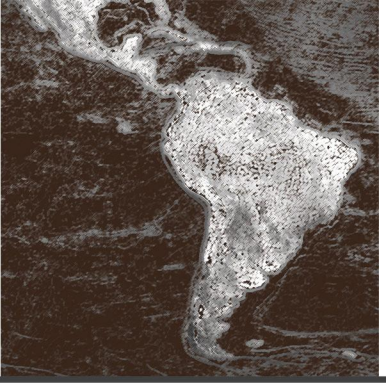

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Marcelaria, a new genus for the *Laurera purpurina* group in the *Trypetheliaceae* (Ascomycota: Dothideomycetes)

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Resumen — Aptroot, A., Nelsen, M. P. & Parnmen, S. (2013) *Marcelaria*, a new genus for the *Laurera purpurina* group in the *Trypetheliaceae* (Ascomycota: Dothideomycetes). *Glalia* **5(2):** 1–14. — Introducimos el nuevo género *Marcelaria* Aptroot, Nelsen & Parnmen, para el grupo de *Laurera benguelensis*, un linaje pequeño dentro de *Trypetheliaceae* que tiene buen soporte en estudios de filogenia molecular y una morfología distinctiva de sus ascomata. El género se caracteriza por tener ascomata sésiles, solitarios a aggregados, con la región ostiolar ancha y plana y frecuentemente una fisura entre la pared interior del ascoma y el tejido adjacente. Se aceptan tres especies en este género, las cuales previamente fueron incluidos en el género *Laurera* sensu lato: *M. purpurina* (Nyl.) Aptroot, Nelsen & Parnmen, una especie del Neotrópico y de Africa tropical con los ascomata rojo brillantes; *M. benguelensis* (Müll. Arg.) Aptroot, Nelsen & Parnmen, una especie de Asia Oriental con ascomata amarillo-anaranjados y el talo con pruina naranja y el himenio insperso; y *M. cumingii* (Mont.) Aptroot, Nelsen & Parnmen, otra especie de Asia Oriental con ascomata amarillo-anaranjados y himenio insperso pero el talo sin pruina. Todas las especies y sus tipos son ilustradas con imágenes y se agrega una clave taxonómica. La química de los pigmentos se clarificó usando análisis de TLC comparativa.

Abstract — Aptroot, A., Nelsen, M. P. & Parnmen, S. (2013) *Marcelaria*, a new genus for the *Laurera purpurina* group in the *Trypetheliaceae* (Ascomycota: Dothideomycetes). *Glalia* **5(2):** 1–14. — We describe the new genus *Marcelaria* Aptroot, Nelsen & Parnmen for the *Laurera benguelensis* group, a small lineage within *Trypetheliaceae* that is well-supported in molecular phylogenetic studies and features distinctive ascoma morphology. The genus is characterized by sessile, solitary to aggregate ascoma warts with broad, flat ostiolar region and often a split between the inner ascoma wall and the surrounding tissue. Three species are accepted in this genus, all previously placed in *Laurera* sensu lato: the neotropical and African *M. purpurina* (Nyl.) Aptroot, Nelsen & Parnmen, with bright red ascomata; the East Asian *M. benguelensis* (Müll. Arg.) Aptroot, Nelsen & Parnmen, with (orange-)yellow perithecia and an orange pruinose thallus, as well as inspersed hamathecium; and the East Asian *M. cumingii* (Mont.) Aptroot, Nelsen & Parnmen, with (orange-)yellow perithecia with a broad ostiolar region and a smooth, non-pruinose thallus, also with inspersed hamathecium. All three species are illustrated and a taxonomic key is given. The pigment chemistry of the species was clarified using comparative TLC analysis.

Palabras clave • Key words — Amazon, Democratic Republic of Congo, India, Ivory Coast, Philippines, Thailand, *Trypethelium*.

Introduction

Trypetheliaceae is one of the predominant elements of crustose lichen communities in tropical forests and savannas (HARRIS 1986; MAKHIJA & PATWARDHAN 1988, 1993; SIPMAN & HARRIS 1989; KOMPOSCH & HAFELLNER 2003; APTROOT et al. 2008; RIVAS PLATA et al. 2008). The family was traditionally included in Pyrenulales, but molecular data subsequently placed it within Dothideomycetes, in its own order Trypetheliales, whereas Pyrenulales form part of Eurotiomycetes (APTROOT et al. 2008; NELSEN et al. 2009, 2011). Likewise, molecular phylogenetic studies changed our view of generic classification within the family. Traditionally accepted genera based on ascoma arrangement and ascospore septation largely form unnatural groups, whereas details in ascoma anatomy and ascospore septal type, as well as ecology, are good predictors of monophyletic clades (NELSEN et al. 2012). Thus, the genus *Trypethelium* sensu stricto is now narrowly defined by pseudostromatic ascoma clusters with internal, powdery pigment and transversely multiseptate ascospores with more or less rectangular lumina. On the other hand, the genus *Astrothelium* now includes the bulk of species previously separated in the genera *Astrothelium*, *Cryptothelium*, *Laurera*, and *Trypethelium* sensu lato, independent of ascoma arrangement and ascospore septation, although most species in this genus have their ascomata immersed in thalline warts.

Laurera was traditionally recognized by solitary to aggregate perithecia with apical ostiole and muriform, hyaline ascospores (LETROUIT-GALINOU 1957, 1958; Mathey 1979, HARRIS 1986; MAKHIJA & PATWARDHAN 1988; APTROOT et al. 2008). Later, several authors recognized the morphological disparateness of species included in the genus and proposed the recognition of various groups (LETROUIT-GALINOU 1957, 1958; UPRETI & SINGH 1987). One of these is the *L. benguelensis* group, characterized by sessile, solitary to aggregate perithecial warts with broad, flat ostiolar region and often a split between the proper ascoma wall and surrounding thallus warts, superficially similar to the double margin found in *Thelotrema* in the *Graphidaceae*. The ascoma warts contain several layers, including an outer and an inner, strongly gelatinous cortex, a medulla filled with pigment crystals, and a proper, carbonized inner wall (excipulum), whereas algal cells are absent and restricted to the vegetative thallus. This group is one of the few morphologically characterized groups that form separate clades within *Trypetheliaceae*, distinct from both *Trypethelium* sensu stricto and the large *Astrothelium* clade. The three species currently recognized in this group, two of which having been sequenced, are the neotropical and African *L. purpurina* (Nyl.) Zahlbr., with bright red perithecia, the East Asian *L. benguelensis* (Müll. Arg.) Zahlbr., with (orange-)yellow perithecia and an orange pruinose thallus, and the East Asian *L. cumingii* (Mont.) Zahlbr., with orange-yellow perithecia with a broad osiolar area and a non-pruinose thallus. In the present paper, we describe the clade formally as the new genus *Marcelaria*.

Special attention was paid to the nature of the anthraquinone pigments in these species. In the literature, there are several reports pertaining to the nature of these pigments, identified with a wide range of methods which are not readily available for identification purposes (STENSIÖ & WACHTMEISTER 1969; MATHEY 1981; MATHEY et al. 1980; MANOJLOVIĆ et al. 2009, 2010; MARKOVIĆ & MANOJLOVIĆ 2010). As anthraquinones from this group form very specific patterns on TLC plates, we report the patterns with this standard method and compare this with a range of other patterns present in mostly tropical lichens.

Material and Methods

Identification and descriptive work was carried out in Itabaiana, Universidade Federal de Sergipe, using a LEICA EZ4 dissecting microscope and a LEICA DM500 compound microscope, in Soest, using an OLYMPUS SZX7 dissecting microscope and an OLYMPUS BX50 compound microscope with interference contrast, connected to a NIKON Coolpix digital camera, and at the Field Museum, using LEICA MS5, MOTIC K400, and OLYMPUS SZX12 dissecting microscopes and ZEISS Axioscope 2, OLYMPUS BH-2, and VISTA VISION VWR V036 compound microscopes, in part connected to JENOPTIC ProgRes C3 and C5 digital microscope cameras. Sections were mounted in tap water, in which also all measurements were taken. Chemistry was investigated by comparative TLC using solvent A (ORANGE et al. 2001) and by applying 10% KOH solution to sections and as spot test.

Results and Discussion

Marcelaria Aptroot, Nelsen & Parnmen gen. nov.

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A new genus in the family *Trypetheliaceae* characterized by unilocular, solitary or aggregated pseudostromata covered by bright (orange-)yellow or red pigment and usually with a split between the inner wall and the surrounding tissue; ascospores muriform, hyaline.

Type: *Marcelaria purpurina* (Nyl.) Aptroot, Nelsen & Parnmen.

Etymology — We dedicate this genus to our colleague and friend Marcela Cáceres, for her contributions to the knowledge of Brazilian microlichens and on the occasion of her birthday on the day this paper is published. The type of the new genus is her favorite lichen.

Description — Thallus crustose, corticolous on tree trunks, in part endoperidermal, with a thin, prosoplectenchymatous, cartilaginous cortex; photobiont *Trentepohlia*. Ascomata abundant, perithecioid, sessile, in unilocular, solitary or aggregated warts but not pseudostromatic, covered by bright (orange-)yellow or red pigment, usually with a split between the inner wall and the surrounding covering tissue; the covering tissue mostly formed by a thick, gelatinous inner cortex that becomes greenish in K. Hamathecium composed of thin, straight, branched and anastomosing paraphysoids embedded in gelatinous matrix, IKI-negative. Asci bitunicate, with clearly discernable layers and broad, flat ocular chamber, clavate with short stipe, IKI-negative. Ascospores hyaline, muriform, oblong-oval to ellipsoid or fusiform, without distinct median septum, with endospore and more or less rounded lumina. Pycnidia with punctiform ostiole, internally brain-like lobate. Conidia hyaline, bacillar. Chemistry: several red, orange and/or yellow anthraquinones present (sometimes partly restricted to thallus or ascomata) and often also lichexanthone.

Discussion — *Laurera purpurina*, *L. benguelensis* and *L. cumingii* were treated in two separate groups by LETROUIT-GALINOU (1957) and MAKHIJA & PATWARDHAN (1988), the *L. megasperma* and *L. cumingii* groups. However, the species agree well in morphological and anatomical details, except for the red versus (orange-)yellow pigment. One of the differences that appears to have caused their placement in different groups is the relatively thicker cor-

tex covering the inner ascoma wall in *L. purpurina*. The rather broad, flat-topped ascomata usually containing a single perithecium (but several ascomata often aggregated), with a split between inner wall and adjacent cover, are very characteristic and, together with the muriform ascospores, distinguish these species from the closely related genus *Trypethelium* (NELSEN et al. 2012). The two sequenced species, *Marcelaria purpurina* from the Neotropics and Africa, and *M. cumingii* from Southeast Asia, form a strongly supported clade (NELSEN et al. 2012), underlying the importance of these morphological characters for predicting phylogenetic relationships.

***Marcelaria benguelensis* (Müll. Arg.) Aptroot, Nelsen & Parnmen comb. nova**

MycoBank 805451

Bathelium benguelense Müll. Arg., *Flora* **68:** 256 (1885); *Laurera benguelensis* (Müll. Arg.) Zahlbr., *Cat. Lich. Univ.* **1:** 503 (1922). **Type:** India, *Kurz 173* (G, lectotype!, selected here).

Laurera subbenguelensis Upreti & Ajay Singh, *Bull. Jard. Bot. Nat. Belg.* **57:** 380 (1987). **Type:** India, *Singh & Ranjan 102285* (LWG, holotype, not seen).

(Fig. 1, 2A–B)

Description — Thallus olive-green; surface often partly to completely orange pruinose (a different pigment compared to that of the ascomata). Ascoma warts 0.6–1 mm diam. and up to 0.7 mm high, clusters of 2–6 warts up to 2.5 mm diam., bright (orange-)yellow; surface smooth to rough, often slightly shiny; in section with 3–5 µm thick, prosoplectenchymatous upper cortex and 50–100 µm thick, gelatinous main cortex filled with yellow-olive to orange-brown pigment granules (see SCHUMM & APTROOT 2012). Proper wall (excipulum) 50–80 µm thick, becoming thicker towards the ostiole, brown-black, carbonized; nucleus 0.4–0.5 mm diam. and 0.5–0.6 mm high. Hamathecium densely and heavily inspersed; oil droplets lining the paraphysoids, angular-rounded, 3–7 µm diam. Ascospores 8 per ascus, their wall IKI-negative, muriform with 15–23 transverse septa and 3–7 longitudinal septa per segment, 50–80 × 17–23 µm, surrounded by a 3–12 µm thick gelatinous sheath. Conidia 5 × 0.5 µm.

Secondary chemistry — Thallus UV+ yellow, K– or K+ blood-red where orange pigment is present as pruina or in the thin medulla; ascoma warts UV+ yellow, K+ blood-red with purplish hue. TLC: Two anthraquinones (parietin = physcione, teloschistin = fallacinol) plus lichexanthone.

Discussion — This is a rather conspicuous species, restricted to continental Southeast Asia, reported from India, Myanmar, Thailand, Cambodia, and the Philippines (LETROUIT-GALINOU 1957; MAKHIJA & PATWARDHAN 1988; MANOJLOVIĆ et al. 2009 & 2010; MOON et al. 2013). It differs from *Marcelaria cumingii* in the pruinose thallus and smaller ascomata with narrow ostiolar region and from *M. purpurina* in the (orange-)yellow ascomata and inspersed hymenium. The pigments of *M. benguelensis* were given by MANOJLOVIĆ et al. (2009) as 1,8-dihydroxy-3-methoxy-6-methylanthraquinone, 1,8-dihydroxy-3-formyl-6-methoxyanthraquinone, 1,8-dihydroxy-3-hydroxymethyl-6-methoxy-anthraquinone, and 1,3,8-trihyroxy-6-methylanthraquinone, but later on, these substances were identified with secalonic acid D, parietin, emodin, teloschistin, and citreorosein (MANOJLOVIĆ et al. 2010), pigments shared

mostly with species of *Teloschistaceae* but also reported from *Trypethelium* and *Pyrenula* species (HAUSCHILD et al. 1968; SANTESSON 1970; MATHEY 1979; MATHEY et al. 1980; SØCHTING 1997; TAKENAKA et al. 2000; FAZIO et al. 2012). MATHEY (1981) also reported lichexanthone for *Laurera benguelensis*, which was confirmed by MANOJLOVIĆ et al. (2010) and MARKOVIĆ & MANOJLOVIĆ (2010), who also reported norlichexanthone. We co-chromatographed two specimens, one from Cambodia [Angkor Wats, *Kashiwadani & Moon 50349* (ABL ex TNS)] and one from Thailand [Sukhotai, *Bandoni et al. 10636* (ABL ex L)] and found them to consistently contain two anthraquinone spots (parietin, teloschistin) plus lichexanthone.

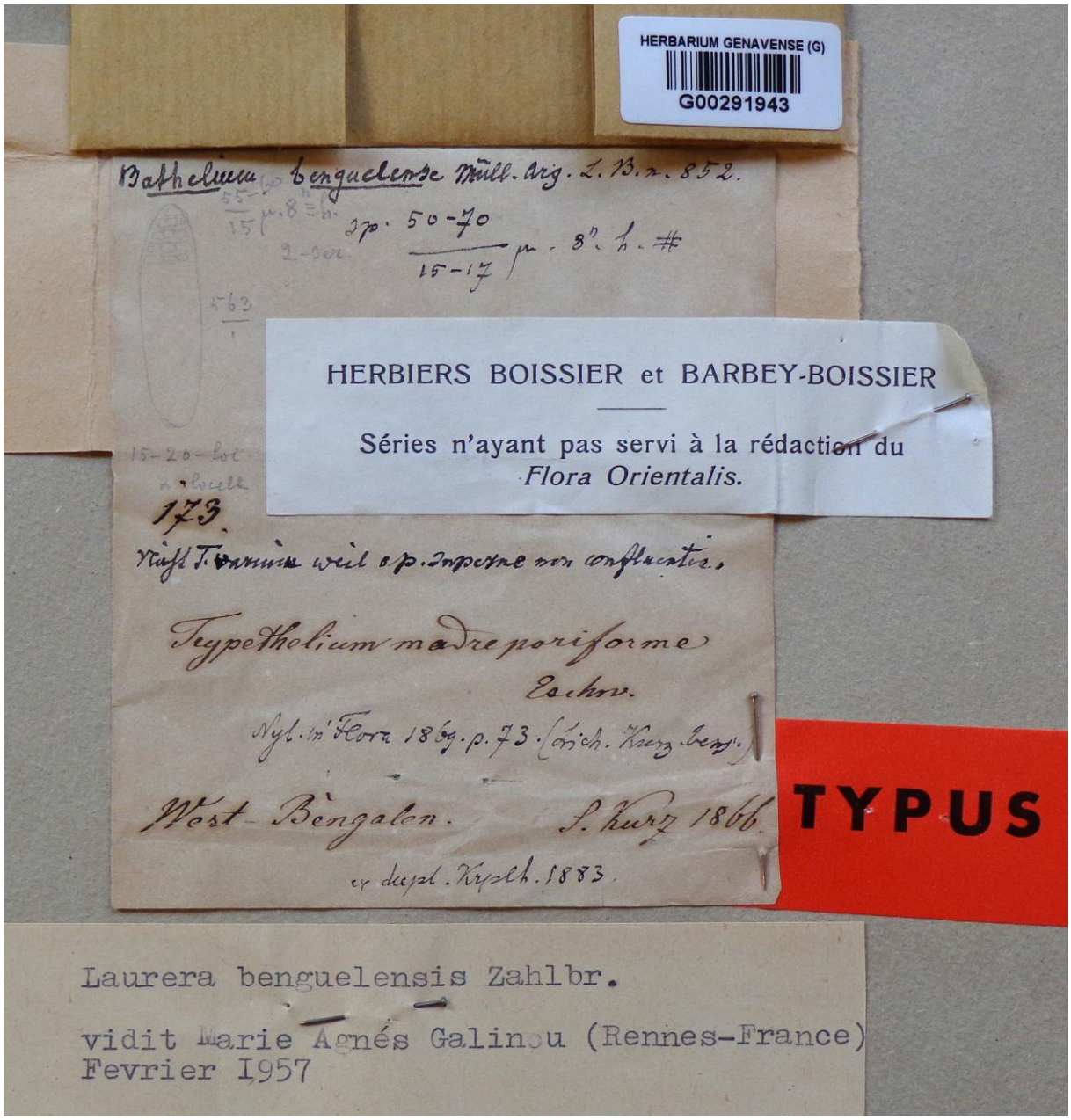

Figure 1 — *Marcelaria benguelensis* (holotype label of *Bathelium benguelense* in G).

Laurera subbenguelensis Upreti & Ajay Singh (UPRETI & SINGH 1987; MAKHIJA & PATWARDHAN 1988) was stated to differ from *L. benguelensis* mainly by the inspersed hamathecium. This is based on a misinterpretation, since the type of *Bathelium benguelense* is strongly inspersed. The error stems from the fact that UPRETI & SINGH (1987) studied syntype material of *Bathelium benguelense* from H with the correct collector data (*Kurz 173*), but annotated as *B. madreporiforme* (Eschw.) Trevis. That material in fact appears to represent *B. mastoideum* Afz. ex Ach.; it lacks external pigment pruina on the ascomata and has a crystalline, pigment-filled medulla and a non-inspersed hymenium. In contrast, the lectotype in G selected here fits the protologue of *B. benguelense* in having non-stromatic ascomata with external pigment pruina, lichexanthone, and an inspersed hymenium. Hense, the interpretation of *Laurera benguelensis* and *L. subbenguelensis* in subsequent works (e.g. MAKHIJA & PATWARDHAN 1988; AWASTHI 1991), following UPRETI & SINGH (1987), is incorrect. Although we did not study the type of *Laurera subbenguelensis*, its description and the excellent color picture of the type in SINGH & SINHA (2010: 38, fig. 23E) leave little doubt that it is conspecific with *Marcelaria benguelensis* in its correct circumscription: the ascomata show a yellow pigment pruina, very similar to that of the lectotype of *M. benguelensis*; the overall appearance suggests the present of lichexanthone; and the ascoma morphology fits into the range of variation observed for the latter. The excellent illustrations provided by SCHUMM (2013) and SCHUMM & APTROOT (2012) under the name of *Laurera subbenguelensis* also refer to *Marcelaria benguelensis*.

The thick medulla-like tissue found in the outer ascoma wall in *Marcelaria* and other *Trypetheliaceae* was interpreted as medullary tissue (LETROUIT-GALINOU 1957; MAKHIJA & PATWARDHAN 1988). However, when sectioning well-developed thalli in species such as *Laurera megasperma*, it becomes apparent that this tissue is structurally identical to the thick inner cortex of the thallus which is situated above the photobiont layer, not the medulla which is situated below. In addition, the tissue represents a highly relatinized and dense hyphal tissue, not a loose medullary tissue. Thus, in *Marcelaria*, apparently only the cortex covers the ascomata, whereas in *Laurera megasperma* and many other taxa in the *Astrothelium* clade, beneath that cortex there is also an algal layer and a reduced medulla present in the covering tissue.

Marcelaria cumingii **(Mont.) Aptroot, Nelsen & Parnmen comb. nova**

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Trypethelium cumingii Mont. in Hooker, *London J. Bot.* **4:** 5 (1845); *Bathelium cumingii* (Mont.) Trevis., *Flora* **44:** 21 (1861); *Trypethelium cumingianum* Stirt., *J. Linn. Soc. Bot.* **14:** 473 (1875) [nom. illeg.]; *Melanotheca cumingiana* (Stirt.) Müll. Arg., *Bull. Herb. Boissier* **2**(App. 1): 96 (1894) [nom. illeg.]; *Laurera cumingii* (Mont.) Zahlbr., *Catal. Lich. Univ.* **1:** 503 (1922), also als '*cummingii*.' **Type:** Philippines, *Cuming* (BM, holotype!; H, isotype!).

(Fig. 2C–F, 3)

Description — Thallus greenish to yellowish orange but not pruinose. Ascoma warts 0.5–0.8 mm diam. and up to 0.5 mm high, clusters of 2–5 warts up to 2 mm diam., bright (orange-)yellow but ostiolar region usually black; surface smooth to rough, often slightly shiny; in section with 3–5 µm thick, prosoplectenchymatous upper cortex and 40–80 µm thick, gelatinous main cortex filled with yellow-olive to orange-brown pigment granules. Proper wall (excipulum) 30–60 µm thick, becoming thicker towards the ostiole, brown-black,

carbonized; nucleus 0.3–0.4 mm diam. and 0.3–0.4 mm high. Hamathecium clear. Ascospores 2 per ascus, their wall IKI-negative or sometimes IKI+ brownish (dextrinoid), muriform with 15–21 transverse septa and 3–7 longitudinal septa per segment, 50–70 × 14–22 µm, surrounded by a 3–9 µm thick gelatinous sheath. Conidia 4–5 × 0.5 µm.

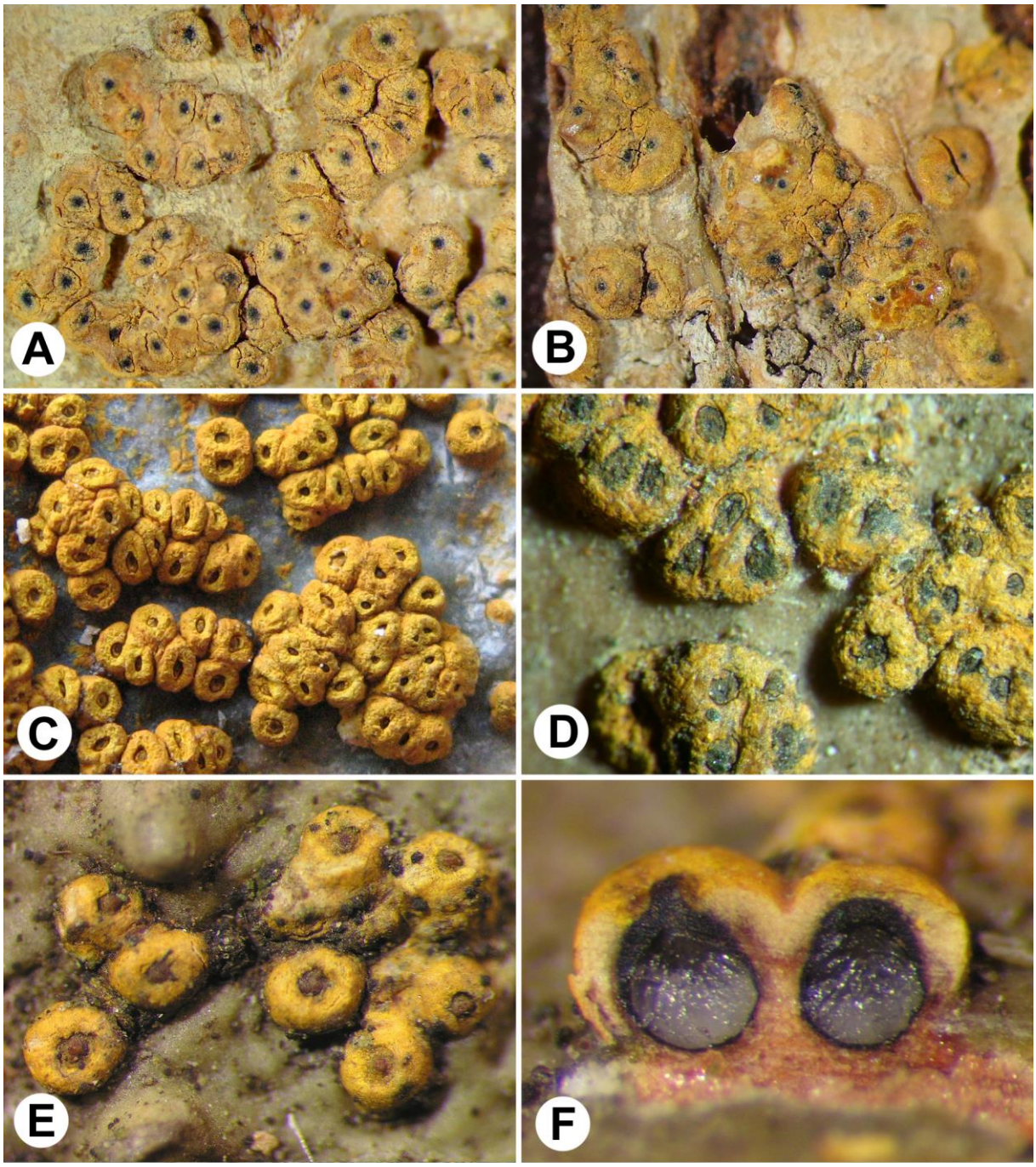

Figure 2 — *Marcelaria benguelensis* and *M. cumingii*. A–B, *M. benguelensis*, thallus with ascomata (holotype of *Bathelium benguelense* in G). C–F, *M. cumingii*, thallus with ascomata (C, Thailand, unknown collector; image by Wetchasart Polyam; D, Philippines, *Aptroot 20052*; E–F, Thailand, *Parnmen s.n.*).

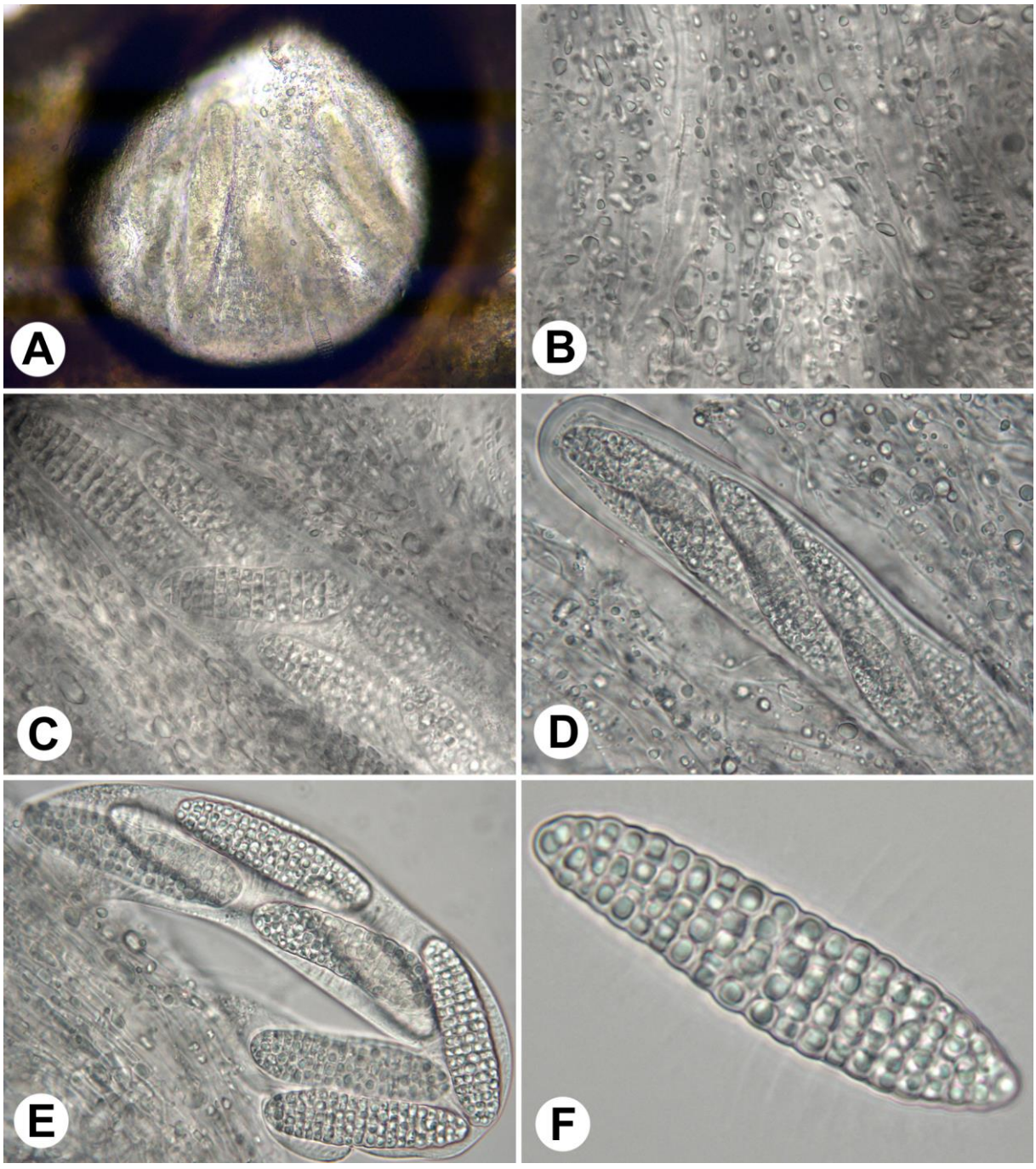

Figure 3 — *Marcelaria cumingii* (Thailand, *Parnmen s.n.*). A, section through ascoma. B, inspersed hamathecium. C–E, ascus with ascospores. F, Ascospore.

Secondary chemistry — Thallus UV+ yellow, K+ purple; ascoma warts UV+ yellow, K+ purple. TLC: Three anthraquinones (parietin = physcione, emodin, and a trace derivate) plus lichexanthone.

Discussion — *Marcelaria cumingii* is externally very similar to *M. benguelensis*, although it has a non-pruinose thallus and slightly larger ascomata with broader ostiolar region. Also, TLC usually reveals three instead of two anthraquinones. *Marcelaria cumingii* is known with certainty only from Southeast Asia (Philippines). It was previously incorrectly reported from India [Andaman Islands; the material cited by MAKHIJA & PATWARDHAN (1988) and AWASTHI (1991) refers to *M. benguelensis*]. The material reported from New Zealand is a another species, probably a *Bathelium*, as the ascomatal warts are glossy black (GALLOWAY 1985). We chromatographed one specimen of *M. cumingii* from the Philippines [Luzon, *Aptroot 20052* (ABL)].

Marcelaria purpurina **(Nyl.) Aptroot, Nelsen & Parnmen comb. nova**

MycoBank 805453

Trypethelium purpurinum Nyl. in Leighton, *Trans. Linn. Soc. London* **25:** 459 (1866); *Bathelium purpurinum* (Nyl.) Müll. Arg., *Linnaea* **63:** 45 (1880); *Laurera purpurina* (Nyl.) Zahlbr., *Denkschr. Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Kl.* **83:** 93 (1909). **Type:** Brazil, *Spruce 236* (PC, holotype!).

Tremotylium sprucei Müll. Arg., *J. Linn. Soc., London* **30:** 454 (1895). **Type:** Brazil, *Spruce 187* (G, holotype!).

(Fig. 4, 5)

Description — Thallus olive-green but sometimes with patches of bright red pruina. Ascoma warts 0.7–1.2 mm diam. and up to 0.7 mm high, clusters of 2–10 warts up to 4 mm diam., bright red; surface rough by the often thick pruina; in section with 5–8 µm thick, prosoplectenchymatous upper cortex and 100–200 µm thick, gelatinous main cortex filled with yellow-olive to orange-brown pigment granules. Proper wall (excipulum) 50–80 µm thick, becoming thicker towards the ostiole, brown-black, carbonized; nucleus 0.5–0.7 mm diam. and 0.4–0.5 mm high. Hamathecium clear. Ascospores 8 per ascus, their wall IKI+ violet, densely muriform with 29–49 transverse septa and 5–9 longitudinal septa per segment, 110–170 × 14–26 µm, surrounded by a 5–10 µm thick gelatinous sheath. Conidia not observed.

Secondary chemistry — Thallus UV–, K+ purple; ascoma warts UV–, K+ purple. TLC: Five anthraquinones (xanthorin = lauropurpurone, parietin = physcione, and three other orange anthraquinones, possibly secalonic acid derivates).

Discussion — *Marcelaria purpurina* is one of the most conspicuous neotropical rain forest lichens. It is not common but occurs widely in the Amazon region, especially in western Amazonia (Colombia, Venezuela, Guyana, Brazil, Bolivia; LETROUIT-GALINOU 1957; KOMPOSCH & HAFELLNER 2003). The species is also found in tropical West Africa (ABBAYES 1953; LETROUIT-GALINOU 1957), hence showing a Gondwanan distribution. Besides its distribution range, it differs from the southeast Asian *M. benguelensis* and *M. cumingii* in the red instead of (orange-)yellow pigment pruina, the generally larger ascomata with thick main cortex, and the substantially larger, amyloid ascospores. These morphological differences together with the non-overlapping distribution make the genus *Marcelaria* an exemplar lichen genus to study Gondwanan versus Laurasian distribution patterns in lichens and emphazises close paleogeographical relationship of western tropical Africa with the Neotropics (LÜCKING 2003).

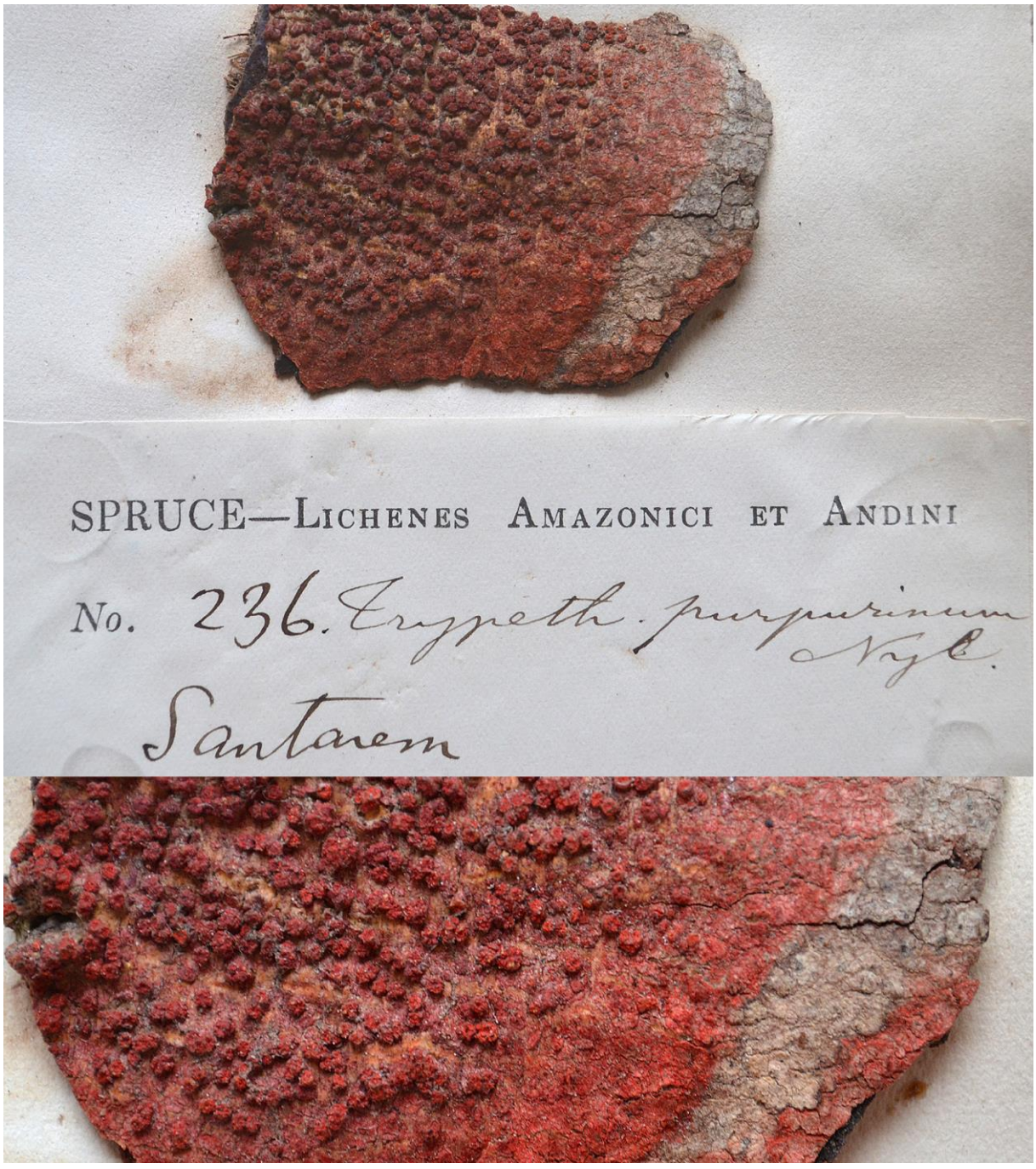

Figure 4 — *Marcelaria purpurina* (holotype of *Trypethelium purpurinum* in PC).

Based on material from Africa (Ivory Coast), the dominant red pigment in *Marcelaria purpurina* was determined as xanthorin (1,5,8-trihydroxy-6-methoxy-3-methylanthraquinone = lauropurpurone), a pigment also found in *Rusavskia elegans* (Link) S.Y. Kondr. & Kärnefelt (STENSIÖ & WACHTMEISTER 1969; MATHEY et al. 1980). We co-chromatographed another specimen from Africa [Democratic Republic of Congo, *Ertz 14840* (ABL ex BR)] and a speci-

men from the Amazon [Brazil, *Cáceres & Aptroot 11203* (ABL ex ISE)] and found them to contain exactly the same five anthraquinones.

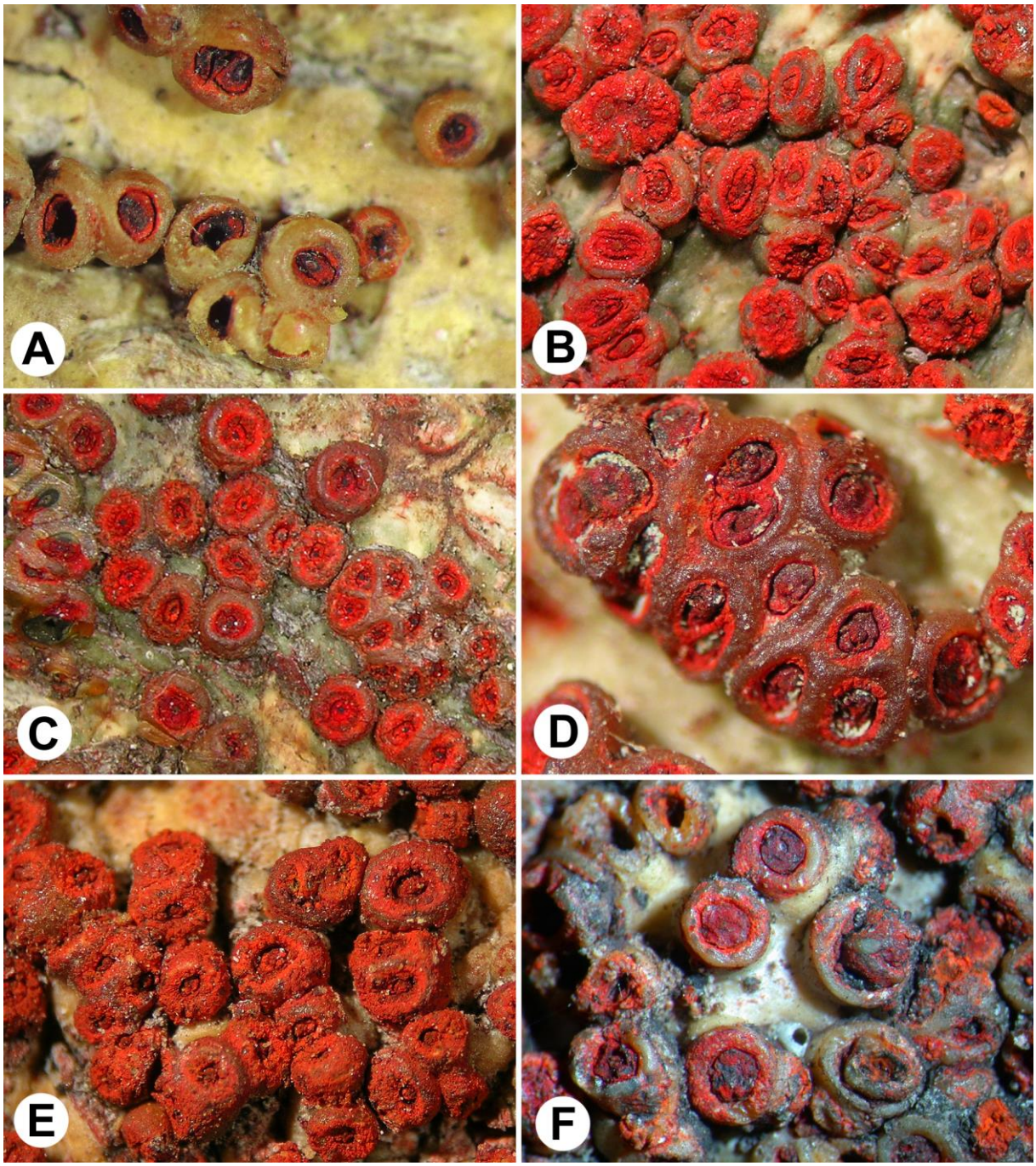

Figure 5 — *Marcelaria purpurina*, thallus and ascomata (A, holotype of *Tremothylium sprucei* in G; B, Colombia, *Moncada 3467*; C, Brazil, *Cáceres s.n.*; D, Brazil, *Brako 7381*; E, Bolivia, *Van den Boom 4107*; F, Democratic Republic of Congo, *Ertz 14840*).

The intensely red pigment in *Marcelaria purpurina* adds to the variation of similarly colored but chemically distinct, red pigments found in tropical crustose lichens of different phylogenetic affinities (Fig. 6).

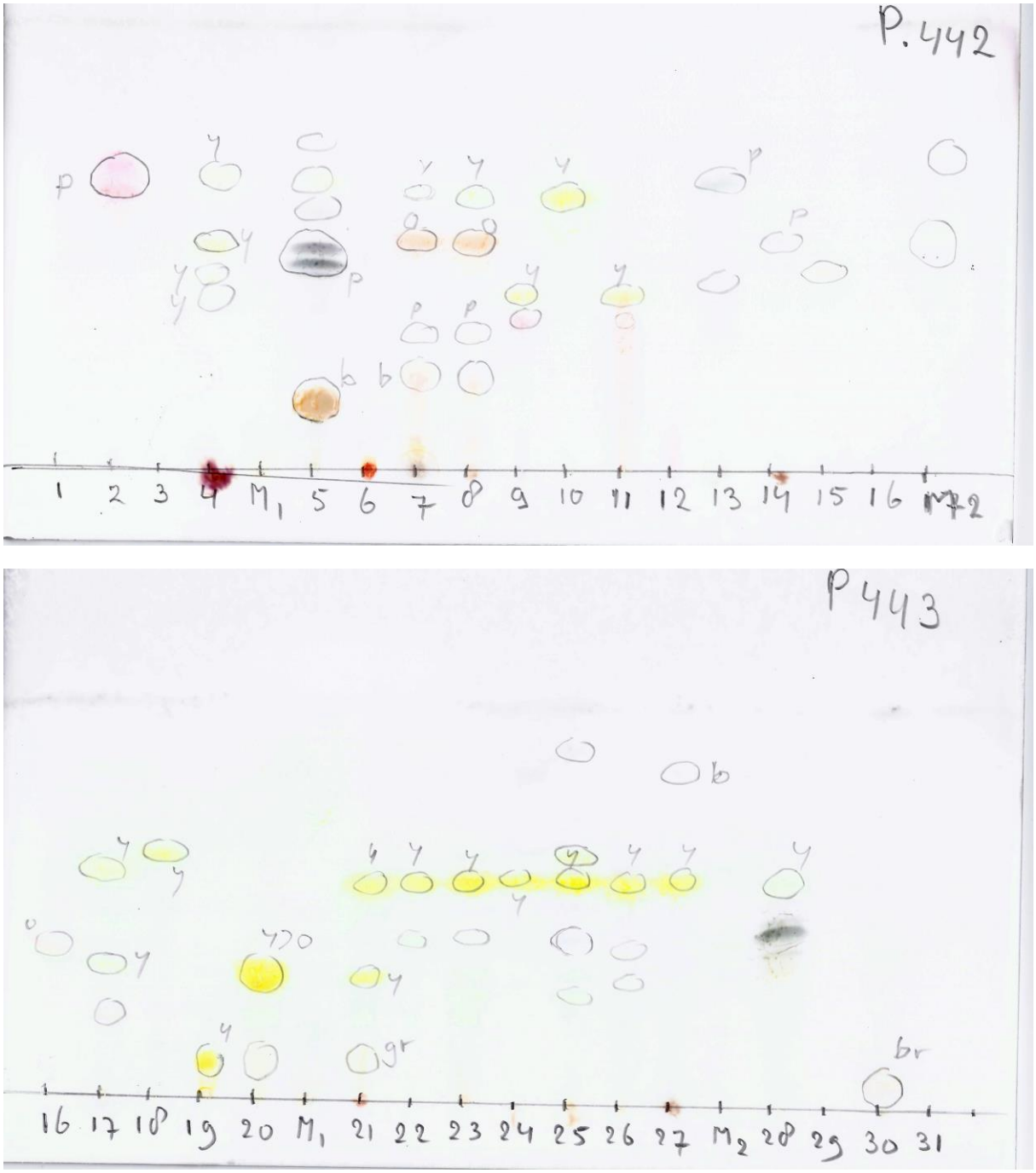

Figure 6. — TLC plates with tropical lichens with red pigments (solvent A = TDA; substances from top to bottom) 1. *Piccolia elmeri*; 2. *Pyrenidium* sp. nov.; 3. *Ramboldia haematites*; 4. *Haematomma persoonii*; 5. *Hyperphyscia pyrithocardia*; 6. *Gassicurtia coccinea*; 7. *Marcelaria purpurina* (Congo); 8. *Marcelaria purpurina* (Rondonia); 9. *Pyrenula sanguinea*; 10. *Rusavskia elegans*; 11. *Mazaediothecium rubiginosum*; 12. *Pyrenula reginae*;

Figure 6 (continued from previous page). — 13. *Pyrenula rubronitidula*; 14. *Pyrenula rubrojavanica*; 15. *Malmidea amazonica*; 16. *Malmidea amazonica*; 17. *Astrothelium cinnamomeum*; 18. *Pyrenula plicata*; 19. *Sergipea aurata*; 20. *Malmidea atlantica*; 21. *Trypethelium* sp. nov.; 22. *Teloschistes exilis*; 23. *Marcelaria benguelensis* (Thailand, thallus); 24. *Marcelaria benguelensis* (Cambodia, pseudostroma); 25. *Marcelaria cumingii*; 26. *Letrouitia vulpina*; 27. *Trypethelium eluteriae*; 28. *Letrouitia domingensis*; 29. *Ampliotrema* sp. nov.; 30. *Chroodiscus coccineus*.

Key to the species currently accepted in *Marcelaria*

1a Ascomata (and often thallus) bright red, UV–; hamathecium clear; ascospores 110–170 µm long, amyloid; Neotropics and African Paleotropics ..... ***Marcelaria purpurina***

1b Ascomata (and often thallus) (orange-)yellow, UV+ yellow; hamathecium densely inspersed; ascospores 50–80 µm long, non-amyloid (rarely dextrinoid); eastern Paleotropics.....2

2a Thallus pruinose; ostiolar region narrow..... ***Marcelaria benguelensis***

2b Thallus non-pruinose; ostiolar region broad, flat ..... ***Marcelaria cumingii***

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Scaphis Eschw., *Systema Lichenum*: 14 (1824). – Tipo: *Scaphis anfractuosa* Eschw. ≡ *Graphis anfractuosa* (Eschw.) Eschw.

(Fig. 2A–F, 5J–L)

Descripción — Talo grisáceo a marrón amarillento pálido ...

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Usar numeración consecutiva, separando las parejas de alternativas con las letras a/b en minúscula. Tabulación: 1 cm en la margen izquierda y sangría de 1 cm; 16 cm en la margen derecha utilizando puntos [.....], dejando un espacio a la izquierda y a la derecha de cada linea de puntos como se muestra a continuación:

15a Ascosporas pequeñas, menos de 20 µm de largo 16
15b Ascosporas medianas a grandes, más de 20 µm de largo 18

Figuras, fotografías e ilustraciones:

Las figuras, fotografías e ilustraciones deben ser preparadas en formato TIFF o JPG de alta calidad, con un tamaño final de máximo 22 cm × 16 cm, en resolución de 300 dpi. Se alienta el envío de figuras en color. En el caso de figuras compuestas, usar lineas blancas finas para separar cada imagen y letras mayúsculas en las imagenes para su identificación (**A**, **B**, **C**, ...). Se sugiere usar ARIAL BLACK de 20 puntos para las letras indicativas.

Tablas:

Tabla 1 — Separación tradicional de géneros en la familia *Graphidaceae* (según MÜLLER ARGOVIENSIS 1880, 1882, 1887a, b, 1894a; ZAHLBRUCKNER 1907, 1923, 1926).

Organización apotecios	Ascosporas hialinas transversal	Ascosporas hialinas muriformes	Ascosporas marrón grisáceas transversal	Ascosporas marrón grisáceas muriformes
Lirelas solitarias	*Graphis*	*Graphina*	*Phaeographis*	*Phaeographina*
Lirelas estromáticas	*Glyphis*	*Medusulina*	*Sarcographa*	*Sarcographina*

Referencias:

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