

## Phytogeographical and taxonomic remarks on eleven species of cyanophilic lichens from Central Europe

Fytogeografické a taxonomické poznámky k vybraným druhům cyanofilních lišejníků střední Evropy

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Comments on 11 species of cyanophilic lichens are presented. A new combination *Peccania cernohorskyi* is proposed, commented on and typified. *Anema nodulosum*, *A. prodigulum*, *Lempholemma intricatum*, *Leptogium ferax*, *Porocyphus rehmicus* and *Zahlbrucknerella calcarea* are reported from Slovakia for the first time, *Leptogium biatorinum* and *L. magnussonii* from Hungary, and *Anema prodigulum*, *Heppia adglutinata*, *Leptogium biatorinum* and *Psorotichia taurica* from the Czech Republic. *Leptogium cretaceum* is lectotypified.

**Key words:** Central Europe, *Collemataceae*, *Heppiaceae*, *Lichinaceae*, lichens, phytogeography, taxonomy

### Introduction

Cyanophilic lichens, especially crustose ones, are described in various works from different periods as “the most intricate, and perhaps the least understood” (Crombie 1875) or simply “problematic” (Schultz & Büdel 2002). The information presented for 11 species from 3 families (*Collemataceae*, *Heppiaceae*, *Lichinaceae*) are intended to increase the descriptive information on “the very tips of phylogenetic branches“, without which phylogenetic studies would make little progress (Landrum 2001).

### Material and methods

The specimens were either collected in the field by the authors or selected from herbaria when working on the revision, as indicated in the section ‘Specimens examined’. Acronyms of the collections follow Holmgren et al. (1990). Labels are full-scale cited. Descriptions of the species are based on these specimens. Each species entry is supplemented by a reference to its publication and basionym. Data on the species *Leptogium biatorinum* s. l. includes, moreover, a synonym and its lectotypification. Entry for the species *Peccania cernohorskyi* includes revised material from the countries, from which it is reported.

## Results

### *Anema nodulosum* (Nyl.) Forss.

Nova Acta R. Soc. Scient. Upsal., ser. 3, 13 (6), p. 93, 1885. – *Collema nodulosum* Nyl., Acta Soc. Linn. Bordeaux 21, p. 266, 1857.

**Description:** Thalli black, cushion-like, diameter 3–4 mm, composed of small, nodulose-, globose- or club-like,  $\pm$  pruinose lobes. Rhizohyphae tufted. Apothecia present, diameter up to 0.5 mm,  $\pm$  sunken into the lobes, disc redbrown, thalline exciple very thin. Spores ellipsoid, unicellular, 8 per ascus, 10–13 $\times$ 6–9  $\mu$ m.

The genus *Anema* is insufficiently studied from a biological and nomenclatoric viewpoint. Worldwide, 10 cosmopolitan species have been registered (Kirk et al. 2001). Only a few are included in modern works (cf. Wirth 1995, Moreno & Egea 1992, Clauzade & Roux 1985). There is more information on *A. nodulosum* in Forssell (1885), Ozenda & Clauzade (1970) or Clauzade & Roux (1985). The species occurs in France (Ozenda & Clauzade 1970, Clauzade & Roux 1985) from where the lectotype originated (Henssen & Jørgensen 1990), Algeria, Morocco and Spain (Moreno & Egea 1992). It has not been reported from Slovakia (see Pišút et al. 1998, Lackovičová 2003).

**Specimens examined:** **Slovakia:** Strážovské vrchy Mts: ad rupes calcareas supra Súfov, ca 400 m, 3. VI. 1922, leg. J. Suza (PRM, ut *A. decipiens*, fertile, rev. H. & G. Czeika); Muránska planina plateau: ad arcem Muráň, c. 950 m, in rupibus calcareis Cigánka, 21. V. 1929 leg. J. Suza (PRM, ut *A. decipiens*, rev. H. & G. Czeika, cum *Collema* sp., *Placynthium garovaglii*, *P. subradiatum*, *Synalissa symphorea*).

### *Anema prodigulum* (Nyl.) Henssen

Lichenologist 22 (2), p. 139, 1990. – *Omphalaria prodigula* Nyl., Flora 62, p. 353, 1879.

**Description:** Thalli composed of groups of blue-black, occasionally pruinose, up to 1 mm wide lobes of the same height, attached to the substrate by rhizohyphae. In contrast to those of *A. nodulosum* the tiny thalli do not form cushions. Sterile lobes nodular, those bearing apothecia of  $\pm$  clavate shape. Apothecia present, diameter up to 0.7 mm, often prominent, mostly one per lobe. Disc red-brown, thalline exciple broad. Spores ellipsoid, unicellular, 8 per ascus, 11–15  $\times$  7–9  $\mu$ m.

This species might be confused with those of the genus *Psorotichia* (Moreno & Egea 1992), but the difference is evident when the anatomy is studied. Moreover, the surface of the squamules differs in the two genera. According to Ozenda & Clauzade (1970), it is uneven, but not as rough, granular or verrucose as in *Anema*. The species is known from France (Ozenda & Clauzade 1970, Clauzade & Roux 1985), Morocco, Spain (Moreno & Egea 1992) and North America (Schultz 2002, see also detailed description). It is not reported from Slovakia and the Czech Republic (see Pišút et al. 1998, Vězda & Liška 1999, Lackovičová 2003).

**Specimens examined:** **Slovakia:** Malá Fatra Mts – Malý Rozsutec, dolomit, 1931, leg. Z. Černohorský (PRM, ut *A. decipiens*, rev. H. & G. Czeika); **Czech Republic:** Moravia occid. – Ivančice, in rupibus conglomeratis permicis in valle fluvii Rokytná prope pag. Budkovice, alt. 250 m s. m., 14. XII. 1956, leg. A. Vězda (W, Lich. Bohem. Exs. no. 34, ut *A. notarisii*, rev. H. & G. Czeika).

*Heppia adglutinata* (Kremp.) A. Massal.

Geneac. Lich.: 8, 1854. – *Lecanora adglutinata* Kremp., Flora 24: 675, 1851.

**Description:** Olive-green thalli are squamulose to peltate, diameter up to 4 cm. Lower surface delimited by a well developed cortical layer. Apothecia present (diameter to 2 mm), immersed, exposing brown-red, urceolate to plain discs. Spores unicellular, ellipsoidal ( $20\text{--}23 \times 7\text{--}8 \mu\text{m}$ ). Hymenia stain red with iodine.

This species, reintroduced into the literature by Henssen (1994), is distinct from *H. lutosa* with which it is frequently synonymized (cf. Gyelnik 1935, Egea 1989, Hafellner & Türk 2001). It is reported from Europe and North America (Henssen 1994, Guttová & Palice 2002, Büdel et al. 2002). So far, it is not known from the Czech Republic (see Vězda & Liška 1999).

**Specimens examined:** **Czech Republic:** Vápence u Švarcentalu [= Černý Důl, Krkonoše Mts], 20. VII. 1924 leg. A. Hilitzer (PRM, ut *H. virescens*, rev. A. Guttová).

*Lempholemma intricatum* (Arnold) Zahlbr.

Cat. Lich. Univ. 3: 22, 1925. – *Omphalaria intricata* Arnold, Flora 52: 254, 1869.

**Description:** Brown-black to black thalli clustered in mats (diameter up to 1 cm). Lobes cylindrical, several mm long, tangled, surface gently longitudinally wrinkled, apices not swollen. Apothecia absent. The specimens are identical to the British material from Kirkcudbright, Black Craig (BM).

The status of this species is not clear. Certain forms resemble well developed morphs of *Lempholemma botryosum* (Coppins et al. 1992). In that case characters of the thallus, lobes and spores are useful. *L. intricatum* does not form umbilicate thalli like *L. botryosum* and the lobes are up to 5 mm long, whereas those of *L. botryosum* do not exceed 1 mm and the spores are larger ( $10\text{--}14 \times 8\text{--}11 \mu\text{m}$ ) than those of the latter species ( $7\text{--}9 \times 5\text{--}7 \mu\text{m}$ ) (Coppins et al. 1992, Massalongo 1856).

The species is reported from Great Britain (Coppins et al. 1992), Germany (Scholz 2000), Norway (Jørgensen 1988), Austria (Hafellner & Türk 2001) and Switzerland (Henssen 1969). It has not been reported from Slovakia (see Pišút et al. 1998, Lackovičová 2003).

**Specimens examined:** **Slovakia:** Slovenský raj Mts – reservatio Piecky, Veľký vodopád, ad ripam rivi,  $48^{\circ}56'20''\text{N}$ ,  $20^{\circ}21'50''\text{E}$ , ad saxa calcarea, alt. 600 m s. m., 6. VIII. 1998, leg. J. Halda, Z. Palice & Š. Bayerová (herb. J. Halda, JPH/2782, rev. A. Guttová); Malá Fatra Mts – in monte Malý Rozsutec, loco subhumido, ad saxa dolomitica, alt. 1300 m, 9. V. 1973 leg. I. Pišút (BRA, rev. A. Guttová); Belianske Tatry – Südhang des Skalné vráta, Kalkfelswand, c. 1400 m s. m., 19. VIII. 1999 leg. H. & G. Czeika (herb. H. & G. Czeika).

*Leptogium biatorinum* s. l.

*Leptogium biatorinum* (Nyl.) Leight., Lich. Fl. Gr. Brit. 3<sup>rd</sup> ed.: 25, 1879. – *Collema biatorinum* Nyl., Acta Soc. Linn. Bordeaux 21: 268, 1857.

*Leptogium cretaceum* (Sm.) Nyl., Acta Soc. Linn. Bordeaux 21: 24, 1857. – *Lichen cretaceus* Sm., Engl. Bot. XI: 738, 1800. Type: E.B. 738, Dr. Noëhden from Eton, ex herb. Turner (BM) – **lectotype, designated here.**

**Description:** Thalli brown-black, or when growing in the shade of a bluish-grey colour, spreading over rock surfaces as  $\pm$  a continuous crust. Composed of granules (juvenile stages) or irregularly shaped squamules with sublobate, often ascending margins. Apothe-

cia frequent, sessile (diameter 0.20–0.75 mm), with a prominent proper exciple. The habitus is variable, which is why the collective name *L. biatorinum* s. l. is used here. The character of particular features varies within the delimitations of the taxa listed above (see Smith & Sowerby 1800, Leighton 1879, Ozenda & Clauzade 1970, Blum et al. 1975, Clauzade & Roux 1985, Jřrgensen 1994, Guttova & Palice 2002, Wirth 1995 for further information).

The duplicate of Nylander’s original material of *L. biatorinum* (Nyl.) Leight. (*Collema biatorinum*, ad Parisiens, ex herb. Leighton, BM) is terricolous. The thalli are composed of granules, which form tiny lobulate squamules. The sessile apothecia are globular. The lower part of the thin thalline exciple proliferates locally forming squamule-like outgrowths comparable to those of e.g. *L. lichenoides*. If the original material (possibly in H, P. M. Jřrgensen, pers. com) is not located, this duplicate specimen could become a the lectotype.

The original material of *Leptogium cretaceum* (Sm.) Nyl. consists of two saxicolous specimens (*Lichen cretaceus*), 1. Sowerby’s herbarium Feb. 1859, 2. E.B. 738, Dr. Noehden from Eton, ex herb. Turner; both BM). The former was studied by Henssen in 1976 and labelled as the type. It corresponds with illustrations published in 11th volume of English Botany (Smith & Sowerby 1800). The thalli grow on flint stones and are composed of stellately radiating lobate squamules with sessile apothecia centrally. The latter is not so well developed and directly refers to the one described by Smith in the sentence “Our perfect specimens were gathered on chalk by Dr. Noehden, and Mr. Gotobed of Eton” (Smith & Sowerby 1800). We designate it as a lectotype.

This taxon is reported from many European countries and the USA (Hafellner & Třrk 2001, Alstrup & Sřchting 1989, Ozenda & Clauzade 1970, Scholz 2000, Coppins & Purvis 1992, Nimis 1993, Motiejunaite et al. 1998, Motiejunaite 1999, Diederich & Serusiaux 2000, Fautynowicz 1993, Santesson 1993, Kondratyuk et al. 1998, Jřrgensen & Třnsberg 1999). It has not been reported from the Czech Republic and Hungary (see Vezda & Liřka 1999, Verseggy 1994, 2003).

**Specimens examined:** **Czech Republic:** Moravia, Brno – ad marginem silvae pr. p. Mokra Hora, c. 300 m s. m., ad terram laessaceam, VI. 1960, leg. A. Vezda (W, ut *L. byssinum*, rev. H. & G. Czeika); Brno – inter pagos Soběřice et Mokra Hora (prope urbem Brno), ad terram arenaceam et supra muscos in fossis viae sylvaticae, alt. 300 m s. m. 28. II. 1961, leg. A. Vezda (Lich. Sel. Exs. no 81, ut *L. subtile*) [BP, BRA; rev. A. Guttova], ibid. alt. 250 m, IV. 1966 leg. A. Vezda (ut *L. byssinum*) [BM, rev. P. M. Jřrgensen, A. Guttova]; Bohemia septentr. – ad muros arenaceos humidos prope Přihrazy, Mlada Boleslav, VII. 1965 leg. Vezda ut *L. cf. tenuissimum* (BRA, rev. A. Guttova); **Hungary:** Pilis Mts, “Visegradi-hegyseg” – Visegrad, the valley of the stream Apatkuti patak (Apatkuti volgy), mixed deciduous forest (*Carpinus betulus*, *Fagus sylvatica*, *Quercus* sp. div.) c. 2.5 km from Visegrad past abandoned quarry, andesite outcrops along the road bank, on shaded mossy andesite rock, alt. c. 350 m a.s.l., 21. XI. 2002 leg. A. Guttova, E. Farkas & L. Lokos, fertile (SAV, BP).

#### *Leptogium ferax* (Dur. et Mont.) Rabenh.

Sitzungs-Ber. Naturwiss. Ges. Isis, Dresden, 1870: 237, 1871. – *Collema ferax* Dur. et Mont., Flore d’Algerie, Crypt. 1: 202, 1846.

**Description:** Thalli mostly brown, if shaded then of a greenish tinge, not exceeding 1 cm in diameter. Lobes orbicular, margin entire, lamina subtly wrinkled (as in e.g. *L. magnussonii*). Medulla compact, comparable to that of *L. magnussonii* (cf. Jřrgensen 1994). Apothecia present, diameter 2–2.5 mm, rim lined with dense accumulation of scale- or shell-like structures recalling the isidia of *Collema flaccidum*. The plane of the

disc red-brown. Spores ellipsoidal (immature ones fusiform to broadly fusiform), submuriform to muriform, 8 per ascus,  $30.9 (32.2) \times 9.2 (11.5) \mu\text{m}$ .

This species resembles the common gelatinous lichen *Collema crispum* (Degelius 1954). A well developed cortex and muriform spores are diagnostic characters. It has been recorded from the coastal regions of Mediterranean Algeria, France, Greece (Crete), Portugal and Spain (Arvidsson 1984, Carvalho & Jones 1997). Despite its conspicuous habit the species is not reported from inland localities. The western slopes of the Malé Karpaty Mts (SW Slovakia) experience special climatic conditions, which is reflected in the presence of several submediterranean and pannonian vascular plants. Taking this phytogeographical aspect into account, we expected to find this species there but finding a new macrolichen in an area frequently visited by lichenologists (cf. Lackovičová 1978, 1988) is certainly interesting. Nevertheless, the species has not been reported from Slovakia up to now (see Pišút et al. 1998, Lackovičová 2003).

**Specimens examined:** **Slovakia:** Malé Karpaty Mts – Plavecký Mikuláš, unnamed hill with limestone/conglomerate outcrops and short xerotherm vegetation above central part of the village (E slope of the elevation 367.2), on open, exposed calcareous soil in rock fissures among mosses (*Bryum argenteum*, *Tortella tortuosa*, *Hypnum cupressiforme*, *Tortula muralis*, *Encalypta vulgaris*, *Ditrichum flexicaule*), alt. c. 280 m a.s.l., 5. VI. 2001 leg. A. Guttová (7469d), fertile (SAV, together with *Agonimia opuntiella*, *Caloplaca* sp., *Mycobilimbia* sp.); Plavecký Mikuláš – Kršlenica national nature reserve, S exposed limestone/conglomerate ridge of cliffs, on soil among mosses (*Encalypta* cf. *vulgaris*), alt. c. 480 m a.s.l., 5. IV. 2002 leg. A. Guttová, A. Lackovičová, E. Lisická, J. Liška & V. Orthová (7469d), fertile (SAV); Plavecké Podhradie – Pohanská national nature reserve, W slope of the hill Pohanská, abandoned quarry currently used as shooting-range, on sandy soil among mosses (*Ceratodon purpureus*, *Didymodon* sp., *Tortula muralis*, *Encalypta streptocarpa*, *Fissidens* sp.), alt. c. 300 m a.s.l., 8. XI. 2002 leg. A. Guttová, V. Kučera, A. Lackovičová & V. Orthová (7569b), fertile (SAV, conf. P. M. Jørgensen XII. 2002).

*Leptogium magnussonii* Degel. et P. M. Jørg.

Lichenologist 26 (1): 14, 1994.

**Description:** Parts of the thalli brown to brown-black, 2–3 cm in diameter. Lobes rounded, lamina sparingly covered with granular or cylindrical isidia. Medulla compact. Apothecia absent.

Since 1994, when this isidiate *Leptogium* species was described (Jørgensen 1994), more information has been recorded on its distribution and ecological requirements (Berger 1996, Sérusiaux et al. 1999, Guttová 2000). This species is on the red-list in Sweden (Thor & Arvidsson 1999). The find recorded here is the first for Hungary (see Versegly 1994, 2003).

**Specimens examined:** **Hungary:** Pilis Mts, Visegrádi-hegység – Kő-hegy Mt., on the rocks at Petőfi-pihenő N of Pomáz. On siliceous rock. Alt. 350 m a.s.l., 19. V. 1985 leg. E. Farkas & L. Lőkös (herb. Vácrátót ut *L. lichenoides*, rev. P. M. Jørgensen ut *L. magnussonii* 29. I. 2001); Pilis Mts, Visegrádi-hegység – along the stream Apátkúti-patak in the valley Apátkúti-völgy) and on the hill Apátkúti-bérc 1–2 km S of Visegrád. On mossy soil, on siliceous rocks. Alt. 350 m, 3. IV. 1988 leg. E. Farkas & L. Lőkös (herb. Vácrátót ut *L. lichenoides*, rev. P. M. Jørgensen ut *L. cf. magnussonii* 29. I. 2001).

*Peccania cernohorskyi* (Servít) Czeika et Guttová, **comb. nov.**

*Thyrea cernohorskyi* Servít, Věstn. Král. České Společn. Nauk, ser. math.-nat., 1934: 6, 1935. Type: diabasy u sv. Ivana 25. IX. 1930 (PRM – **lectotype, designated here**).

In 1930, Z. Černohorský and A. Hilitzer collected a diminutive terricolous/saxicolous cyanolichen at a locality on the Bohemian Karst [= Český kras] S of Prague, frequently visited by botanists. After examining the material Servít recognized it as an undescribed species of the genus *Thyrea* and named it after one of the collectors – “*Thyrea Černohorskýi*” Servít (see Servít & Černohorský 1935). His description is thorough, consisting of a Latin diagnosis and comprehensive German commentary on details of apothecial anatomy and a comparison with the species *Thyrea camaromorpha*. The text is supplemented by accurate illustrations of a fertile thallus (also in cross-section), asci with spores and paraphyses.

Almost 60 years later, the taxon “*Černohorskýi*” was revised by Henssen & Jørgensen (1990). They transferred *Thyrea cernohorskyi* Servít to the genus *Anema* [*A. cernohorskyi* (Servít) Henssen], although no original material was located.

In 2000, when revising different taxa of cyanolichens from Slovakia and the Czech Republic deposited in PRM, we located the original material and duplicates of *Thyrea cernohorskyi* in BRA and PRC. The material corresponds with the original description and illustrations (thallus surface not smooth, covered with spherical/verrucose outgrowths, apothecia diameter 1–1.5 mm, upper part of hymenium orange-brown, 8 spores/ascus, 12–15 × 12–14 µm). The thalli are heteromerous (growing either on a layer of soil/dust with bryophytes or directly on rock). They also bear pycnidia producing filiform conidia, (16) 19–25 × ±1 µm. The hymenium is delimited exclusively by a thalline exciple. Recent material collected by J. Kocourková at the same locality (PRM) is identical with the original material, but sterile, producing only filiform conidia.

In terms of the recent delimitation of the genus *Anema* (Henssen & Jørgensen 1990, Moreno & Egea 1992, Schultz & Büdel 2002) the following characters are crucial: thallus squamulose/subfruticulose/peltate, homoimerous, lacking central hyphal strand, fruiting bodies pycnoascocarps, hymenium colourless, thalline exciple well developed, proper exciple inconspicuous or missing, conidia ellipsoid. Not all characters of the thalli, however, correspond to this description. The habit is subfruticulose to peltate (see Servít & Černohorský 1935: “ex initiis globosis monophyllinus, demum p.p. crustosus... thalli monophylli 2–3 mm lati, irregulariter subcrenulati vel lobulati, subtus late umbilicati...”) and thalli are not fixed to the substrate by a central holdfast, but attached at several spots. The conidia are filiform as in the genus *Peccania*, representatives of which are the only ones with filiform conidia in the related groups *Anema* – *Thyrea* – *Peccania* (cf. Moreno & Egea 1992). For this reason, the combination *Peccania cernohorskyi* (Servít) Czeika et Guttová is proposed. As there are several specimens collected at the same time in different herbaria, a lectotype is designated. The specimens in BRA and PRC are isolectotypes.

**Specimens examined:** **Czech Republic:** Diabasy u sv. Ivana [= Svatý Jan pod Skalou], ad saxa diabasica prope sv. Ivan, 25. IX. 1930 (PRM, ut *Thyrea Černohorskýi*; BRA, rev. A. Guttová, H. & G. Czeika), ibid. saxa diabasica prope sv. Ivan, 25. IX. 1930, A. Hilitzer (BRA, ut *Thyrea Černohorskýi*, rev. A. Guttová); ibid., 25. IX. 1930 leg. Z. Černohorský (PRC, ut *Thyrea Černohorskýi*, rev. A. Guttová); ibid. 25. IX. 1998 leg. J. Kocourková (PRM, rev. A. Guttová, H. & G. Czeika).

Besides the Czech Republic, *Anema cernohorskyi* (Servít) Henssen is recorded from Germany (Scholtz 2000). The entry is based upon Henssen: Lich. Cyan. Fungi Sax. Exs. no 47 (BRA, W; rev. A. Guttová, H. & G. Czeika). However, the material in this collection is *Anema tumidulum* Henssen ined., like that recorded by Santesson (1993) from Norway, from calcareous rock in Buskerud and Telemark.

**Specimens examined:** **Norway:** Buskerud, Hole, the island Storøya in lake Tyrifjorden, south-western part, alt. c. 65 m, calcareous rock face, 14. XI. 1981 E. Tindal no 3142 (O, rev. A. Guttová); Buskerud, Hole, Purkøya, the SW-side, alt. 63–75 m, on calcareous rock, steep rock wall, 8. IX. 1997 H. Bratli & E. Tindal no 8720 (O, rev. A. Guttová); Buskerud, Hole, Burudåsen, between Kongelva and Kleiva, alt. 90 m, steep, W-facing, calcareous rock wall in edge of pine forest, 29. I. 1989 J. Holtan-Hartwig & E. Tindal (O, rev. A. Guttová); Buskerud, Hole, limestone cliffs c. 500 m SE of Brånsnes church, alt. 65–80 m, 9. IV. 1994 R. Haugan & E. Tindal no 7873 (O, rev. A. Guttová); Buskerud, Hole, cliffs S of Stammes at the shore of lake Tyrifjorden, alt. 70 m, steep, SE-facing cliffs of calcareous rock, 29. I. 1989 J. Holtan-Hartwig & E. Tindal (O, rev. A. Guttová); Buskerud, Hole, Lemostangen in lake Tyrifjorden, alt. 65 m, 31. X. 1981 E. Tindal no 3105 (O, rev. A. Guttová); Telemark, Bamble, Langesundstangen, the west side, alt. 1–40 m, on vertical, calcareous rock wall, 22. VI. 1997 H. Bratli & E. Tindal nos 1096, 8738 (O, rev. A. Guttová); Telemark, Porsgrunn, Kotøya, alt. 2–5 m, steep to vertical rock wall, facing west, calcareous rock, 8. VI. 1996 H. Bratli & E. Tindal (O, rev. A. Guttová).

*Porocyphus rehmicus* (A. Massal.) Zahlbr.

Cat. Lich. Univ. 2: 756, 1924. – *Psorotichia rehmicia* A. Massal., Miscell. Lichenol.: 53, 1865.

**Description:** Thallus black, granular, non-areolate, photobiont is a filamentous cyanobacterium (*Calothrix* sp.). Apothecia present, discs remain pore-like. Paraphyses shortly branched, apices not swollen. Spores both ellipsoidal ( $12.5\text{--}15 \times 5\text{--}7.5 \mu\text{m}$ ) and spherical.

The thallus corresponds to that described for *P. rehmicus*, although this species is reported to prefer calcareous substrates (Migula 1929, Henssen 1963, Ellis 1981, Moreno & Egea 1994). According to others the thalli bearing this name could be an aberrant form of *P. coccodes*, growing on silicate (Coppins & Gilbert 1992). Despite all these uncertainties, the crucial character distinguishing the two species is the shape of the thallus; in *P. rehmicus* it is granular or minutely shrubby and in *P. coccodes* areolate.

The species might have been overlooked in Slovakia from where it has not been reported (see Pišút et al. 1998, Lackovičová 2003).

**Specimen examined:** **Slovakia:** Malá Fatra Mts – auf einem Granitfelsen zwischen Kralován und Párnica, Com. Árva in Ungarn, 17. juli 1883 Lojka (Gránitsziklán Kralovánes Párnica. Com. Árva), ut *Psorotichia* (BP, rev. A. Guttová).

*Psorotichia taurica* (Nyl.) Vain.

Termész. Füzet. 22: 312, 1899. – *Collemopsis taurica* Nyl. Flora 64, p. 97, 1886.

**Description:** Thallus black, brown-black, forming irregular patches of diameter 1–3 cm, growing preferably in rock fissures and caverns. Composed of granules to irregularly shaped areoles (diameter up to 0.5 mm), thin (up to 0.3 mm). Apothecia ± abundant, diameter up to 0.25 mm, globose. Disc concolorous with thallus, urceolate, exposed mostly through a pore-like opening. Epithemium and upper part of hymenium emerald green or blue-green. Spores predominantly spherical (diameter 7–8  $\mu\text{m}$ ), exceptionally broadly ellipsoidal (7–10  $\times$  6–8  $\mu\text{m}$ ), 16 per ascus. For additional information consult Nylander (1886) and Oksner (1956).

The type of the species is reported from the Crimean peninsula, Ukraine (cf. Nylander 1886, Oksner 1956, Kondratyuk et al. 1998). Kopatchevskaya (1986) regarded this species as an element of the European area, Crimean-Caucasian group. It has not been found in the Czech Republic (see Vězda & Liška 1999).

**Specimens examined:** **Czech Republic:** Central Bohemia, Praha–Hlubočepy – the Prokopské údolí valley, an abandoned flooded quarry, on steep, periodically inundated Ca-rock above the small lake, alt. 240 m a.s.l., 18. IV. 1999, leg. Z. Palice, L. Bičanová & K. Vincencová (herb. Z. Palice no. 1879, det. H. Czeika); *ibid.* 25. VI. 2002, leg. A. Guttová & Z. Palice (SAV).

### *Zahlbrucknerella calcarea* (Herre) Herre

J. Wash. Acad. Sc. 2: 384, 1912. – *Zahlbrucknera calcarea* Herre, Proc. Wash. Acad. Sci. 12: 129, 1910.

**Description:** The black thalli are up 1 cm in diameter, composed of tufts of fine filaments, which nearly completely cover the photobiont (*Scytonema* sp.) and the mycobiont is concentrated mostly in conspicuous hyaline basal strand. Apothecia absent.

When fertile, the species is easy to identify because of the peculiar polysporous asci (16–24 spores – Henssen 1977, Kantvilas & Elix 1992). Despite it having a cosmopolitan distribution, it is rarely recorded. This, to a certain extent, might be due to its ecological requirements. It prefers the bases of perpendicular rock-faces, where collecting is often difficult. It has not been reported from Slovakia (see Pišút et al. 1998, Lackovičová 2003).

**Specimens examined:** **Slovakia:** Strážovské vrchy Mts – ad rupes calcareas supra Súfov, c. 500 m, 3. VI. 1922, leg. J. Suza (PRM, ut *A. decipiens*, rev. H. & G. Czeika, cum *Synalissa symphorea*, *Anema tumidulum*, *Placynthium subradiatum*, *Collema* sp.); Tatry Mts (Bélai mészalpok) – mézskősziklafalon a Greiner-en, c. 2000 m, Szepesom, 9. VIII. 1916 leg. Timkó (BP, cum *Placynthium coerulescens*); Belianske Tatry Mts – Südhang des Skalné vráta, Kalkfelswand, c. 1400 m s. m., 19. VIII. 1999 leg. H. & G. Czeika (herb. H. & G. Czeika).

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### Souhrn

Příspěvek obsahuje komentáře k fytogeografii, případně k taxonomii 11 druhů cyanofilních lišejníků z čeledí *Collemataceae*, *Heppiaceae* a *Lichinaceae*. Je navržena nová kombinace *Peccania cernohorskyi*, doplněná typifikací. Druhy *Anema nodulosum*, *A. prodigulum*, *Lempholemma intricatum*, *Leptogium ferax*, *Porocyphus rehmicus* a *Zahlbrucknerella calcarea* jsou udávány poprvé z území Slovenska, *Leptogium biatorinum* a *L. magnussonii* poprvé z Maďarska. Z území České republiky jsou poprvé udávány následující taxony: *Anema prodigulum*, *Heppia adglutinata*, *Leptogium biatorinum* a *Psorotichia taurica*. Pro druh *Leptogium cretaceum* byl vybrán a ustanoven lektotyp.

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