

## Lichenicolous fungi from the Czech Republic II. *Arthrorhaphis arctoparmeliae* spec. nov. and some new records for the country

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**Abstract:** KOCOURKOVÁ, J. & VAN DEN BOOM, P. P. G. 2005. Lichenicolous fungi from the Czech Republic II. *Arthrorhaphis arctoparmeliae* spec. nov. and some new records for the country. – *Herzogia* 18: 23–35.

A new lichenicolous fungus, *Arthrorhaphis arctoparmeliae* is described. *Toninia talparum* is recorded as new to Europe, *Endococcus verrucisporus*, *Everniicola flexispora* and *Unguiculariopsis lesdainii* are new for Central Europe and 17 additional lichenicolous fungi are first records for the Czech Republic: *Arthonia digitatae*, *Dactylospora attendenda*, *Lettauia cladoniicola*, *Lichenochora* aff. *epimarmorata*, *Lichenonium lichenicola*, *Merismatium heterophractum*, *Milospium lacoizquetae*, *Muellerella triseptata*, *Phoma lecanorae*, *Stigmatidium microspilum*, *S. squamariae*, *Syzygospora bachmannii*, *Taeniolella punctata*, *Tremella lichenicola*, *Trichonectria anisospora*, *Zwackhiomyces calcariae* and *Z. physciicola*.

**Zusammenfassung:** KOCOURKOVÁ, J. & VAN DEN BOOM, P. P. G. 2005. Lichenicole Pilze aus Tschechien II. *Arthrorhaphis arctoparmeliae* spec. nov. und einige Erstnachweise für das Land. – *Herzogia* 18: 23–35.

Der lichenicole Pilz *Arthrorhaphis arctoparmeliae* wird neu beschrieben. *Toninia talparum* wird erstmals aus Europa gemeldet, *Endococcus verrucisporus*, *Everniicola flexispora* und *Unguiculariopsis lesdainii* sind neu für Mitteleuropa und 17 weitere flechtenbewohnende Pilze sind neu für Tschechien: *Arthonia digitatae*, *Dactylospora attendenda*, *Lettauia cladoniicola*, *Lichenochora* aff. *epimarmorata*, *Lichenonium lichenicola*, *Merismatium heterophractum*, *Milospium lacoizquetae*, *Muellerella triseptata*, *Phoma lecanorae*, *Stigmatidium microspilum*, *S. squamariae*, *Syzygospora bachmannii*, *Taeniolella punctata*, *Tremella lichenicola*, *Trichonectria anisospora*, *Zwackhiomyces calcariae* und *Z. physciicola*.

**Key words:** Biodiversity, Ascomycetes, Deuteromycetes, Basidiomycetes.

### Introduction

In the most extensive and recent publicatio on lichenicolous fungi from the Czech Republic, 156 species are treated (KOCOURKOVÁ 2000). Since this publication several additional lichenicolous fungi have been found and are published in the annotated list below. Some of these were found during a one week field trip to western Bohemia by the second author in the autumn of 2003 and also during an excursion of both authors together in the autumn of 2004. Additional new records for the Czech Republic originating from previous field studies by the first author are also included.

### Material and methods

Samples obtained by J. Kocourková are deposited in PRM, by B. & P. van den Boom in a private herbarium (hb Boom).

Specimens have been identified using standard microscopical techniques. Macrophotographs and microphotographs were taken with a digital camera Olympus C5050 on Olympus SZX 9

Stereomicroscope and Olympus BX 50 (to  $\times 1250$ ) fitted with a Nomarski differential interference contrast.

The nomenclature of host lichens follows HAFELLNER & TÜRK (2001). Author's abbreviations follow BRUMMITT & POWELL (1992). The abbreviation "BR Křivoklátsko" is used for the area of the Biosphere Reserve Křivoklátsko.

## Results

### *Arthonia digitatae* Hafellner

This recently described species (HAFELLNER 1999), was so far known only from six localities in Austria. However, the species has probably been overlooked in other parts of Europe. Apothecia of the fungus occur on squamules of *Cladonia digitata*. They are very inconspicuous and the infection rather suggests damage by a dematiaceous hyphomycete. When well developed, the apothecia are slightly convex and confluent. The species was recently reported from Luxembourg as well (SÉRUSIAUX et al. 2003), from podetia of a different host (*Cladonia subulata*). According to these authors this fungus may represent a different species and additional material of the taxon should be studied. Most recently, the species was found on the type host during a post congress excursion (IAL 5) in southern Estonia by the first author (APTROOT et al. 2005).

Northern Bohemia, Jizerské hory Mts., Distr. Jablonec nad Nisou, Mt. Jizera, Prales Jizery nature reserve, on trunk of *Picea abies*, on *Cladonia digitata*, 1065 m, MTB 5257, 9.X.1999, J. Kocourková (PRM 760569).

### *Arthrorhaphis arctoparmeliae* Kocourková et P.Boom **spec. nov.** (Figs 1–6)

Species lichenicola in thallus *Arctoparmelia incurvae*, insignis ascomatibus sessilibus, basim angustatis, atris, ad 0.35 mm diam., margine elevato; hymenium hyalinum, inspersum; paraphyses ramosae, 1.2–1.7  $\mu\text{m}$  crassae; asci clavati vel subcylindrici; ascospores 6 nae aciculares vel bacillares, hyalinae, 12–17 septatae, (60–)65–100(–110)  $\mu\text{m}$  longae, (3–)3.5–5(–5.5)  $\mu\text{m}$  latae, curvatae. Pycnidia non visa.

**Type:** Czech Republic, Southern Bohemia, Šumava Mts., Distr. Prachatice, near Popelná, valley of Losenice brook, on south-facing slope of Mt Šafářův vršek, in granite boulder scree, on *Arctoparmelia incurva*, 850 m, MTB 6947, 20.X.1999, J. Kocourková & A. Vězda (PRM 842998 – holotype).

Thallus, prothallus and mycelium not observed, hyphae indistinct inside the thallus of the host. Ascomata (0.15–)0.25–0.35(–0.4) mm wide, for a long time globose and closed, later conical, sessile, slightly to strongly constricted at base, roundish to irregular, flexuose or angular, black; margin prominent, up to 60(–80)  $\mu\text{m}$  wide. Exciple dark olivaceous brown to blackened, 20–25  $\mu\text{m}$  wide, only 10  $\mu\text{m}$  at base, without an ascomatal wall at the base when mature. Hamathecium of paraphyses 1.2–1.7  $\mu\text{m}$  wide, anastomosing, pale olivaceous, interspersed with yellow oil droplets, which later become crystallized. Hymenium hyaline, 200–250  $\mu\text{m}$  high. Hypothecium hyaline or pale aeruginose. Asci usually 6-spored, rarely 4- or 8-spored, clavate to subcylindrical, 110–135  $\times$  14–17  $\mu\text{m}$ , thin walled throughout, with a small tholus or ocular chamber, which is not always well developed. Ascospores hyaline, parallel in ascus, (60–)65–100(–110)  $\times$  (3–)3.5–5(–5.5)  $\mu\text{m}$ , 12- to 17-septate, acicular, often slightly curved, sometimes straight or rod-shaped. Pycnidia not seen.

**Chemistry:** Aeruginose pigment in apothecium (epithecium, excipulum), decolourized in K, N-.

**Distribution and ecology:** The new species is known from three localities in southern Bohemia. It occurs in some of the best preserved sites of Bohemia. All localities consist of granite boulder screes in open places in forests. Our study provides a further argument for an official protection status for these sites. The saxicolous lichen flora is luxuriant with most lichen communities well developed, including *Cladonia amaurocraea*, *C. macrophylla*, *C. stellaris* besides *C. stygia* (very common), *Fuscidea cyathoides*, *Micarea leprosula*, *M. sylvicola* and *Rhizocarpon eupetraeum*. On rotting stumps among boulders, a.o. *Hertelidea botryosa*, *Lecania furfuracea*, *Lecanora hypoptella*, *Micarea micrococum*, *Pycnora praestabilis* and *P. sorophora* have been found.

**Notes:** *Arthrorhaphis arctoparmeliae* is only known from *Arctoparmelia incurva*. It is a strongly parasitic fungus. It causes concentric infection spots on the host thallus that spreads from the central part of the thallus. Finally the host tissue is killed. Ascomata are formed on living to nearly dead blackened tissue, which falls off together with the ascomata. Ascomata are formed on the thallus, including the soralia.

The new species was observed over a period of two years, in spring and in autumn. Mature spores were observed only in late autumn. In the type-locality the species is very abundant on the host thalli and comparatively widespread; it occurs on practically every thallus.

In the most recent extensive treatment of the genus *Arthrorhaphis* (OBERMAYER 1994), four lichenicolous species are recognized, all associated mainly with *Baeomyces rufus*. One species, *A. muddii* W.Obermayer, is known from *Dibaeis baeomyces*. The two other species of the genus, *A. aeruginosa* R.Sant. & Tønsberg and *A. olivaceae* R.Sant. & Tønsberg, develop without an autonomous thallus and are known from the hosts *Cladonia* spp. and *Melanelia* spp. They have been described by SANTESSON & TØNSBERG (1994). *Arthrorhaphis aeruginosa* differs from *A. arctoparmeliae* in having longer and somewhat narrower, straight ascospores that are more septate, thinner paraphyses, 8-spored asci and abundant pycnidia. It is known from several species of *Cladonia*, a different host genus. *Arthrorhaphis olivaceae* differs in its hymenium without oil droplets, longer ascospores (100–135 µm), 8-spored asci and a different host genus (*Melanelia*). *Arthrorhaphis muddii* differs in having larger apothecia (300–500 µm in diameter instead of 250–350 µm in our species), in shorter and narrower asci (90–130 × 12 µm instead of 110–135 × 14–17 µm), in the number of spores per ascus (regularly 8-spored instead usually 6-spored, rarely 4- or 8-spored in *A. arctoparmeliae*) and in its different ecology and type of infection. The host-genus of *A. muddii* is *Dibaeis*.

The new species has been found mixed with two other lichenicolous fungi that most probably belong to the genera *Lichenostigma* and *Sphaerellothecium*. That material, however, need further study.

**Additional specimens examined** (all on *A. incurva*): **Czech Republic**: Southern Bohemia, Šumava Mts., Distr. Prachatice, near Popelná, valley of Losenice brook, on south-facing slope of Mt Šafářův vršek, in granite boulder scree, 810–830 m, MTB 6947, 5.IX.1998, J. Farkač (PRM 765798); ibidem 19.V.1999, J. Kocourková & P. Kocourek (PRM 765799); ibidem. 23.X.2003, P. & B. van den Boom 31780 (hb Boom); SSE of Klatovy, Národní park, E of Srní, NW of Turnerova chata, along stream Vydra, SW exposed scree, on granite boulders, 750 m, 21.X.2003, P. & B. van den Boom 31666, 31688 (hb Boom); W of Vyšší Brod, Čertova stěna, right side of Vltava, W exposed scree, surrounded by a *Pinus* forest, 650 m, 25.X.2004, P. & B. van den Boom 33821 (hb Boom); ibidem 26.X.2004, P. van den Boom 33849 (hb Boom), W. von Brackel & J. Kocourková (PRM 789777).

#### **Specimen compared:**

*Arthrorhaphis muddii* Obermayer

Southern Bohemia, Šumava Mts., Distr. Prachatice, Volary, Nové Údolí, a sandy quarry c. 0.5 km ENE from the railway-stop, 48°50'N, 13°48'E, on *Dibaeis baeomyces*, 805 m, MTB 7249; 17.X.1998, J. Kocourková & Z. Palice (PRM 758488, hb Palice).

#### ***Dactylospora attendenda* (Nyl.) Arnold**

The species was originally described from Russia by Nylander under the name *Lecidea attendenda* (NYLANDER 1866). It is widely distributed in the northern hemisphere. The species was treated in detail by TRIEBEL (1989), who reported it on members of Lecideaceae, Porpidiaceae and Stereocaulaceae (*Amygdalaria consentiens*, *A. pelobotryon*, *Pilophorus acicularis*, *P. awasthianus*, *P. cereolus*, *P. calvatus*, *P. dovrensis*, *Porpidia flavocaerulescens*, *P. melinodes*) from Iceland, Finland, Norway, Russia, Sweden, Nepal, Japan and the U.S.A. The species has also been reported from Austria (HAFELLNER & MAGNES 2002, HAFELLNER et al. 2004), Cyprus (LITTERSKI & MAYRHOFER 1998, 2000), Great Britain (HITCH 1993) and from Canada (ALSTRUP & COLE 1998). The fungus was reported from the host *Icmadophila ericetorum* by IHLEN (1998), ALSTRUP & COLE (1998) and HAFELLNER & MAGNES (2002). The Czech record represents an additional record of *Dactylospora attendenda* on this latter host.

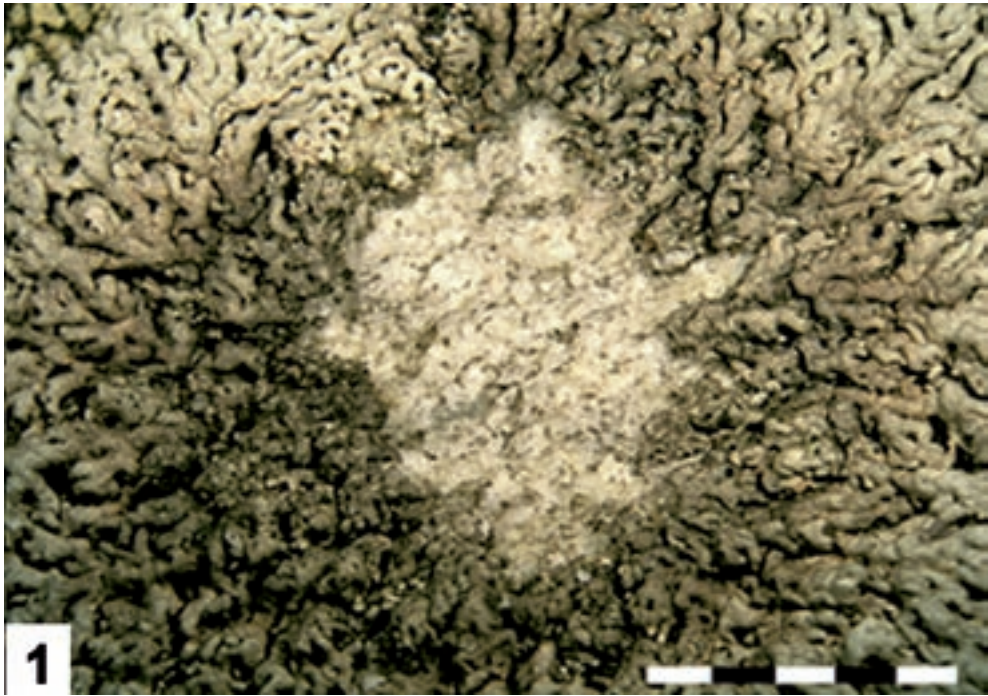
Western Bohemia, SSE of Klatovy, Národní park, E of Srní, W side of Vydra, Mnich, E exposed slope with *Betula-Picea* forest, on *Pinus sylvestris* trunk, on *Icmadophila ericetorum*, 750 m, 21.X.2003, P. & B. van den Boom 31729 (hb Boom).

#### ***Endococcus verrucisporus* Alstrup ("verrucosporus")**

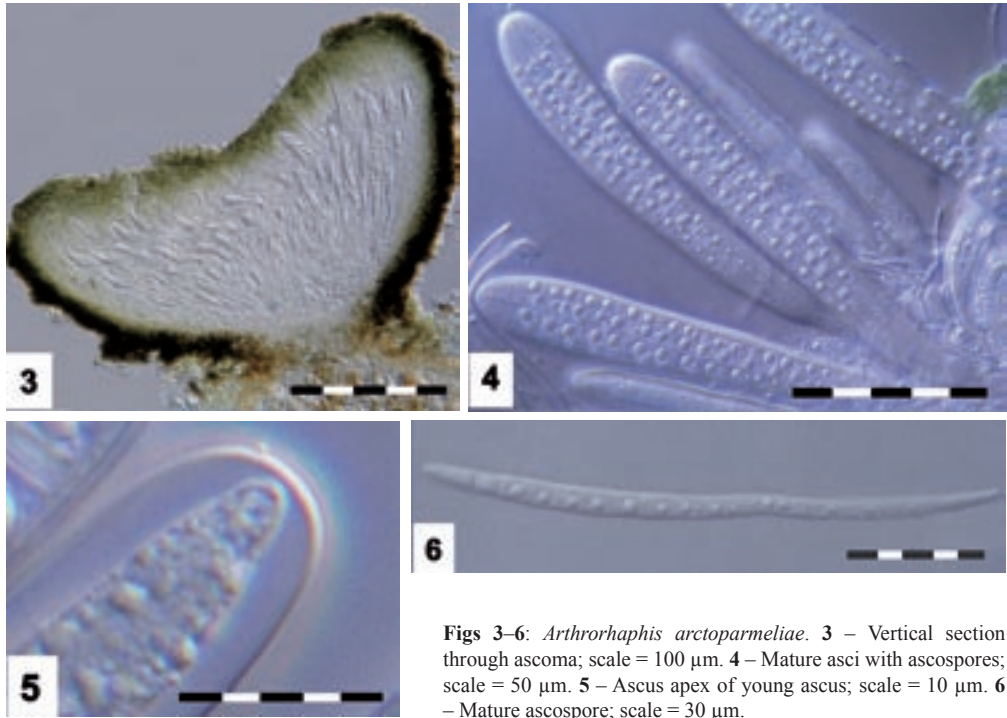
New for Central Europe.

This species was originally described from *Ionaspis lacustris* collected on the Faeroe Islands (ALSTRUP et al. 1994) and until now it has been found in Norway (ALSTRUP 1997), Belgium (SÉRUSIAUX et al. 1999), Ireland (HITCH 2000) and Great Britain (HITCH 2000, ORANGE 2002).

Northern Bohemia, Jizerské hory Mts, settlement Jizerka, the Jizerka brook in meadow below NW slope of Bukovec Mt, on gneissaceous boulders in brook, on *Ionaspis lacustris*, 840 m, MTB 5158 C11, 3.VI.2000, J. Kocourková (PRM 765797).



Figs 1, 2: *Arthrorhaphis arctoparmeliae*. 1 – Habitus of infected host thallus of *Arctoparmelia incurva*; scale = 200 mm. 2 – Ascomata on host thallus; scale = 0.5 mm.



**Figs 3–6:** *Arthrorhaphis arctoparmeliae*. **3** – Vertical section through ascoma; scale = 100  $\mu\text{m}$ . **4** – Mature asci with ascospores; scale = 50  $\mu\text{m}$ . **5** – Ascus apex of young ascus; scale = 10  $\mu\text{m}$ . **6** – Mature ascospore; scale = 30  $\mu\text{m}$ .

***Everniicola flexispora*** D.Hawksw.

New for Central Europe.

*Everniicola flexispora* was originally described from the host *Evernia prunastri* in the British Isles (HAWKSWORTH 1982). It was later reported from the host *Nephroma arcticum* from Canada, Finland, Greenland, Norway, Sweden and the U.S.A. (ALSTRUP & HAWKSWORTH 1990), and Norway (HAFELLNER 1993), and it has also been found on *Usnea subfloridana* in the British Isles (HITCH 1996). The species is also known from Spain (MARCOS 1993, on *E. prunastri*) and Russia (ZHURBENKO 2004, on *N. arcticum*). It has been distributed in Santesson's Fungi lichenicoli exsiccati 165, 179 and 235 (SANTESSON 1994a, 1994b).

*Dimelaena oreina* extends the host spectrum of *E. flexispora*. Among the collections of the first author there are also samples on *Aspicilia cinerea* and *Xanthoparmelia conspersa*. The conidia on these hosts deviate in some characters, mainly in the smaller size (only  $4\text{--}6 \times 1\text{--}1.5 \mu\text{m}$  instead of  $8\text{--}10\text{--}11.5 \times 1.5\text{--}2 \mu\text{m}$  on *E. prunastri* or  $7\text{--}8 \times 1.5\text{--}2 \mu\text{m}$  on *Nephroma arcticum*). An additional collection is also on *Pertusaria lactea*. Further studies should be carried out with additional material to see if there are different taxa on such unrelated hosts growing in very different habitats.

Central Bohemia, Praha, Dolní Liboc, Divoká Šárka nature reserve, on lydite rocks, on *Dimelaena oreina*, 320 m, MTB 5951, 25.XI.1998, J. Kocourková (PRM 892626).

***Lettauia cladoniicola*** D.Hawksw. & R.Sant.

In Europe, this species was previously known from the following countries: Germany, Sweden (HAWKSWORTH & SANTESSON 1990), Denmark (ALSTRUP 1993), Norway (IHLEN 1997), Finland (SANTESSON et al. 2004) and the British Isles (HITCH 1998, 2000). Data from North America were published by IHLEN & TØNSBERG (1996) as well as by DIEDERICH (2003). The host species are *Cladonia amaurocraea*, *C. arbuscula*, *C. azorica*, *C. portentosa* and *C. rangiferina*. *Cladonia stellaris* represents a new host for this species.

Southern Bohemia, Šumava Mts., Distr. Prachatice, near Popelná, valley of Losenice rook, on south-facing slope of Mt Šafářův vršek, in granite boulder scree, on *Cladonia stellaris*, c. 850 m, MTB 6947, 20.X.1999, J. Kocourková (PRM 765787).

***Lichenochora* aff. *epimarmorata* Nav.-Ros.**

NAVARRO-ROSINÉS & ETAYO (2001) provided a key to the species of *Lichenochora* growing on Teloschistaceae that brought us to question the identity of a fungus kept for long time in the herbarium of the first author under the name *Lichenochora xanthoriae* Triebel & Rambold. The fungus is, in fact, much more similar to *Lichenochora epimarmorata*, known from Cataluña in Spain (NAVARRO-ROSINÉS et al 1998), with regard to the size of ascomata (180–220 µm) and asci (50–75 × 13–15 µm), and the size and type of spores (12.5–14.6 × (5.5–)6–7.3 µm without a clear torus). *Lichenochora epimarmorata*, however, produces clusters of perithecioid ascomata on the apothecial discs of *Caloplaca marmorata*, whereas our species lives on *C. crenulatella*, forming microcecidia on the host thallus. Individual or clusters of ascomata burst through these microcecidia. Typical *L. epimarmorata* does not form microcecidia. Both host species of *Caloplaca* are members of the subgen. *Gyalolechia* characterized by a thin sporal septum. Although the species in *Lichenochora* genus are regarded to be strongly host specific and there are differences in the infection characteristics, our species is tentatively better placed in *L. aff. epimarmorata*, rather than under a new name, until more collections become available (Etayo, pers. comm.). Surprisingly, on three of the fungal ascomata checked, anamorphs were found in microscope squash sections. As no conidioma was observed, and no anamorph in the genus *Lichenochora* is known, we assume that the conidial infection grows on the surface of the host thallus. Conidia of this kind (ampulliform, filiform and curved in their upper parts, about 20 µm long and produced on ampulliform conidiogenous cells sitting closely together) are typical of the genus *Fusarium*, a genus probably having many lichenicolous species that have not been studied so far.

Central Bohemia, Praha, Troja, at Vltava River, at canoe slalom course, on top of concrete post, on apothecia and thallus of *Caloplaca crenulatella*, 178 m, MTB 5852, 24.X.1997, J. Kocourková (PRM 760652).

***Lichenocodium lichenicola* (P.Karsten) Petrak & H.Sydow**

This species, the rarest of the genus, is known so far from Finland (the type locality), Germany (DIEDERICH 1986), Luxembourg (DIEDERICH 1989, DIEDERICH et al. 1991), Spain (GIRALT 1996) and also from the Canary Island La Gomera (ETAYO 1996). The species is known from various *Physcia* species, including *P. aipolia*, *P. semipinnata* and *P. tenella*. *Physcia dubia* extends the known host range.

Central Bohemia, Příbram, Kamýk nad Vltavou, in Medná village, on granite boulder in wall, on *Physcia dubia*, 370 m, MTB 6351 D, 16.II.2004, J. Malíček (PRM 765788).

***Merismatium heterophractum* (Nyl.) Vouaux**

*Merismatium heterophractum* was known from Finland, Sweden, Russia, Slovenia (TRIEBEL 1989), Greenland (ALSTRUP et al. 2000, HANSEN 1998), Austria (HAFELLNER et al. 2004) and Alaska (ZHURBENKO & LAURSEN 2003).

*Merismatium heterophractum* was described from *Lopadium disciforme* and also recorded on *Biatora vernalis*, *Biatora subduplex*, *Biatora* sp., *Bilimbia sabuletorum*, *Lepraria neglecta*, *Nephroma arcticum*, and *Cladonia* sp. Despite the wide taxonomical range and ecological variability of hosts, morphologically, our specimens are not significantly variable and all features agree with the description given by TRIEBEL (1989). For comparison, samples on *Biatora subduplex* and *Cladonia* sp. collected in Austria and a sample on *Lecanora* sp. from Estonia were checked.

Northern Bohemia, Jizerské hory Mts, 2.5 km NNE of Bedřichov, nature reserve Nová louka, in peat bog, on dead twigs of *Picea abies*, on *Lecanora conizaeoides*, 760 m, MTB 5156 D20, 16.VII.2001, J. Kocourková (PRM 895929); Klikvová louka nature reserve, in peat bog, on dead branch of standing *Picea abies*, on wood, on thallus of *L. conizaeoides*, 780 m, MTB 5156 D24, 10.IX.2002, J. Kocourková (PRM 765795); Southern Moravia, Moravský kras Landscape Protected Area, Ostrov u Macochy, Balcarka cave, 49°22'593"N/16°45'426"E, on rocks above cave, on low calcareous outcrop at path, over bryophytes, on *Bilimbia sabuletorum*, 453 m, MTB 6666 A15, 16.IX.2003, J. Kocourková (PRM 765796).

Specimens examined for comparison:

**Austria**, Steiermark, Ostalpen, Schladminger Tauern, Schladming, Znachspitze SE above Giglachseehütte S of Schladming, 47°16'30"N/13°38'20"E; NW-overhangs E above Znachsattel, on slightly calcareous micaschist steep cliff, on *Biatora subduplex* and *Cladonia* sp., 2120 m, 8747/2, 27.VIII.2001, J. Kocourková (PRM 900301).

**Estonia**, Põlvamaa Co., Taevaskoja along Ahja river: on *Lecanora* sp., on twigs of *Pinus sylvestris*, 22.VIII.2004, J. Kocourková (PRM).

#### *Milospium lacoizquetae* Etayo & Diederich

So far, this species was reported from the type locality in Spain and also from France, from *Cladonia parasitica* (ETAYO & DIEDERICH 1996, ETAYO 2002). Two additional records from the Czech Republic with a new host species are mentioned here. Recently the first author has also found it in Austria (HAFELLNER et al. 2004).

Northern Bohemia, Jizerské hory Mts, Prales Jizery nature reserve, on moribund standing *Picea abies*, on *Cladonia digitata*, 1065 m, MTB 5257, 19.VIII.2000, J. Kocourková (PRM 760653); Southern Moravia, Moravský kras Landscape Protected Area, 2 km W of Vilémovice, Suchý glen, above locality "Mastný flek", 49°21'40"N/16°43'10"E, scree forest on S-facing slope, on rotting wood, on *Cladonia* sp., 430 m, MTB 6666 A13, 16.V.2003, J. Kocourková (PRM 765794).

#### *Muellerella triseptata* Diederich

The species has already been found in Luxembourg, France and Austria (BERGER 1996), Switzerland (MATZER & HAFELLNER 1990) and Italy (NIMIS & TRETACH 1999), and was collected on *Buellia griseovirens*, *Physcia caesia*, *Biatora helvola* and *Lecanora* cf. *chlarotera*. Iberian specimens growing on *Parmelina quercina* are clearly ornamented with setae near the ostiole and have been named *Capronia triseptata* (Diederich) Etayo (ETAYO 1996), but only more material growing on the type-host *Buellia griseovirens* (the type is very scanty) can solve the problem of generic placement (Etayo, pers. comm.).

Southern Moravia, Moravský kras Landscape Protected Area, Ostrov u Macochy, Balcarka cave, 49°22'593"N/16°45'426"E, on rocks above cave, on low calcareous outcrop at path, over bryophytes, on *Phaeophyscia sciastra*, 455 m, MTB 6666 A15, 16.IX.2003, J. Kocourková (PRM 765793).

#### *Phoma lecanorae* Vouaux

The status of this species is not yet clear. In the new British checklist (HAWKSWORTH 2003), this taxon is mentioned as *Phoma lecanorae* ? = *Opegrapha* sp. <sup>4</sup>. We prefer to use the provisional name *Phoma lecanorae*. It has been found on apothecia of *Lecanora pulicaris*. On the same (small) specimen, an additional fungus, *Phaeosporobolus* sp., has been found also growing on apothecia of this *Lecanora*.

Western Bohemia, Šumava Mts., Distr. Prachatice, Národní park, E of Srní, W bank of Vydra, E exposed mossy outcrops at open places in *Picea-Betula* forest, on *Salix*, on *Lecanora pulicaris*, along Vydra, 750 m, 21.X.2003, P. van den Boom 31713 & Z. Palice (hb Boom).

#### *Stigmatidium microspilum* (Körb.) D.Hawksw.

Beside the recent collection cited below, an old historical specimen of this lichenicolous fungus has been found under the synonymous name *Arthopyrenia microspila* Körb. in PRM. Most probably Rabenhorst's report of this fungus, "Buchen in der Sächs. Schweiz" (RABENHORST 1870, as *Arthopyrenia microspila*), refers to a German locality. *Stigmatidium microspilum* occurs in the following countries: Austria (e.g. GRUBE 1993, SANTESSON 1994a), Belgium (e.g. BOOM et al. 1998), the British Isles (e.g., HAWKSWORTH 2003), Denmark (ALSTRUP et al. 2004) Estonia (RANDLANE & SAAG 1999), France (e.g., BOULY DE LESDAIN 1909), Germany (KÖRBER 1865), Luxemburg (DIEDERICH 1989), Italy (BAGLIETTO & CARESTIA 1879), Poland (e.g., EITNER 1896), Spain (e.g., LONGAN & GÓMEZ-BOLEA 1999), Sweden (SANTESSON 1993), Ukraine (HAWKSWORTH 1992, KONDRATYUK et al. 1998).

Southern Bohemia, Písek, on *Pinus*, on *Graphis scripta*, Dědeček (PRM 694661); Eastern Bohemia, Distr. Náchod, Podorlická pahorkatina Highlands, valley of Metuje River, along path to Peklo settlement, on *Fraxinus excelsior*, on *Graphis scripta*, 320 m, MTB 6356 A, 21.IV.2001, J. Kocourková (PRM 900443).

#### *Stigmatidium squamariae* (de Lesd.) Cl.Roux & Triebel

The species was treated in detail by ROUX & TRIEBEL (1994). According to CALATAYUD & TRIEBEL (1999) and ROUX & TRIEBEL (1994), in Europe, the species has only been reported from the Mediterranean region so far. The Austrian locality and the new Czech localities, however, enlarge the distribution

area and it seems that the species has probably been overlooked. In the Czech Republic the species was found in both cases on S-facing shale rocks in xerothermic localities, on *Lecanora polytropa*. In Europe, *S. squamariae* is found in Austria, Italy and Spain and is known from the hosts *Lecanora muralis*, *L. polytropa*, *L. valesiaca* (WITTMANN & TÜRK 1990, ROUX & TRIEBEL 1994, LLIMONA et al. 1998, HAFELLNER 1999, CALATAYUD & ETAYO 1999).

Central Bohemia, the city of Praha, Motol, Kalvarie in Motol nature reserve, on crest-top of south-facing slope outcrops of rocks along road, on diabase, on *Lecanora polytropa*, 320 m, MTB 5951 B, 8.X.1989, J. Horáková (PRM 896008); the city of Praha, Baba nature reserve, left bank of Vltava River, steep exposed slope of schistaceous rock, on *L. polytropa*, 270 m, MTB 5852C, 22.IX.2002, J. Kocourková (PRM 765791).

***Syzygospora bachmannii*** Diederich & M.S.Christ.

In the paper with the original description (DIEDERICH 1996) this species is mentioned from a wide range of hosts in the genus *Cladonia* (sect. *Cladina*, *Cladonia*, *Cocciferae*, *Ochroleucae*, *Perviae* and *Unciales*) and was reported as a widely distributed species in Europe, as well as from Macaronesia, Canada and Papua New Guinea. It was later reported from the U.S.A. (HAFELLNER et al. 2002), Guyana (SIPMAN 1997) and Panama (DIEDERICH 2003).

Northern Moravia: Moravskoslezské Beskydy Mts., Distr. Frýdek-Místek, between villages Horní Lomná and Dolní Lomná, Mionší nature reserve, at forest path margin below a hillside, on *Cladonia fimbriata* (podetia), 700 m, MTB 6477, 2.X.1999, J. Kocourková (PRM 900286).

***Taeniolella punctata*** M.S.Christ. & D.Hawksw.

This species is apparently confined to the host *Graphis scripta*, and it has been reported from Austria (BERGER & TÜRK 1994), Azores (BERGER & APTROOT 2002) Belgium (BOOM et al. 1998), the British Isles (HAWKSWORTH 2003), Denmark (e.g., HAWKSWORTH 1979), France (e.g., DIEDERICH & ROUX 1991), Germany (e.g., JOHN 1990), Lithuania (MOTIEJŪNAITĖ & ANDERSSON 2003), Luxembourg (e.g., DIEDERICH 1986), the Netherlands (SPARRIUS 2000) and Poland (JANDO & KUKWA 2003).

Eastern Bohemia, Distr. Náchod, Podorlická pahorkatina Highlands, valley of Metuje River, along path to Peklo settlement, on *Fraxinus excelsior*, on *Graphis scripta*, 320 m, MTB 6356 A, 21.IV.2001, J. Kocourková (PRM 900442); Southern Moravia, LPA Pálava, Distr. Břeclav, NNR Ranšpurk, on *Carpinus betulus*, on *Graphis scripta*, 155 m, MTB 7367, 11.X.2000, J. Kocourková (PRM 765792).

***Toninia talparum*** Tindal

New for Europe.

*Toninia talparum*, previously known only from the Pacific coastal areas and a few inland localities in southwestern U.S.A. and northwestern Mexico, is confined to saxicolous species of *Lecania* on acidic or calcareous rocks. Although this *Toninia* species is known from several different *Lecania* species in the Sonoran region, in Europe, this species is limited to *Lecania inundata*. There is no thallus developed. According to the protologue (TINDAL 1991), *T. talparum* develops apothecia up to 1 mm diam. Several *Lecania* specimens from the Pacific coastal areas, which are infected by this *Toninia*, were studied by the second author who found that most apothecia only reach c. 0.5 mm diam. Apothecia in European specimens are up to 0.4(–0.5 mm diam.). The hypothecium is colourless or contains a small pale brownish or brown purplish rim below and there are slightly smaller, exclusively 1-septate spores, 10–14.5 × 4–5.5 µm. The fuscoviolaceous pigment of the excipulum in the European specimens has rarely been found in Pacific specimens.

Three lichenicolous *Toninia* species may occur on saxicolous hosts. *Toninia subfuscae* (Arnold) Tindal differs in having larger apothecia (up to 0.6 mm) and 1–3-septate spores, and it grows on other crustose lichens of the Lecanoraceae such as *Lecanora campestris*, *L. chlarotera*, *L. muralis*, *L. sienae*, *L. horiza* (TINDAL 1991, BOOM 1999), *Lecanora* sp. (HAFELLNER 1996) and *Lecidella scabra* (TINDAL 1991). *Toninia subtalparum* P.Boom, another species on *Lecania*, resembles *T. talparum* but is only known from *L. dudleyi* (Sonoran region) and differs in having longer and wider ascospores, a dark brown hypothecium and a reddish brown excipulum (BOOM 2004).

*Toninia episema* (Nyl.) Tindal is an obligate parasymbiotic fungus occurring in similar habitats but it grows on *Aspicilia calcarea* and has exclusively 1-septate, small ascospores, 10–13 × 3.5–5.5 µm, and a reddish brown hypothecium (TINDAL 1991, BOOM 1999).



Selected specimens examined: **Mexico:** Baja California, west coast between Guerrero Negro and Rosarito, Laguna Manuela 12 km W of Villa Jesús Maria, c. 20–50 m, 28°15'N/114°07'W, hills NW above the beach, on horizontal soil, on *Lecania* sp., 21.II.1993, J. Hafellner 44415 & A. Hafellner (PRM, GZU); WNW of Rosarito, Santa Rosalillita, near punta I. Adelaida, 10 m, 28°39.4'N/114°14.8'W, on *Lecania fructigena*, 20.VII.2000, P. & B. van den Boom 25161 (hb Boom); near Laguna Manuela, 28°15'N/114°07'W, 100 m, on *Lecania fructigena*, 21.II.1993, T. H. Nash III 33968 (ASU, hb Boom). **USA:** California, Santa Barbara Co., St. Barbara, Mission, churchyard, on stones on soil, 200 m, 34°25'N – 119°43'W, on *Lecania* cf. *inundata*, 8.VII.2002, P. & B. van den Boom 28886 (hb Boom). **Czech Republic** (all on *Lecania inundata*): Central Bohemia, Biosphere Reserve Křivoklátsko, Distr. Rakovník, Krakovec, below the Krakovec castle, on spilite rocks, 435 m, MTB 5947 D14, 26.I.1997, J. Kocourková & P. Kocourek (PRM 758540); *ibidem*, on steep slope of Čertova skála rock, on spilite rock, 290 m, MTB 6048 B03, 14.VII.1997, J. Kocourková & P. Kocourek (PRM 765789); Sýkořice, nature reserve Kabečnice, at the basis of shale rocks at the Berounka River, 230 m, MTB 5949; 23.VIII.1998, J. Kocourková & P. Kocourek (PRM 758538); Distr. Beroun, BR Křivoklátsko, near the village of Trubín, on the S slope of Trubínský vrch hill, on diabasic rocks, 340 m, MTB 6050, 21. and 23.III.1997, J. Horáková (PRM 764905); Central Bohemia, the city of Praha, Nová Ves, the Hemrový skály diabasic rocks, 265 m, MTB 5952, 15.IV.1999, J. Kocourková (PRM 765790); the city of Praha, between Butovice and Klukovice, in the Prokopské údolí valley, on the S slope of calcareous rocks above the old swimming pool Holyňské koupaliště, 260 m, MTB 5952, 15.IV.1999, J. Kocourková (PRM 764907); *Ibidem* (PRM 764906); the city of Praha, Hlubočepy, in the Prokopské údolí valley, Děvín rock, on calcite, 250 m, MTB 5952, 26.IX.1994, J. Horáková (PRM 758541); the city of Praha, Hlubočepy, in the Prokopské údolí valley, Dlouhý crest at Děvín, in opposite to the viaduct; on south-facing slope, on sloping flat calcareous rocks, 230 m; 5952 C; 14.XI.2004, J. Kocourková (PRM 789778).

**Spain:** Asturias, SW of Oviedo, S of Grado, Tameza, old church, on vertical surface of shaded wall, on *Lecania* sp. 800 m, 3.VII.2001, P. & B. van den Boom 27820 (hb Boom).

### *Tremella lichenicola* Diederich

In Europe, this species is strictly confined to the host *Mycoblastus fucatus*. It is known from more than ten countries with a distribution range from northwestern to central Europe (e.g., DIEDERICH 1986, DIEDERICH 1996, DIEDERICH & SÉRUSIAUX 2000, SANTESSON 1993). Outside Europe it is known from Canada (DIEDERICH 1996).

Northern Bohemia (all on *Mycoblastus fucatus*), Jizerské hory Mts., Distr. Jablonec n. Nisou, NE exposed slope of Mt. Bukovec, 890 m, on bark of *Fagus sylvatica* trunk, MTB 5158, 3.VI.2000, J. Kocourková (PRM 760655); Western Bohemia, SSE of Klatovy, Národní park, E of Srní, W side of Vydra, Mnich, E exposed slope with *Betula-Picea* forest, on *Pinus* trunk, 750 m, 21.X.2003, P. & B. van den Boom 31740 (hb Boom); *ibidem* on *Betula* trunk, 21.X.2003, P. & B. van den Boom 31732 (hb Boom).

### *Trichonectria anisospora* (Lowen) P.Boom & Diederich

A recent treatment of this taxon has been published by SÉRUSIAUX et al. (2003). Until recently, this species appeared to be confined to *Hypogymnia physodes*. The first author, however, collected it in Estonia on *Hypogymnia tubulosa* (APTROOT et al. 2005). All Czech records were found on *Hypogymnia physodes* only.

Western Bohemia, SSE of Klatovy, Národní park, S of Srní, along road to Modrava, NW of Rokyta, *Picea* forest, on *Picea* branch, 900 m, 19.X.2003, P. & B. van den Boom 31583 (hb Boom); WSW of Klatovy, NW of Železná Ruda, near Černé Jezero, *Picea* forest nearby lake, on *Picea*, 845 m, 20.X.2003, P. & B. van den Boom 31626 (hb Boom); WSW of Klatovy, NW of Železná Ruda, near Černé Jezero, N slope of Špičák, open place with stumps, on *Sorbus*, 1100 m, 20.X.2003, P. & B. van den Boom 31660 (hb Boom);

Frymburk, S side of Lipno lake, Vítkův kámen, field with *Vaccinium myrtillus* and scattered *Sorbus* trees, on *Sorbus*, 1030 m, 28.X.2004, P. & B. van den Boom 33936 (hb Boom); Southern Bohemia: Distr. Prachatice, 1 km NW of Zálesí SW of Soběšice, in on twigs of *Betula*, 28.X.2004, J. Kocourková & W. von Brackel (PRM 789779); Distr. Český Krumlov, near Lipno water basin, 3 km SE of Muckov, peatbog Rašeliniště Bobovec, on twigs of *Picea abies*, 695 m, 49°10'10.8"N/13°42'46.2"E 22.X.2004, J. Kocourková & W. von Brackel (PRM 789780).

### *Unguiculariopsis lesdainii* (Vouaux) Etayo & Diederich

New for Central Europe.

According to DIEDERICH & ETAYO (2000) this species is distributed mainly in northwestern Europe (Denmark, France, Great Britain and Sweden) and is restricted to the host *Lecanora saligna*.

Central Bohemia, Blaník Landscape Protected Area, Benešov, between villages of Kondrac and Březina, near road, in valley of Brodec brook, on wooden railing of bridge over brook, on *L. saligna*, 360 m, MTB 6355 A, 4.V.2001, J. Kocourková (PRM 896033).

### *Zwackhiomyces calcariae* (Flagey) Hafellner & Nik.Hoffmann

The genus *Zwackhiomyces*, and taxa included in this genus, were treated in detail by GRUBE & HAFELLNER (1990). Since that treatment, several new taxa have been described and further taxa were found to belong to this genus. A review of some additional taxa is given by HOFFMANN & HAFELLNER (2000), who provided a detailed description of *Pharcidia calcariae* based on a study of the type specimen from Algeria and proposed recombining the species in the genus *Zwackhiomyces*. Based on literature reports, these authors also regarded several additional records named as *Didymella sphinctrinoides* var. *aspiciliicola* from Austria, France, Switzerland and Italy, as possibly belonging to *Zwackhiomyces calcariae*. They did not accept them under this species, however, until verified specimens could be found. As features in our fungus fit the description given by HOFFMANN & HAFELLNER (2000), we identified this fungus as *Zwackhiomyces calcariae*.

Western Bohemia, Šumava Mts., Distr. Klatovy, Strašín, nature reserve Strašinská cave, on calcareous rock, on *Aspicilia calcarea*, 585 m, MTB 6747; 9.VIII.1999, J. Kocourková & P. Kocourek (PRM 896134).

### *Zwackhiomyces physciicola* Alstrup

Until now the species has been found on the hosts *Phaeophyscia* cf. *sciastra*, *Phaeophyscia orbicularis*, *Physcia caesia* and *P. tribacia*. *Phaeophyscia nigricans* extends the known host range for *Zwackhiomyces physciicola*. According to SÉRUSIAUX et al. (1999), the species most probably does not belong to the genus *Zwackhiomyces*. Under strong magnification, three pairs of setulae on the large cell of 2-celled spores could be observed.

This is a widely distributed species but it is rather rare. In Europe it has been reported from the following countries: Denmark (ALSTRUP 1993, type specimen), Austria (WITTMANN & TÜRK 1990, as *Didymella sphinctrinoides*; HAFELLNER & TÜRK 1995), France: Corse (HAFELLNER 1994), Luxembourg (SÉRUSIAUX et al. 1999, DIEDERICH & SÉRUSIAUX 2000) and Spain (CALATAYUD & BARRENO 1995).

Western Bohemia, Šumava Mts., Distr. Klatovy, Strašín, nature reserve Strašinská cave, on calcareous rock, on *Phaeophyscia nigricans*, 585 m, MTB 6747; 9.VIII.1999, J. Kocourková & P. Kocourek (PRM 896135); Central Bohemia, Distr. Rakovník, Podbořánky, in a cemetery, on the S oriented wall, near the ground, on *Phaeophyscia orbicularis*, 545 m, MTB 5946, 20.VII.2000, J. Kocourková (PRM 760664); Southern Bohemia, Distr. Jindřichův Hradec, near the village of Albef, by the Osika pond, on roof of a house of the field center of Charles University Praha, on *Phaeophyscia orbicularis*, 650 m, MTB 6956, 5.IX.1988, V. Skalický (PRM 761618); Distr. Tábor, Dobronice near Bechyně, field center of Charles University Liška, together with *Arthonia phaeophysciae*, on *Phaeophyscia orbicularis*, 380 m, MTB 6653, VI.1993, J. Váňa (PRM 760538).

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