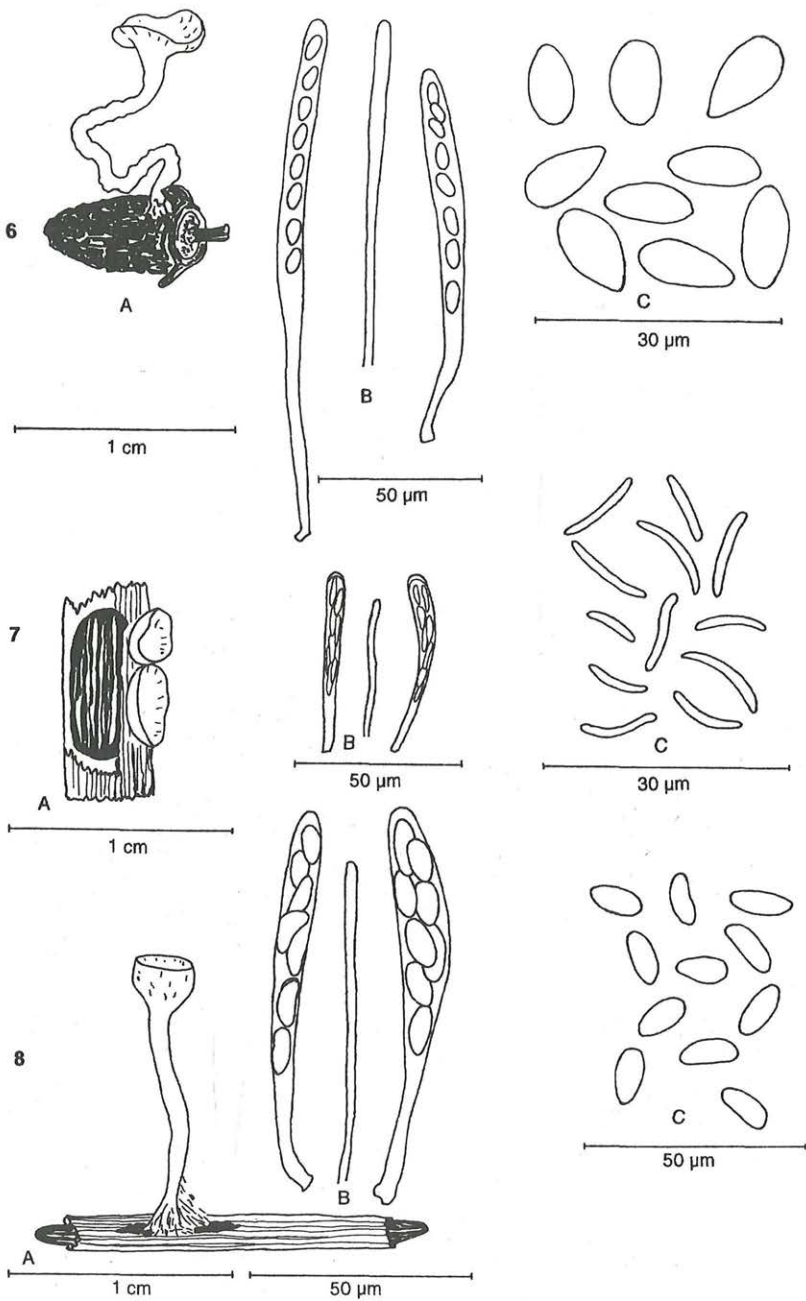


Fig. 6. *Monilinia johnsonii* (4833): A apothecium developing from mummified *Crataegus* spec. haw; B asci and paraphysis; C ascospores. - Fig. 7. *Myriosclerotinia curreyana* (4174): A apothecia on sclerotium embedded within pith of *Juncus effusus* culm; B asci and paraphysis; C ascospores. - Fig. 8. *Myriosclerotinia dennisii* (3525): A apothecium on sclerotium within *Eriophorum vaginatum* culm; B asci and paraphysis; C ascospores.

spores and is so far known only from England, Finland, Ireland and Norway, is especially common on *J. conglomeratus* and *J. effusus* throughout the British Isles. It is only occasionally reported on the European continent (Belgium, the Czech Republic, Denmark, Finland, France, Germany, The Netherlands, Poland, Spain and Switzerland), although common in Norway, with a single record for the USA as *Sclerotinia juncigena* (E. & E.) WHETZEL.

***Myriosclerotinia dennisii* (SRVCEK) SCHWEGL.**, Schweiz. Z. Pilzk. **56**: 53-54, 1978.

Common synonym: *Sclerotinia dennisii* SRVCEK.

Type locality: The Czech Republic, Bohemia, Sobeslav blat (peat bog), as *Sclerotinia dennisii* in culms of *Eriophorum vaginatum*.

Eriophorum angustifolium - apothecia on sclerotia within culms:

Croatia: Zaprešić, Dubravica near the River Sutla, (3529) leg. J. T. P. & M. T., 9. 9. 1969 as sclerotia within culms with apothecia developed in natural culture and harvested 16.-24. 3. 1970.

Eriophorum vaginatum - apothecia on sclerotia within previous year's culms:

Slovenia: near Bled, Mrzli Studenec, Pokljuka Moor, in a *Sphagnum* bog, (3525) leg. J. T. P. & M. T., 7. 9. 1969 as sclerotia within culms with apothecia developed in natural culture and harvested 12. 2.-7. 4. 1970.

| Coll. | Asci | Ascospores |
|-------|-----------------------------------|-------------------------------------|
| 3525 | (45) 78-109-149 x 6.3-8.6-11.6 µm | (90) 8.6-12.1-17.5 x 3.7-4.8-5.7 µm |
| 3529 | (30) 81-93-101 x 6.6-8.2-9.8 µm | (70) 9.8-12.7-16.5 x 3.8-4.7-6.3 µm |

Initially confused with the circumpolar, foliicolous *Ciborinia ciborium* (VAHL: FR.) SCHUM. & KOHN (= *Sclerotinia vahliana* ROSTR.) and infrequently reported or collected in Europe (Austria, British Isles, the Czech Republic, Estonia, Germany, The Netherlands, Norway, Poland and Switzerland), this culmicolous species is not uncommon on *Eriophorum* in bogs when sought. Unlike the following two species, spermodochidia are absent from the culms within which the sclerotia develop. The fungus is also recorded from several arctic *Eriophorum* spp. in northern Canada and the first author has also made collections in the French Alps on *Eriophorum latifolium* HOPPE.

***Myriosclerotinia duriaeana* (TUL. & TUL.) BUCHW.**, Friesia **3**(4): 299-301, 1947.

Common synonym: *Sclerotinia duriaeana* (TUL. & TUL.) REHM.

Anamorphs (Microconidial): *Myrioconium ambiens* (DESMAZ.) VON HOEHNEL.

(Sclerotial): *Sclerotium nigricans* SACC.

Type locality: France, near Bazas, as *Peziza duriaeana* in culms of *Carex arenaria* L.

Carex brizoides - apothecium on sclerotium within culm bearing paired spermodochidia with many other culms, bearing similar spermodochidia, split open with their sclerotia ejected:

Croatia: near Petrinja, Kotar Forest, (3296) leg. J. T. P. & M. T., 19.8.1967 as a single sclerotium within a bleached culm bearing paired spermodochidia in a desiccated but normally wet *Quercus robur* wood with a single apothecium (3351) developed in natural culture and harvested 9. 5. 1968.

| Coll. | Asci | Ascospores |
|-------|---------------------------|--------------------------------------|
| 3351 | (04) 160-170 x 7.5-9.9 µm | (20) 10.2-12.4-13.8 x 5.1-5.8-6.7 µm |

This species has been confused with the following and from which it differs by the characteristically paired spermodochidia on the culm wall and the ascospore shape.

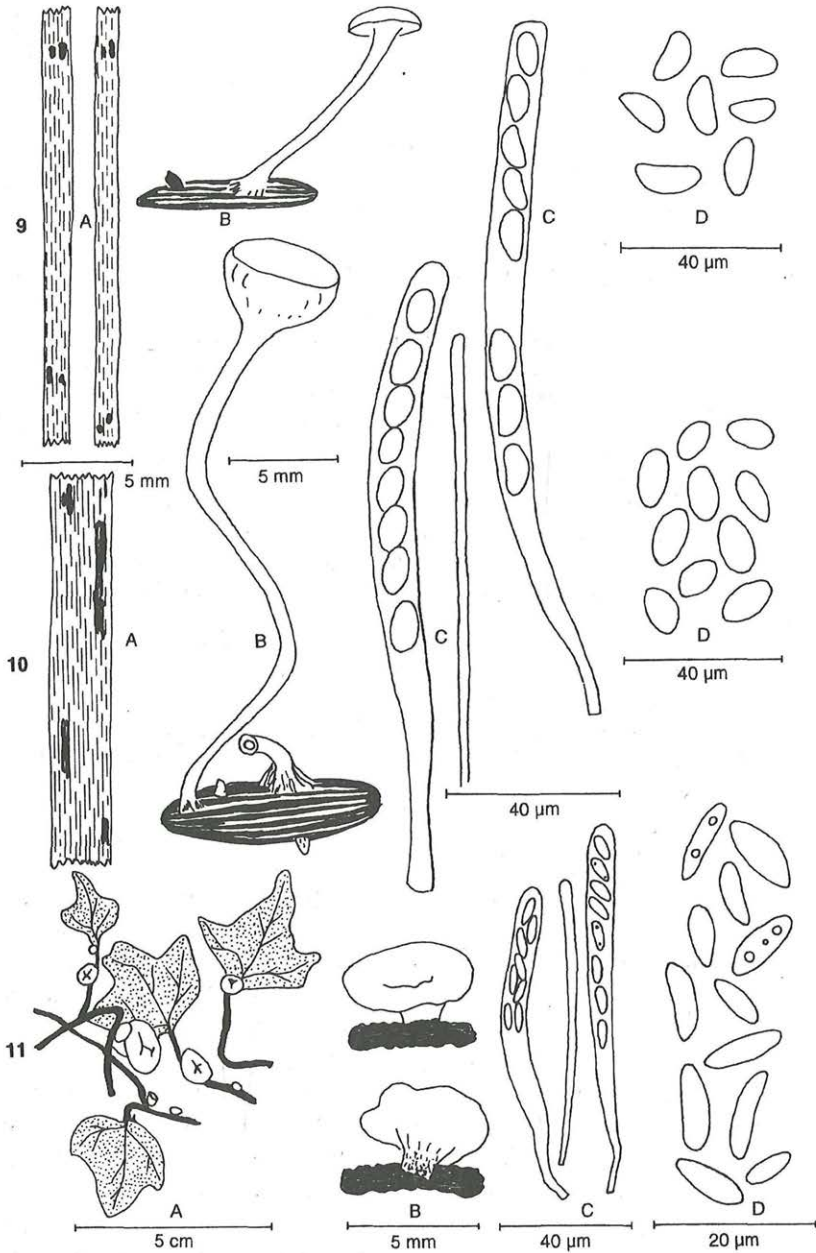


Fig. 9. *Myriosclerotinia duriaeana* (3296): A *Carex brizoides* culms with paired spermodochidia; (3351): B apothecia on loose sclerotium; C ascus; D ascospores. - Fig. 10. *Myriosclerotinia sulcatula* (3620): A *Carex spec.* culm with irregularly distributed spermodochidia; (3817): B apothecia on loose sclerotium; C ascus and paraphysis; D ascospores. - Fig. 11. *Pycnopeziza sejournei* (4825): A apothecia on dead leaves and stems of *Hedera helix*; B upper and under views of apothecium on dead stem; C asci and paraphysis; D ascospores.

Recorded on various *Carex* spp. from Europe (Belgium, British Isles, Denmark, France, Germany, Norway and Switzerland), the fungus is also known from Greenland and North America, where SCHUMACHER & KOHN (1985) also report it on the arctic *Eriophorum scheuchzeri* HOPPE.

***Myriosclerotinia sulcatula* SCHUM. & KOHN**, *Canad. J. Bot.* **63**: 1630-1632, 1985.

Common synonym: *Sclerotinia sulcata* WHETZEL.

Anamorphs (Microconidial): *Myrioconium affine* (DESMAZ.) BUCHWALD.

(Sclerotial): *Sclerotium sulcatum* ROBERGE.

Type locality: USA, New York, McLean Preserve, on *Carex elata* ALL. as *C. stricta* GOODEN.

Carex spec. - sclerotia within pale-coloured culms bearing irregularly situated linear spermodochidia with other culms, bearing similar spermodochidia, split open with their sclerotia dispersed:

Slovenia: Kranjska Gora, between Podkoren and Rateče, source of the River Sava, (3520) leg. J. T. P. & M. T., 5. 9. 1969 as sclerotia with apothecia developed in natural culture (3817) and harvested 5. 5. 1970; - nearer Podkoren, (3521) leg. J. T. P. & M. T., 6. 9. 1969 as sclerotia with no apothecia produced in natural culture; - nearer Rateče, (3522) leg. J. T. P. & M. T., 6. 9. 1969 as sclerotia with no apothecia produced in natural culture; - Šmarje, southeast of Ljubljana, (3528) leg. J. T. P. & M. T., 7. 9. 1969 as sclerotia with no apothecia produced in natural culture.

Carex brizoides - pale culms with typical spermodochidia but sclerotia dispersed:

Croatia: near Petrinja, Kotar Forest, (3297) leg. J. T. P. & M. T., 19. 8. 1967 in a desiccated, normally very wet *Quercus robur* wood.

Carex (?) *nigra* - pale culms with typical spermodochida but sclerotia dispersed:

Croatia: Zaprešić, Dubravica near the River Sutla, *Sphagnum* bog in wood, (3530) leg. J. T. P. & M. T., 9. 9. 1969.

Carex ? *pendula* - single sclerotium in pale culm bearing typical spermodochidia:

Slovenia: near Krško, Krakovski gozd (forest) near Kostanjevica na Krki, forest ditch, (4221) leg. J. T. P. & M. T., 24. 9. 1977, with no apothecia produced and sclerotium deteriorating in natural culture.

| Coll. | Asci | Ascospores |
|-------|---|---|
| 3817 | (10) 121-147-174 x 7.8-9.3-12.7 μ m | (20) 10.0-11.2-13.8 x 4.8-5.6-6.3 μ m |

This is the most common culm-inhabiting species on *Carex*, confused with the preceding but readily recognized by the irregular distribution of the linear spermodochidia on the host culm and ascospore shape and reported in Europe from the British Isles, Denmark, France, Germany, Hungary, The Netherlands, Norway, Poland, Sweden, and Switzerland. Originally described from France as the anamorph *Sclerotium sulcatum* ROBERGE, with the teleomorph published as *Sclerotinia sulcata* WHETZEL, a nomen nudum as no Latin diagnosis was given, but by which name it has been generally reported, publication of a new name was necessary. The occurrence of culms bearing the paired spermodochidia of the rarer *M. duriaeana*, intermixed with those bearing the characteristic spermodochidia of *M. sulcatula* at Petrinja, did raise some doubts about their separate identities but the differently shaped spores appear to be conclusive.

***Pycnopeziza sejournei* (BOUD.) WHITE & WHETZEL**, *Mycologia* **32**: 616, 1940.

Type locality: France, Forêt de Blois on leaves of *Hedera helix* as *Peziza*.

Hedera helix - old leaves and stems:

Croatia: Vrbovsko, Gorica Forest near Gomirje, 400 m west of source of Ribnjak stream, about 10 apothecia, 5-11 mm diam., on dead leaves and stems, (4825, MAT. 2/484) leg. N. M., 14. 5. 1988; - Zagreb, Maksimir Park, a single apothecium on an unknown blackened stem or petiole, probably *H. helix*, (4837, MAT. 2/1227) leg. Z. T., 3. 3. 1990.

| | Asci | Ascospores |
|------|----------------------------------|-------------------------------------|
| 4825 | (10) 91-101-110 x 5.0-6.6-8.0 µm | (20) 8.1-10.6-12.8 x 2.4-3.2-4.0 µm |
| 4837 | (10) 84-92-112 x 4.0-5.6-6.4 µm | (20) 8.0-9.8-11.6 x 3.2-5.2-5.6 µm |

Pycnopeziza sejournei, confused by VON HOEHNEL (1918) with *Lambertella tetrica* (QUÉL.) DUMONT, which also occurs on *Hedera helix* stems but is a completely different fungus with smaller, coloured spores, appears to be known from relatively few collections: the type as *Peziza* (BOUDIER 1881) and two further finds as *Phialea* (GRELET 1948) in France, one as *Ombrophila* (REHM 1915) and two as *Pycnopeziza* (HÄFFNER 1984, with a good, illustrated account) in Germany, one in Portugal as *Peziza* (ALMEIDA & CÂMARA 1909), with OBS.: "Ascoma minore, 1 mm lat.", which is rather small as published measurements indicate 3-8 mm diam. with the Croatian apothecia reaching 11 mm diam., and two as *Pycnopeziza* (WHETZEL & WHITE 1940) in Switzerland with three further, so far unpublished, Swiss collections, two by Mr P. BLANK and one by Mr W. MATHEIS. The description and illustration for the report of *P. sejournei* on *H. helix* in India in THIND & SAINI (1967) indicate some other species.

The genus *Pycnopeziza* was established by WHITE & WHETZEL (1938) for two discomycetes with an *Acarosporium* pycnidial anamorph: *P. sympodialis* (BUBÁK & VLEUGEL) WHITE & WHETZEL on buds and catkins of several trees and *P. quisquilaris* (ELLIS & EVERH.) WHITE & WHETZEL on *Acer* buds. WHETZEL & WHITE (1940) added *Pycnopeziza pachyderma* (REHM) WHETZEL & WHITE, as an earlier name for *P. quisquilaris*, with *P. sejournei* (BOUD.) WHETZEL & WHITE on *Hedera helix* stems on the grounds for the latter that, although they found no conidial anamorph, the "apothecial features nevertheless seem to indicate a close relationship".

No signs of pycnidia were found on the material we have examined and, so far as we have been able to ascertain, neither in the previously mentioned collections. SCHUMACHER (1990) discussed *P. sejournei* during his revision of *Pseudociboria umbrina* KANOUSE and wrote "Judged from the original description of *Peziza* (*Phialea*) *sejournei* of BOUDIER's (1881, 1910), I can see no good characteristics that would indicate a close relationship to *Pycnopeziza*. On the other hand, the brown, sessile apothecia and the presence of heavily melanized paraphyses of the hymenium in my opinion should justify a comparison with *Pseudociboria* (see also BOUDIER 1910, pl. 484)."

Whilst *Hedera helix* was not observed in the vicinity by the collector, with the substrate thought to be a petiole and March appearing somewhat early, the single apothecium of 4837 has been included on account of the close resemblance to the apothecia of 4825.

***Rutstroemia firma* (PERS.: FR.) KARSTEN**, Bidr. Finl. Nat. Folk. 19: 108-109, 1871.

Type locality: ? Germany.

Quercus spp. - fallen branches and twigs but also reported from other trees.

Quercus spec. - buried branch in *Alnus*, *Populus* and *Quercus* forest:

Croatia: Križevci, Ratarska šuma (forest), (4829, MAT. 2/607) leg. N. M., 11. 9. 1988.

| Coll. | Asci | Ascospores |
|-------|------------------------------------|--------------------------------------|
| 4829 | (10) 124-139-142 x 7.0-8.4-10.0 µm | (20) 13.6-17.3-22.4 x 4.0-5.8-7.2 µm |

Rutstroemia firma has been widely reported from Europe, as well as the Canary Islands and Nepal, chiefly on twigs etc. of *Quercus* but also of other trees.

***Rutstroemia petiolorum* (ROB. in DESMAZ.) WHITE**, *Lloydia* 4: 197, 1941.

Type locality: France, as *Peziza petiolorum* ROB. in DESMAZ., on petioles of *Fagus sylvatica* leaves.

Fagus sylvatica - apothecia on stromatized petioles of old, fallen leaves:

Bosnia-Herzegovina: Foča, Perućica Virgin Forest in the Sutjeska National Park near Tjentište, (3910) leg. J. T. P., M. T. & S. M., 27. 9. 1977.

Croatia: Delnice, Leska area near Crni Lug in the Risnjak National Park, (3106) leg. M. T., 6. 10. 1966; - near Zagreb, below Sljeme near summit of Mt Medvednica, (3540) leg. J. T. P. & M. T., 12. 9. 1969.

| Coll. | Asci | Ascospores |
|-------|----------------------------------|--------------------------------------|
| 3106 | (10) 90-98-106 x 6.9-8.5-11.4 µm | (20) 11.8-13.5-15.0 x 3.5-3.8-4.2 µm |
| 3540 | (10) 86-97-119 x 7.9-8.7-9.9 µm | (20) 12.9-13.9-16.6 x 2.9-3.7-4.6 µm |
| 3910 | (10) 84-91-100 x 6.0-9.1-11.0 µm | (20) 12.8-14.4-16.8 x 3.6-4.2-4.8 µm |

The species is not uncommon throughout Europe, collected or reported on *Fagus sylvatica* petioles from Austria, the British Isles, Denmark, France, Germany, Greece, Poland and Switzerland. It is well distinguished by its habitat and allantoid, biguttulate ascospores but has been confused with *Rutstroemia sydowiana* on *Castanea* and *Quercus* leaves, with even DESMAZIÈRES (1842) writing "quelquefois aussi sur celles du Chêne et du Châtaignier". However, PALMER (1968) also found it on petioles of *Quercus alba* L. in CUP 25525 from Cayota Lake, New York State, USA, leg. 1. 9. 1936 whilst BATRA & BATRA (1963) reported it on leaves of *Quercus incana* ROXB. (= *Quercus leucotrichophora* A. CAMUS) in India and WHITE (1941) also mentions *Betula* leaves.

***Rutstroemia sydowiana* (REHM in SYDOW) WHITE**, *Lloydia* 4: 200, 1941.

Type locality: Germany, Berlin, on petioles and nerves of decaying leaves of *Quercus robur* (as *Q. pedunculata* EHRH.).

Castanea sativa - apothecia on old, fallen burrs:

Croatia: near Zagreb, Medveščina area on slopes of Medvednica, minute apothecia on spines of woolly, unstromatized burrs, (3538) leg. J. T. P. & M. T., 12. 9. 1969; - near Zagreb, Varoško rebro on Mt Medvenica, mixed *Castanea* and *Quercus humilis* wood, (3272) leg. J. T. P. & M. T., 15. 8. 1967.

Macedonia: 50 km southwest of Skopje, above Gostivar, (2917) leg. C. H., 18. 10. 1965.

Quercus cerris - apothecia on petioles:

Croatia: near Rijeka, Lovran, (3104) leg. M. T., 8. 10. 1966; - near Rijeka, Opatija, (3105) leg. M. T., 7. 10. 1966; - Zagreb, Maksimir Park, (4817) leg. J. T. P. & M. T., 12. 9. 1993.

Quercus cerris - apothecia on a single cupule:

Croatia: Zagreb, Maksimir Park, (4816) leg. J. T. P. & M. T., 12. 9. 1993.

Quercus frainetto - apothecia on petioles and leaf veins:

Croatia: Zagreb, Maksimir Park, (4820) leg. J. T. P. & M. T., 12. 9. 1993.

Quercus humilis - apothecia on petioles:

Bosnia-Herzegovina: Foča, Perućica Virgin Forest in the Sutjeska National Park near Tjentište, (3911) leg. S. M., J. T. P. & M. T., 27. 9. 1977.

Croatia: near Rijeka, Opatija, (4191) leg. M. T., 7. 10. 1966; - near Zagreb, Varoško rebro on Mt Medvednica, mixed *Castanea* and *Quercus humilis* wood, (3294) leg. J. T. P. & M. T., 15. 8. 1967; - near Zagreb, Gračec peak on Mt Medvednica, (3542) leg. J. T. P. & M. T., 13. 9. 1969.

Quercus petraea - apothecia on petioles:

Bosnia-Herzegovina: Sarajevo, Vratca, (3912) leg. S. M., J. T. P. & M. T., 29. 9. 1977.

Croatia: near Zagreb, Medveščina area on lower slopes of Mt Medvednica, (3541) leg. J. T. P. & M. T., 12. 9. 1969.

Macedonia: near Skopje, Mt Vodno, (3103) leg. M. T., 25. 10. 1966.

Quercus robur - apothecia on leaf blades, petioles and cupule pedicel:

Bosnia-Herzegovina: within city area of Sarajevo, (3909) leg. S. M., J. T. P. & M. T., 26. 9. 1977.

Croatia: Zaprešić, Dubravica near the River Sutla, (3531 & 3534) leg. J. T. P. & M. T., 9. 9. 1969; - Jastrebarsko, Lijevo Srđičko near Jamnička Kiselica, (3535) leg. J. T. P. & M. T., 11. 9. 1969; - Zagreb, Maksimir Park, (3552) leg. J. T. P. & M. T., 13. 9. 1969; -- (3557) leg. J. T. P. & M. T., 9. 9. 1969, on pedicel of cupule with acorn galled by the cynipid gall-wasp, *Andricus quercuscalicis*.

Slovenia: Bled, northeastern side of Blejsko jezero, (3526) leg. J. T. P. & M. T., 7. 9. 1969 with apothecia on petioles and occasionally on leaf blades.

| Coll. | Asci | Ascospores |
|-------|--------------------------------------|--------------------------------------|
| 2917 | (06) 114-120-133 x 14.0-15.0-15.7 µm | (13) 10.0-13.7-18.4 x 4.3-6.5-8.6 µm |
| 3103 | (04) 116-130 x 8.3-9.6 µm | (10) 11.4-12.3-13.8 x 5.7-6.1-6.3 µm |
| 3104 | (06) 112-130 x 12.0-14.3 µm | (10) 10.2-11.9-13.7 x 5.7-5.9-6.3 µm |
| 3105 | (10) 120-139-160 x 6.4-9.2-11.8 µm | (10) 11.3-12.4-13.1 x 5.8-6.6-7.4 µm |
| 3272 | (10) 106-121-135 x 8.1-9.7-10.8 µm | (20) 10.6-12.3-13.9 x 4.6-5.8-6.5 µm |
| 3294 | (10) 98-115-135 x 9.9-11.1-12.0 µm | (20) 9.4-11.1-12.0 x 4.6-6.1-7.4 µm |
| 3526 | (10) 119-127-138 x 8.0-10.9-13.8 µm | (20) 11.6-13.0-15.0 x 4.6-5.2-6.6 µm |
| 3531 | (10) 84-96-104 x 9.0-9.9-11.0 µm | (10) 10.6-12.8-18.8 x 4.8-5.5-5.7 µm |
| 3534 | (10) 100-107-114 x 9.4-10.1-11.8 µm | (20) 11.3-12.5-13.4 x 4.2-5.8-7.4 µm |
| 3535 | (10) 95-107-116 x 9.8-11.4-14.5 µm | (20) 11.9-13.3-14.8 x 4.4-5.5-6.9 µm |
| 3538 | (10) 106-117-142 x 10.8-12.6-14.2 µm | (10) 11.5-13.6-15.6 x 5.5-6.0-6.5 µm |
| 3541 | (10) 111-118-126 x 8.4-11.0-11.8 µm | (20) 11.5-13.9-15.7 x 4.5-7.2-8.3 µm |
| 3542 | (10) 111-116-120 x 8.4-10.2-12.7 µm | (20) 12.3-13.7-15.1 x 5.5-6.6-8.7 µm |
| 3552 | (10) 112-122-132 x 8.8-10.0-12.4 µm | (20) 10.1-12.5-13.9 x 4.9-6.2-9.1 µm |
| 3557 | (10) 96-115-118 x 9.8-12.4-13.7 µm | (20) 11.9-13.3-15.6 x 4.6-6.0-7.4 µm |
| 3909 | (10) 100-110-116 x 6.0-10.3-12.0 µm | (20) 11.2-13.9-16.0 x 5.2-6.3-7.2 µm |
| 3911 | (02) 96-100 x 8 µm | (20) 9.6-11.9-14.4 x 4.8-6.2-7.2 µm |
| 3912 | (10) 105-113-122 x 6.0-9.0-11.0 µm | (20) 9.8-11.8-13.6 x 4.8-6.4-8.0 µm |
| 4191 | (08) 117-145 x 7.8-9.5 µm | (10) 10.3-12.3-14.0 x 5.4-5.8-6.5 µm |
| 4816 | (10) 110-114-123 x 6.0-8.6-10.0 µm | (20) 10.4-14.1-15.5 x 4.8-5.7-7.0 µm |
| 4817 | (10) 106-118-134 x 8.0-9.8-12.0 µm | (20) 10.4-12.0-15.7 x 4.0-5.4-7.2 µm |
| 4820 | (10) 116-122-132 x 8.0-9.6-12.0 µm | (10) 12.0-13.7-16.0 x 5.1-6.3-7.6 µm |

Widely distributed throughout Europe, chiefly on the petioles of old, fallen leaves and occasionally burrs of *Castanea sativa* and cupules of *Quercus* spp., *R. sydowiana* is known from collections made or reported from Andorra, Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, The Netherlands, Poland, Russia, Spain, Switzerland and Turkey with two records from the Canary Islands. WHITE (1941) stated that it occurs on leaves of *Quercus* spp. and *Acer* spec. in the USA whilst MATHEIS (1976) reports a collection on a *Fagus sylvatica* petiole. *Quercus frainetto* and *Q. humilis* appear to be hitherto unreported host species.

***Sclerotinia sclerotiorum* (LIBERT) DE BARY**, Vergl. Morph. Biol. Pilze: 22, 1884.

Type locality: The Ardennes region of Belgium.

Helianthus tuberosus or *Solidago* spec. - apothecia on sclerotia in rotting stems:

Croatia: Zagreb, bank of River Sava at Petruševac, (4865, MAT. 2/1994) leg. N. M., 1. 5. 1993.

| Coll. | Asci | Ascospores |
|-------|------------------------------------|-------------------------------------|
| 4865 | (10) 122-130-140 x 7.0-8.9-10.0 µm | (20) 9.7-11.7-14.4 x 4.2-5.5-7.2 µm |

Sclerotinia sclerotiorum is an important plant pathogen with a world-wide distribution, reported from very many hosts, including *Helianthus tuberosus*. Whilst there are numerous records for economic crops with the literature very extensive, it is less often reported from the wild.

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