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New or otherwise interesting Lichens. IV

Neue oder anderweitig interessante Flechten. IV

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Key words: *Bapalmuia, Cryptolechia, Gyalecta, Gyalideopsis, Lecanora, Pertusaria, Tephromela.*

Schlagwörter: *Bapalmuia, Cryptolechia, Gyalecta, Gyalideopsis, Lecanora, Pertusaria, Tephromela.*

Summary: Seven lichen species are described as new to science: *Bapalmuia juliae* (Brazil), *Cryptolechia bicellulata* (Kenya), *Gyalecta coralloidea* (Brazil), *Lecanora wirthii* (New Caledonia), *Tephromela alectoronica* (Australia, Brazil), *T. physodica* (Australia), and *T. rhizophorae* (Brazil). Range extensions are reported for *Cratiria dissimilis, Gyalideopsis africana* and *Tephromela sorediata.* Apothecia are found and described for the first time in *Pertusaria flavoisidiata.*

Zusammenfassung: Die folgenden sieben neuen Flechtenarten werden beschrieben: *Bapalmuia juliae* (Brasilien), *Cryptolechia bicellulata* (Kenya), *Gyalecta coralloidea* (Brasilien), *Lecanora wirthii* (Neukaledonien), *Tephromela alectoronica* (Australien, Brasilien), *T. physodica* (Australien), und *T. rhizophorae* (Brasilien). Neufunde, die die bisher bekannte Verbreitung der Arten *Cratiria dissimilis, Gyalideopsis africana* und *Tephromela sorediata* erweitern, werden mitgeteilt. Die Fruchtkörper von *Pertusaria flavoisidiata* werden erstmals beschrieben.

Introduction

Ongoing efforts to identify and classify my large collections made in Europe and many tropical countries over the last 30 years revealed some interesting findings which are reported here in the fourth paper of this series.

Bapalmuia juliae KALB sp. nov.

Similis *Bapalmuiae callichroae*, sed sporis latioribus et solum singularibus in ascis differt.

Typus: Brazil. São Paulo: Serra do Mar; Serra do Garrãozinho between Moji das Cruzes and Bertioga, in a very humid and dark primary rainforest, 850 m, 23°45' S, 46°10' W, 10. III. 1979, K. Kalb & G. Plöbst (hb. KALB 15047 holotype; fig. 1).

Etymology: This new species is named after my daughter Julia who collected her first lichen *(Xanthoria parietina)* at the tender age of four years.

Thallus muscicolous, hepaticolous or corticolous, smooth to finely granular, granules 0.07-0.1 mm wide, greenish grey to greyish. Apothecia scattered, 0.7-1.3 mm in diam., obconical; disc slightly convex, pale orange brown to ochre brown, not pruinose; margin concolorous with the disc or slightly paler, soon disappearing. Excipulum prosoplectenchymatous, with radiating rows of cells, *c.* 200 µm broad. Hypothecium 250-400 µm high in centre, pale yellowish brown to orange brown; epithecium indistinct to slightly yellowish brown. Hymenium 250-300 µm high. Asci cylindrical, 130-150 × 25-30 µm. Ascospores 1 per ascus, muriform, with 40-50 transverse and 4-6 longitudinal septå per segment, 120-140 × 20-25 µm, 5-7 times as long as broad, oblong ellipsoid, one end broadly rounded, the other end tapering. Pycnidia not observed.

Chemistry: 4,5-dichlorolichexanthone (= coronatone).

Notes: This species is readily characterized by its pale orange to ochre brown, obconical apothecia and especially the broad ascospores. It is well distinguished from other species of *Bapalmuia* by its single spored asci and muriform ascospores. In habit it is similar to *B. callichroa* (MÜLL. ARG.) KALB & LÜCKING, but that species usually has 4-8 submuriform ascospores per ascus. Thus far *B. juliae* is only known from the type collection from Brazil. Its occurrence in an old growth, undisturbed rainforest corresponds with the ecology of the other species of the genus (KALB & al. 2000).

Cryptolechia bicellulata KALB sp. nov.

Similis *Cryptolechiae carneoluteae*, sed ascosporis minoribus et solum 1-septatis differt.

Typus: Kenya. Central Province: Nanyuki District, between Naro Moru and Nanyuki, montane rainforest in a gulch near the cave called "Mao Mao", 2050 m, 17.-18. VIII. 1985, K. KALB & A. SCHRÖGL (hb. KALB 13558 - holotype).

Etymology: The specific epithet refers to the 2-celled ascospores.

Thallus white or glaucous-white, smooth, continuous. Apothecia 0.5-1 mm diam.; disc pale ochre, immersed at first, emerging with an irregularly crenulate margin, becoming flat to convex and ± immarginate. Exciple paraplectenchymatous with radiating rows of cells, laterally *c.* 100 µm thick. Hy-

menium hyaline, 70 µm high, the upper 5-7 µm inspersed by chocolate-brown granules, I+ pale blue (mainly ascus walls). Hypothecium of labyrinthine structure, *c.* 150 µm high. Paraphyses 1-1.5 µm thick, straight, simple to apically branched with slightly swollen apices. Asci narrowly clavate, 50-60 × 8-10 µm, 32-spored. Ascospores 32 per ascus, ellipsoid, 1-septate, sometimes slightly constricted at the septum, 7-10 × 2-3 µm. Pycnidia not seen.

Chemistry: No substances detected by TLC.

Notes: KALB (2007) has presented an overview of this genus with a key to all known species. *Cryptolechia bicellulata* is unique in having 1-septate ascospores and 32-spored asci. It is only known from the type locality.

Gyalecta coralloidea KALB sp. nov.

Similis *Gyalectae friesii*, sed thallo isidiis coralloideis instructo et sporis longioribus differt.

Typus: Brazil. Minas Gerais: Serra da Mantiqueira; above Vila Monte Verde, *c.* 30 km E of Camanducaia, in a very disturbed montane rainforest, 1800 m, 22°50′ S, 46°00′ W, 3. VII. 1979, K. KALB & G. PLÖBST (hb. KALB 36700 - holotype; fig. 2).

Etymology: The new species is distinguished by its coralloid-isidiate upper surface.

Thallus corticolous, up to 10 cm wide, continuous, whitish grey to ochre, with cylindrical, branched and conglutinated isidia, usually bordered by a thin, whitish, 1 mm broad prothallus. Apothecia numerous, 1-1.5 mm diam., disc slightly concave or flat, pale orange, margin thick but hardly visible in young apothecia, hidden by a granular thalline layer, prominent at first, depressed with age, smooth, paler than the disc. Hypothecium hyaline, 20-30 µm high. Hymenium hyaline, 60-70 µm high, I+ blue. Paraphyses simple, 2-2.5 µm, apically slightly thickened (2.5-3 µm). Asci oblong, 45-55 × 12-15 µm, I+ blue. Ascospores 8 per ascus, ellipsoid or fusiform 3-(4) septate, 20-29 × 4 µm, 5-7 times long as broad. Pycnidia not seen.

Chemistry: No substances detected by TLC.

Notes: This new species is similar to *G. friesii* FLOT. ex KÖRB., but the thallus is smooth and non-isidiate in the latter and the ascospores are shorter (12-20 × 3.5-4.5 µm). This is the first species of *Gyalecta* known to bear isidia. *Gyalecta coralloidea* was found growing in remnants of humid, montane forests between 1800 and 2750 m.

Additional specimen examined: Venezuela. Merida: Distr. Rivas Davila; Paramo la Negra, *c.* 20 km W of Bailadores, 2750 m, 8°15' N, 71°50' W, 12. VIII. 1989, K. & A. KALB (hb. KALB 34976).

Gyalideopsis africana KALB & VĚZDA

This species was described by KALB & VĚZDA (1994) from a single collection from Mount Kenya. A further specimen of this species was found among the rich Tanzanian collections made by Dr. A. FRISCH. As in *G. monospora* KALB & VĚZDA and *G. stipitata* KALB & VĚZDA, the pale brown to almost hyaline hyphophores are pedunculate with a globose fascicle of diahyphae at the tip. However, *G. africana* can readily be separated from these two species by its 2-spored asci (vs. the 1-spored in *G. monospora* and *G. stipitata).*

Specimen examined: Tanzania, Kilimanjaro Region, Moshi, Mweka route, mountane *Podocarpus* forest locally dominated by *Erica arborea*, muscicolous on an old trunk of *Podocarpus*, 2700-2900 m, 03°09'50" S, 37°21'50" E, 30. IX. 1999, A. FRISCH 99/Tz2275 (hb. KALB 33833).

Lecanora wirthii KALB sp. nov.

Similis *Lecanorae coronulantis*, sed thallo soredioso et materia chemica differt.

Typus: New Caledonia. Grande-Terre: Prov. Nord, eastern coast, Lindéraligue beach, a few km SE of Hienghène, on *Rhizophora* in a mangrove swamp, 2 m, 20°42' S, 164°57' E, 29. VIII. 1994, K. & A. KALB (hb. KALB 27861 - holotype; fig. 3).

Etymology: This new species is named in honour of my friend and oldest companion in the field of lichenology, the distinguished lichenologist and author Prof. Dr. Volkmar WIRTH.

Thallus corticolous, smooth to bullate-areolate, whitish grey to grey, sorediate, prothallus whitish. Soralia erumpent, semi-globose, with granular soredia. Apothecia sessile, with a constricted base, 0.7-1 mm diam., disc red-brown to dark brown, epruinose, margins prominent, later almost evanescent, entire or crenulate, flexuose, sorediate. Cortex indistinct, not inspersed, *c.* 10 µm thick. Amphithecium with a few clusters of large crystals. Hypothecium orange-brown, 80-100 µm high in the centre. Epihymenium red-brown, K–, without crystals. Hymenium hyaline, 90-100 µm high. Ascospores ellipsoid to broadly ellipsoid, 12-15 × 6-7 µm.

Chemistry: zeorin (major), chodatin (major), isoarthothelin (minor), chloroatranorin (minor), demethylchodatin (minor), asemone (minor), atranorin (trace), 3-*O*-methylthiophanic acid (trace), 5,7-dichloronorlichexanthone (trace), thiophanic acid (trace), 5,7-dichloro-3-*O*-methylnorlichexanthone (trace).

Method: TLC in solvent C; HPLC. Det.: J. A. ELIX, 16.XI.2007.

Notes: LUMBSCH et. al. (1996) reported two of my collections from Costa Rica and Brazil as "sorediate morphotypes of *Lecanora coronulans* NYL. However, these two specimens exhibit major chemical differences from *L. coronulans.* In fact, they show a similar chemistry to *Lecanora wirthii*, namely zeorin (major), atranorin (major), chloroatranorin (minor), demethylchodatin (minor) and cho-

datin (trace), a chemistry which is also characteristic for *Lecanora kalbiana* LUMBSCH, a nonsorediate *Lecanora* species with a dark hypothecium. Therefore, I regard *L. wirthii* as the sorediate counterpart of *L. kalbiana*. With some hesitation, the sorediate specimens cited below are included in *L. wirthii*. Associated species with the holotype include *Cratiria dissimilis* (NYL.) MARBACH, *Dirinaria picta* (SW.) CLEM. & SHEAR and *Diorygma junghuhnii* (MONT. & BOSCH) KALB, STAIGER & ELIX.

Additional specimens examined: Costa Rica. Puntarenas: Fila Cruzes Ridge; surroundings of „Las Cruces Tropical Botanical Garden", *c.* 4 km SSE of San Vito, at the edge of a premontane rainforest near a waterfall, 1350 m, 8°43′ N, 82°58′ W, 1. I. 1979, K. KALB & G. PLÖBST (hb. KALB 29781). Brazil. Bahia: Chapada Diamantina; Serra do Tombador, *c.* 1 km E of Morro do Chapeú, on *Vellozia aloifolia*, in a caatinga, 1000 m, 11°40′ S, 41°10′ W, 19. VII. 1980, K. Kalb & M. MARCELLI (hb. KALB 29786).

Pertusaria flavoisidiata ARCHER & ELIX

ARCHER & ELIX (1993) described this species from Australia (Northern Territory) and ARCHER (1997) subsequently reported localities in Queensland, New South Wales and Papua New Guinea. All of these collections were sterile. However, I detected apothecia in a specimen from New Caledonia (KALB 33341) and they are described here.

Thallus with verrucae and isidia, apothecia verruciform, concolorous with the thallus, hemispherical to flattened, not constricted at the base, 0.7-1.2 mm diam.; ostioles inconspicuous, pale or yellowish, 1 per verruca; spores 4 per ascus, uniseriate, ellipsoid, 60-80 × 30-40 µm, wall smooth, 4-10 µm thick.

This corticolous species is distinguised by its major metabolites, thiophaninic and stictic acids, and by the dull, isidiate thallus.

Specimens examined: New Caledonia. Grande-Terre: Prov. Nord, eastern coast, Lindéraligue beach, a few km SE of Hienghène, on *Rhizophora* in a mangrove swamp, 2 m, 20°42' S, 164°57' E, 29. VIII. 1994, K. & A. KALB (hb. KALB 33341); *c.* 10 km W of Touho, on *Rhizophora* in a mangrove swamp, 2 m, 21°15' S, 165°37' E, 26. VIII. 1994, K. & A. KALB (hb. KALB 27580).

Tephromela alectoronica KALB sp. nov.

Similis *Tephromelae sorediatae*, sed thallo esoredioso differt.

Typus: Australia. Queensland: Main Range, Millstream Falls National Park, Millstream Falls SW of Ravenshoe, on *Eucalyptus*, *c.* 760 m, 10. VIII. 1993, H. MAYRHOFER 11783 & E. HIERZER (CANB - holotype, GZU - isotype; fig. 4).

Etymology: The species is named after its major metabolite, alectoronic acid.

Thallus corticolous, rather thick (150-250 µm), bullate areolate or rimose areolate, whitish grey, ochre grey to dark grey, up to 6 cm wide, areolae 0.2-

0.3 mm wide, prothallus white. Apothecia 0.7-1 mm diam., round to irregular, sessile with constricted base, surrounded by a thick, crenulate or entire margin concolorous with the thallus. Hymenium 110-140 µm high, purple brown or purple-violet, purplish brown, brown or blue green (in KALB 26102) in the upper part. Hypothecium orange-brown, 50-70 thick. Ascospores 8 per ascus, broadly ellipsoid, 12-17 × 6-9 µm. Conidia filiform, 14-20 × 1-1.2 µm.

Chemistry: atranorin (major or minor), alectoronic acid (major), ± physodic acid (trace).

Notes: *Tephromela alectoronica* resembles *T. sorediata* KALB & ELIX but is distinguished by the lack of soralia. Consequently it can be regarded as the primary species of *T. sorediata* (POELT 1970). As is common with secondary, crustose sorediate species, *T. sorediata* has a rather narrow ecology compared to its non-sorediate counterpart. *Tephromela rhizophorae* is a further species with alectoronic acid as the major metabolite (see below), but it can readily be separated by its smaller ascospores and very restricted habitat. *T. atra*, which looks similar and which has been reported to be common in Australia, is saxicolous and has α-collatolic acid as a major metabolite. Associated species in Brazil are *Lecanora concilianda* VAIN., *L. caesiorubella* ACH., *Ochrolechia africana* VAIN., *Pertusaria* sp. and *Ramboldia russula* (ACH.) KALB, LUMBSCH & ELIX. In Australia, I have noted *Cratiria dissimilis* (NYL.) MARBACH (new for Australia) and a *Ramboldia* sp.

The differences in the coloration of the hymenia and epihymenia even within one collection, is not fully understood yet.

Additional specimens examined: **Australia**. Australian Capital Territory: Molongo Gorge Reserve, *c.* 16 km E of Canberra, in an open, humid forest with *Acacia* sp., *Eucalyptus macrorhyncha, Callitris endlicheri*, 35°20' S, 149°16' E, 7 IX. 1995, K. KALB, J. ELIX & G. KANTVILAS (hb. KALB 29205); New South Wales: Oxley Wild Rivers National Park, Wollomombi Falls, *c.* 40 km NE of Armidale, 900 m, 30°20' S, 151°55' E, 10. VIII. 1988, K. KALB & J. WILLIAMS (hb. KALB 20385); New South Wales: Blue Mountains, trail between Echo Point and Carrington Park, in a dry temperate rainforest, 1000 m, 33°43' S, 150°19' S, 30. VII. 1988, K. & A. KALB (hb. KALB 20523); Western Australia: *Dryandra* Forest, a few km NW of Narrogin, 300 m, 32°45' S, 116°56' E, 17 VIII. 1994, K. & A. KALB (hb. KALB 36749); **Brazil**. Bahia: Serra do Tombador, *c.* 1 km E of Morro do Chapeú, in a caatinga, 1000 m, 11°40′ S, 41°10′ W, 19. VII. 1980, K. KALB & M. MARCELLI (hb. KALB 25312); Minas Gerais: Serra da Mantiqueira; Fazenda São Mateus, some km outside Vila Monte Verde, *c.* 40 km E of Camanducaia, on fence posts, 1800 m, 22°45′ S, 46°05′ W, 29. XI. 1980, K. KALB (hb. KALB 26103); Mato Grosso do Sul: *c.* 30 km SW of Campo Grande, on sun-exposed fence posts in an open pasture, 550 m, 20°40′ S, 5440′ W, 16. XI. 1979, K. KALB & G. PLÖBST (hb. KALB 26102); Rio de Janeiro: Serra da Mantiqueira; Itatiaia, between Registro do Picú and Agulhas Negras, at the edge of a dense rainforest, 1900 m, 22°20′ S, 44°45′

W, 23. VII. 1978, K. KALB & G. PLOBST (hb. KALB 26105); Rio Grande do Sul, near Porto Alegre, 9. IX. 1979, J. GOERGEN (hb. KALB 11570).

Tephromela physodica KALB & ELIX sp. nov.

Similis *Tephromelae bunyanae*, sed materia chemica et ascosporis late ellipsoideis differt.

Typus: Australia. Queensland: Kerry, Duck Creek Road near Lamington National Park close to O'Reilly's Mountains Resort, *c.* 850-950 m, 18. VIII. 1993, H. MAYRHOFER 11380, E. HIERZER & R. ROGERS (CANB - holotype, GZU - isotype; fig. 5).

Etymology: The species is named after its major metabolite, physodic acid.

Thallus corticolous, rather thick (100-150 µm), areolate, whitish grey to ash-grey, up to 10 cm wide, areoles 0.3-1 mm diam., prothallus black. Apothecia 1-2.5 mm diam., round to irregular, sessile with constricted base, surrounded by a thick margin concolorous with the thallus. Hymenium 150-200 µm high, purple-violet to purplish brown in the upper part. Hypothecium orange-brown, 75 µm thick. Ascospores 8 per ascus, broadly ellipsoid to subsphaerical, 8-12 × 6-8 µm. Conidia filiform, 8-12 × 1.5 µm.

Chemistry: atranorin (submajor), physodic acid (major), ± 2'-*O*-methylphysodic acid (trace), ± norcolensoic acid (trace).

Notes: This species is well characterized by its ecology and chemistry. *T. immersa* Kalb & Elix which has similar chemistry, is saxicolous and has immersed apothecia. Unlike many other species of *Tephromela* which grow in open and ± dry habitats, *T. physodica* prefers the interior of subtropical or temperate rainforests. Few other lichens are common associates but may include *Tibellia dimerelloides* HAFELLNER & VĚZDA and various sterile sorediate crusts.

Additional specimens examined: Australia. Queensland: McPherson Range, near Lamington National Park, Duck Creek Road, in a subtropical rainforest, 900 m, 24°14' S, 153°07' E, 18. VIII. 1992, K. & A. KALB (hb. KALB 25796); Cunninghams Gap National Park, *c.* 40 km NW of Warwick, in a subtropical rainforest, 750 m, 28°00' S, 152°24' E, 12. VIII. 1988, K. & A. KALB (hb. KALB 21438), 19. VIII. 1992, K. & A. KALB (hb. KALB 35867); *c.* 5 km ENE of Benarkin, c. 24 km E of Yarraman, in a humid *Araucaria* forest, 250 m, 14. VIII. 1988, K. KALB & R. ROGERS (hb. KALB 18001); ascent to Bunya Mountains, *c.* 12 km NNE of Mt. Mowbullan, 680 m, 26°50' S, 151°38' E, 14. VIII. 1988, K. KALB & R. ROGERS (hb. KALB 18997); Bunya Mountains, Mt. Mowbullan, in a very humid rainforest, 1000 m, 26°53' S, 151°36' E, 15. VIII. 1988, K. KALB & R. ROGERS (hb. KALB 20416); Bunya Mountains National Park, Burtons Well track to Mt. Kiangarow, 68 km N of Dalby, at margins of rainforest, 1100 m, 26°50' 17"S, 151°33'12" E, 6. V 2005, J. A. ELIX 37668 (CANB).

Tephromela rhizophorae KALB sp. nov.

Similis *Tephromelae atrae*, sed in corticibus arborum crescente, acidum α-collatolicum deficiente et sporis minoribus differt.

Typus: Brazil. São Paulo: Praia de Peruibe near Itanhaém, in a dense mangrove forest on *Rhizophora mangle*, 2 m, 24°10′ S 46°50′ W, 23. IX. 1978, K. KALB & G. PLÖBST (hb. KALB 26099 - holotype; fig. 6).

Etymology: The name is derived from the phorophyte on which the holotype was growing.

Thallus corticolous, rather thick (100-200 µm), areolate, whitish grey to ash-grey, up to 10 cm wide or more, areoles 0.2-1 mm diam., prothallus black. Apothecia 1-2 mm diam., round to irregular, sessile with constricted base, surrounded by a thick margin concolorous with the thallus. Hymenium 80-100 µm high, purple-violet to purplish brown in the upper part. Hypothecium orange-brown, 100 µm thick. Ascospores 8 per ascus, broadly ellipsoid, 8-10 × 5-6 µm. Pycnidia not seen.

Chemistry: atranorin (major), chloroatranorin (trace), alectoronic acid (major), ± physodic acid (minor, trace or not detected).

Notes: This new species is distinguished by the small ascospores which are often lying across the ascus, the distinct chemistry (i.e. the absence of α-collatolic acid) and the habitat (its preference for *Rhizophora* in mangrove forests). *Tephromela tropica* KALB also has small ascospores and a similar chemistry, but that species differs by the white, fibrose prothallus, apothecia with a much thinner thalline margin and a different ecology. *Tephromela alectoronica* also shares this chemistry, but *T. rhizophorae* is readily distinguished by its smaller ascospores.

Additional specimens examined: Brazil. São Paulo: Ilha Comprida opposite Cananéia, in a mangrove forest on *Rhizophora mangle*, 1 m, 25°00′ S, 47°50′ W, 16. VII. 1979, K. KALB (hb. KALB 36601); between São Lourenço and Juquií, *c.* 65 km W of São Sebastião, around the river mouth of Rio Guaratuba, in a mangrove forest, on *Rhizophora mangle*, 2 m, 23°47′ S, 45°55′ W, 19. II. 1980, K. KALB (hb. KALB 26094, 36600).

Tephromela sorediata KALB & ELIX

This species was described in ELIX & KALB (2006) from montane, *Eucalyptus* forests in south-eastern Australia. Morphologically and chemically identical specimens have now been observed from Patagonia. This distribution could be explained if *T. sorediata* was an old Gondwanan species. However, sorediate species are thought to have evolved relatively recently and their distribution the result of long distance dispersal. Perhaps appropriate studies in population genetics can resolve this problem.

Specimens studied: Argentina. Rio Negro: Northern slope of Cerro Otto, *c.* 10 km W of San Carlos de Bariloche, on *Nothofagus*, 41°10′ S, 71°20′ W, 29.-30 XII.

1980, K. KALB (hb. KALB 26090, 26122); above Llao Llao, *c.* 25 km NW of San Carlos de Bariloche, in a rather disturbed *Nothofagus* forest, 1250 m, 41°10′ S, 71° 30′ W, 31. XII. 1980-1. I. 1981, K. KALB (hb. KALB 25314, 25315, 26123).

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I am very happy to dedicate this paper to my old friend in the field of lichenology, Prof. Volkmar WIRTH on the occation of his 65th birthday in honour of his many contributions to lichenology.

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Annex:

fig. 1-6 on page III

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