

Malmidea aptrootiana (Malmideaceae), a new large-spored species in the *Malmidea granifera* complex

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Abstract. The new species *Malmidea aptrootiana* is described from the Dominican Republic. It forms part of the *M. granifera* complex in having a verrucose thallus (medulla whitish, K+ yellow) and apothecia with a dark hypothecium and with an excipulum containing a medullary layer. Within this complex, the new taxon stands out by its comparatively large ascospores (19–27 × 10–12 µm). Only three species in this complex have larger ascospores: *M. indica* and *M. subindica* (28–40 × 12–24 µm), both described from India, and *M. sorsogona* (22–34 × 11–16 µm), described from the Philippines. The latter overlaps in ascospore size with the new species, but features a yellowish medulla in the verrucae and further differs in the 4-spored asci and apothecia with brownish black disc and thick, mostly entire margins (disc purplish dark brown with the margins becoming thin and crenulate in the new species). Three other species in which the ascospores can reach lengths over 20 µm are *M. chrysostigma*, *M. fenicis*, and *M. verrucosa*, all from the eastern Paleotropics. The first two differ in the yellow, K+ red(-violet) medulla of the verrucae, whereas *M. verrucosa* features 4-spored asci and apothecia with a blackish brown disc and entire, dark margins. In order to facilitate the distinction of these and other species in this group, we provide an updated world key with illustrated diagnostic features for the species of the *M. granifera* complex. While elaborating the key, we came across *Megalospora simplex* Vězda, a foliicolous lichen described from Tanzania, which turned out to belong in *Malmidea*, so we also propose the new combination *Malmidea simplex* here.

Key words: Brazil, chemistry, India, Thailand

Introduction

The genus *Malmidea* Kalb, Rivas Plata & Lumbsch is, next to *Phyllopsora* Müll. Arg., the most important lecanoralean element of strictly tropical crustose lichen communities (Cáceres et al. 2008; Kalb et al. 2011). Apart from the crustose thallus, it is characterized by usually biatorine apothecia and non-septate, hyaline, ellipsoid ascospores. The excipulum can be thin and uniformly plectenchymatous, or it includes large medullary chambers filled with loosely woven hyphae encrusted with crystals. The thallus is often verrucose and contains a diversity of secondary substances, including various pigments (Cáceres 2007; Kalb et al. 2011; Breuss & Lücking 2015; Kalb 2021; Adhikari et al. 2024).

Historically, species now assigned to this genus were classified in the collective genera *Lecanora* Ach. and *Lecidea* Ach. Species of those genera in the strict sense share the ascospore type, but otherwise have a different morphology, anatomy, and ecology, and are not closely related. Although commonly collected, *Malmidea* still reveals novelties on a regular basis, also due to an increased understanding of diagnostically important features. While 50 species were known up to 2016 (Breuss & Lücking 2015; Lücking et al. 2017), this number has raised to 85 during the past decade (e.g., Joseph et al. 2018; Kalb 2021; Lücking et al. 2023; Adhikari et al. 2024; Wang et al. 2024). Also, since its establishment (Kalb et al. 2011), the number of genera recognized in the family *Malmideaceae* has dramatically increased. Besides the large genus *Malmidea*, it now also contains the small or monospecific genera *Australidea* Kantvilas, Wedin & M. Svenss., *Cheiomycina* B. Sutton, *Crustospathula* Aptroot, *Kalbionora* Sodamuk, S.D. Leav. & Lumbsch, *Multisporidea* Kalb & Aptroot, *Savoronala* Ertz, Eb. Fisch., Killmann, Razafindr. & Sérus., and *Sprucidea* M. Cáceres, as well as the lichenicolous

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genus *Zhurbenkoa* Flakus, Etayo, Pérez-Ortega & Rodr. Flakus [Aptroot & Lücking (Aptroot 1998; Ertz et al. 2013; Cáceres et al. 2017; Muggia et al. 2017; Sodamuk et al. 2017; Flakus et al. 2019; Kalb & Aptroot 2021; Kantvilas et al. 2021)].

In this paper, we describe a new species of *Malmidea* from the Caribbean, morphologically similar to *M. granifera* (Ach.) Kalb, Rivas Plata & Lumbsch, but with comparatively large ascospores. A key is provided for the species of the *M. granifera* group. We also propose a new combination in *Malmidea* for *Megalospora simplex* Vězda. The new species is dedicated to our long-standing colleague and friend, André Aptroot, for his invaluable contributions to tropical lichenology and the taxonomy of the *Malmideaceae*, on the occasion of his 65th birthday.

Material and methods

The material was examined morphologically, anatomically, and chemically, at the Lichenologisches Institut Neumarkt and at the Botanischer Garten und Botanisches Museum Berlin, Freie Universität Berlin (BGBM). For morphological studies, we used a Wild M3Z Plan stereomicroscope and, at BGBM, a LEICA S6D and a LEICA Zoom 2000 stereomicroscope. Anatomy was assessed using an Olympus BH-A compound microscope and, at BGBM, a ZEISS Axiostar Plus and a ZEISS Axioskop compound microscope, with hand sections made in deionized water. Macrophotography of the new species was done using a NIKON Z7 with a NIKKOR MC50/2.8 macro lens, with a RAYNOX Digital Camera Macroscopic Lens 4x attached to it, and a CULLMANN CULight V 220DL LED light source. Microscopic images of the new species were taken under 400× and 1000× magnification with a SAMSUNG Galaxy A71 cell phone attached to the PL 10×/20 ocular of the ZEISS Axioskop compound microscope. Part of the images used to illustrate diagnostic features were selected from the comprehensive image collection by the second author [<http://www.fschumm.de>]. For spot tests, we used commercial bleach (C), 10% potassium hydroxide solution (K), and para-phenylene-diamine crystals dissolved in 96% ethanol (P).

Results and discussion

The new species

Malmidea aptrootiana Kalb, Schumm, B. Moncada & Lücking, sp. nov. (Fig. 1)

MycoBank MB 864653

Diagnosis: A new species in the *Malmidea granifera* group, differing from *M. sorsogona* in the 8-spored asci with smaller ascospores and in the whitish medulla, as well as the purplish dark brown apothecial disc and the apothecial margins becoming thin and crenulate with age.

Type: Dominican Republic, La Vega: Straße entlang des Río Jimenoa, ~10–15 km S von Jarabacoa [Road along Río Jimenoa, ~10–15 km S of Jarabacoa]; 18°00'N, 70°27'W [correctable to 19°01'N, 70°37'W according to Google Maps], 1,050 m; am Rand von tropischen Regenwaldresten, auf Baumrinde [at the

margin of tropical rain forest fragments, on tree bark]; 16 Aug. 1996, K. Kalb s.n. (B [B 60 0300603] – holotype!).

Etymology. We are pleased to dedicate this new species to our colleague and friend, André Aptroot, for his numerous and invaluable contributions to tropical lichen taxonomy and the advancement of our knowledge of the recently established family *Malmideaceae* (Aptroot 1998; Cáceres et al. 2017; Kalb & Aptroot 2021).

Description. Thallus corticolous on tree bark, crustose, up to 3 cm across, 100–200 µm thick, continuous; surface distinctly verrucose, light greenish grey, opaque; medulla thin, whitish, K+ deep yellow to yellow-orange; prothallus not observed. Thallus in section composed of confluent, corticate glomerules formed by compact groups of algal cells, forming the verrucae (verrucae 100–250 µm diam.), wrapped in a paraplectenchymatous cortex composed of small cells; photobiont a chlorococcoid green alga. Apothecia biatorine, sessile, rounded, (0.5–)0.8–1.5 mm diam., 0.2–0.3 mm high; disc dark brown with a slight purplish tinge; proper margin cream-colored to pale grey, entire and thickened in younger apothecia, becoming crenulate and thinner in older apothecia. Excipulum 50–80 µm wide, externally paraplectenchymatous with slightly radiating cell rows, colorless, internally with a conspicuous medullary layer of loosely woven hyphae encrusted with numerous small, grey crystals, K+ dissolving with an ochraceous-yellow color reaction but not forming a colored efflux; hypothecium prosoplectenchymatous, 30–50 µm high, dark brown; hymenium 90–100 µm high, colorless, clear; epithecium 10–15 µm high, medium brown, K+ lighter yellowish brown. Paraphyses unbranched; asci clavate, 80–90 µm long, 18–20 µm wide. Ascospores 8 per ascus, irregularly biseriate, ellipsoid, non-septate, 19–27 × 10–12 µm, 1.9–2.3 times as long as wide, colorless, with thin walls and with a thin, somewhat wavy halo especially laterally, I–.

Secondary chemistry. Not tested with TLC due to the limited material available; cortex K– (indicating absence of atranorin); medulla with unknown substances (possibly xantholepinones) reacting K+ deep yellow to yellow-orange.

Ecology and distribution. The new species is so far only known from the type locality in the Dominican Republic, growing on bark in a tropical rain forest remnant. The type locality is situated southwest of the Reserva Científica Ébano Verde and northwest of the Parque Nacional Hoyo del Pino, together representing one of the best conserved areas in the Dominican Republic, so it can be expected that the species is more common there and has to be looked for.

Remarks. *Malmidea aptrootiana* fits the general morphodeme of the *M. granifera* group in having a verrucose thallus with a medulla reacting yellow(-orange) and apothecia with an excipulum featuring a medullary layer. Within this group, the new species features unusually large ascospores. Most other species with this morphology have ascospores distinctly less than 20 µm long. Exceptions

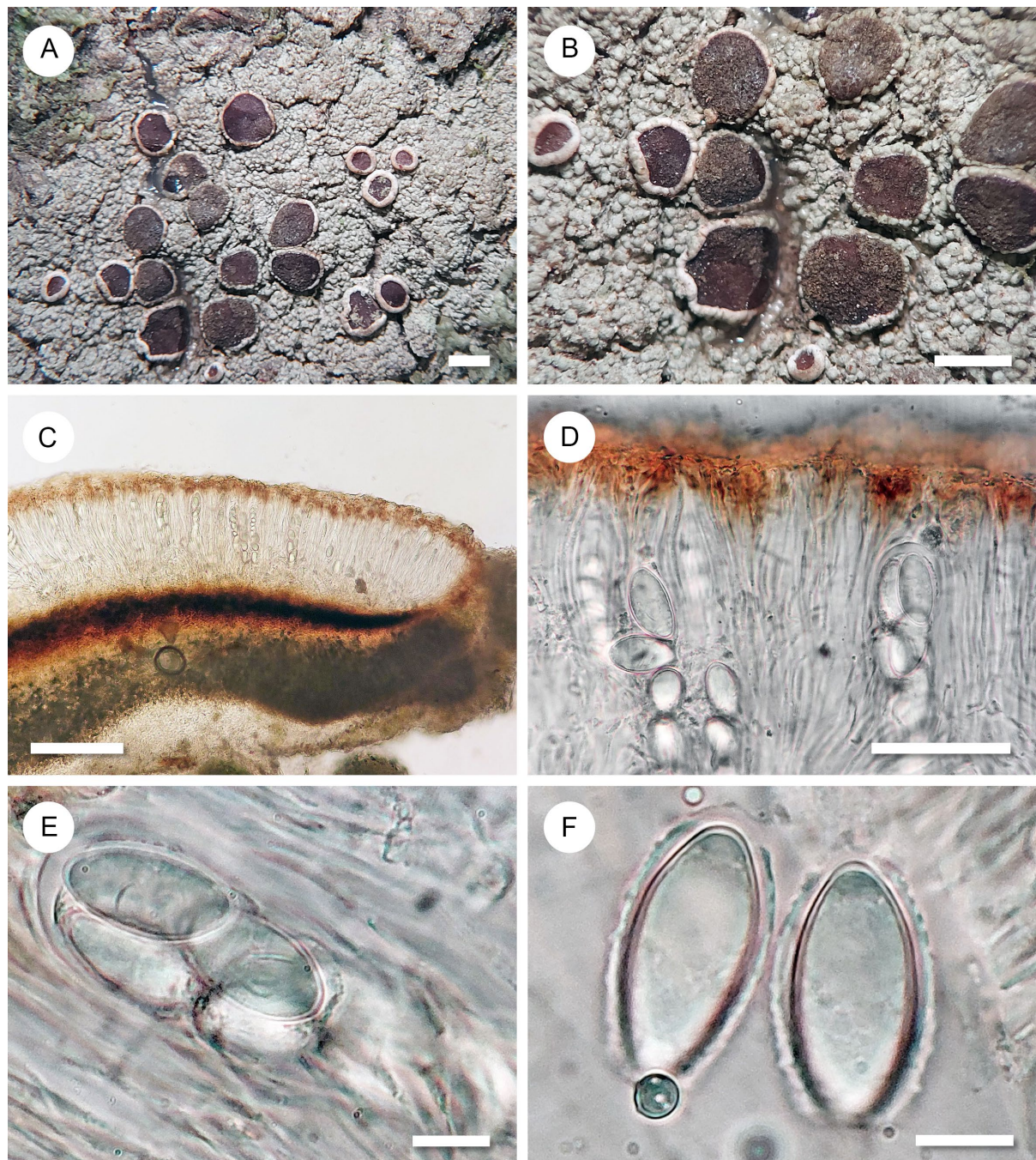


Figure 1. Morphology and anatomy of *Malmidea aptrootiana* (holotype). A, B – thallus with apothecia; C – section through apothecium showing dark hypothecium; D – portion of the hymenium (and epithecium) showing asci with ascospores; E – ascus with 8 biserially arranged ascospores; F – ascospores. Scales: A, B = 1 mm; C = 100 μ m; D = 50 μ m; E, F = 10 μ m.

are *M. indica* (Awasthi & Agarwal) Hafellner & T. Sprib. and *M. subindica* R. Adhikari & Nayaka, both with even larger ascospores of $28\text{--}40 \times 12\text{--}24 \mu\text{m}$ (Adhikari et al. 2024). *Malmidea sorsogona* (Vain.) Kalb, Rivas Plata & Lumbsch, described from the Philippines (Vainio 1921; Kalb et al. 2011), overlaps in ascospore size with the new species. Its ascospores are only slightly larger ($22\text{--}34 \times 11\text{--}16$), but it further differs in the mostly 4-spored asci and in the yellowish medulla. Also, the apothecial disc is brownish black and the rather thick margin is entire to only shallowly crenulate (Fig. 2).

Three other species in the *Malmidea granifera* complex can reach lengths over 20 μm . *Malmidea chrysostigma* (Vain.) Kalb, Rivas Plata & Lumbsch and



Figure 2. Type of *Lecidea sorsogona* Vain. Scale = 1 mm.

M. fenicis (Vain.) Kalb, Rivas Plata & Lumbsch, both from the eastern Paleotropics (Vainio 1921; Kalb et al. 2011), differ in the yellow, K+ red(-violet) medulla of the verrucae, among other features. *M. verrucosa* R. Adhikari, R. Ngangom & Nayaka, described from India (Adhikari et al. 2024), features 4-spored asci and apothecia with a blackish brown disc and entire, dark margins.

In order to facilitate the distinction of these and other species in this group, we provide an updated world key with illustrated diagnostic features for the species of the *M. granifera* complex.

Key to the species of the *Malmidea granifera* morphodeme

The species included in this key share the following characters: thallus verrucose, with whitish or pigmented medulla; apothecia biatorine, no algae in margin [compare with *M. duplomarginata* (Papong & Kalb) Kalb & Papong; Fig. 3A]; excipulum with an internal medullary layer or with medullary chambers; hypothecium (dark) brown. In the key, the medulla refers to the medulla of the verrucae, not the thallus beneath. Isidiate species are not explicitly keyed out, but mentioned under fitting key couplets. To facilitate quick access, the key is divided with subheaders.

- 1 Ascospores at least in part distinctly > 20 µm long, in part up to 40 µm long 2
- Ascospores mostly < 20 µm long 8

[Subgroup 1: Species with ascospores mostly > 20 µm long]

- 2(1) Ascospores 28–40 × 12–24 µm, 2–4 per ascus 3
- Ascospores (14–)18–30(–34) × (8–)10–16 µm, (2–)4–8 per ascus 4
- 3(2) Apothecial disc dark brown (e.g., Fig. 3L); ascospores 30–40 × 12–20 µm, 2–2.5 times as long as broad; atranorin present; eastern Paleotropics (India: Awasthi & Agarwal 1968) *M. indica* (D.D. Awasthi & M.R. Agarwal) Hafellner & T. Sprib.
- Apothecial disc light to medium brown (e.g., Fig. 3J, K); ascospores 28–40 × 17–24 µm, 1.5–2 times as long as broad; atranorin absent; eastern Paleotropics (India: Adhikari et al. 2024) *M. subindica*
- 4(2) Medulla whitish to cream-colored (e.g., Fig. 3O–P) ... 5
- Medulla yellowish to golden-yellow(-orange) (e.g., Fig. 3Q–T) 6
- 5(4) Ascospores 19–27 × 10–12 µm; medulla whitish, K+ yellowish; asci 8-spored; apothecial disc dark purplish brown, with cream-colored to light grey, distinctly crenulate margins when older (Fig. 1A, B); Neotropics (Dominican Republic: this paper) *M. aptrootiana*
- [if thallus isidiate-coralloid and ascospores up to 30 × 15 µm, compare *M. corallophora* Aptroot & Schumm (Schumm & Aptroot 2012)]
- Ascospores 17–25 × 10–13 µm; medulla whitish to cream-colored, K+ orange-yellow (unknown; thallus with atranorin); asci 2–4-spored; apothecial disc dark brown to blackish brown, with dark, entire margins; eastern Paleotropics (India: Adhikari et al. 2024) ... *M. verrucosa*
- [if thallus isidiate and ascospores up to 25 × 15 µm, compare *M. taytayensis* (Vain.) Kalb, Rivas Plata & Lumbsch (Kalb et al. 2011)]

- 6(4) Medulla yellowish, K+ yellow (xantholepinones); asci 4-spored; ascospores 22–34 × 11–16 µm; apothecial disc brownish black, with entire to at best shallowly crenulate margins (Fig. 2); Eastern Paleotropics (Sri Lanka, Philippines: Vainio 1921; Kalb et al. 2011; Weerakoon & Aptroot 2014) *M. sorsogona*
- Medulla yellow(-orange), K+ red(-violet); asci 6–8-spored; ascospores 14–25 × 8–15 µm 7
- 7(6) Apothecial disc black, margin dark; ascospores 14–25 × 8–15 µm, 6–8 per ascus; medulla yellow, K+ red (substances not identified); eastern Paleotropics (India, Philippines: Vainio 1921; Kalb et al. 2011; Adhikari et al. 2024) ...
- *M. fenicis*
- Apothecial disc dark brown to blackish brown, margin whitish to cream-colored; ascospores 18–25 × 10–13 µm, 6–8 per ascus; medulla golden-yellow(-orange), K+ red(-violet) (emodin, emodic acid; thallus with atranorin); eastern Paleotropics (Philippines, Papua New Guinea: Vainio 1921; Kalb et al. 2011; Sipman et al. 2013; Aptroot & Cáceres 2024) *M. chrysostigma*
- 8(1) Apothecial disc orange-brown to red-brown (e.g., Fig. 3F, I); hypothecium orange-brown 9
- Apothecial disc (light to) medium brown to brownish black, lacking an orange or red tinge (e.g., Fig. 3J–M); hypothecium dark brown 11

[Subgroup 2: Species with ascospores mostly < 20 µm long; apothecial disc orange-brown]

- 9(8) Medulla pale yellow, K+ deep yellow (substances not identified); ascospores 12–18 × 7–10 µm, 8 per ascus; Neotropics (Brazil: Cáceres et al. 2012) *M. leucogranifera*
- Medulla whitish, K+ lemon-yellow to bright yellow (e.g., Fig. 3P) 10
- 10(9) Ascospores 15–20 × 6–10 µm; circumpacific (Mexico, Colombia, Venezuela, Bolivia, Brazil, Sri Lanka; Cáceres 2007; Flakus et al. 2011; Weerakoon & Aptroot 2014; García-Martínez 2016; Kalb 2021) ... *M. badimoides*
- Ascospores 10–15 × 6–9 µm; eastern Paleotropics (India: Adhikari et al. 2024) *M. glabromarginata*
- 11(8) Medulla whitish (e.g., Fig. 3O–P) 12
- Medulla pigmented, pale yellowish to orange-yellow or orange-red (e.g., Fig. 3Q–T) 20

[Subgroup 3: Species with ascospores mostly < 20 µm long; medulla whitish]

- 12(11) Apothecial margin dark, thin or becoming excluded; atranorin present; eastern Paleotropics (Thailand; Kalb et al. 2011) *M. inflata*
- Apothecial margin whitish to cream-colored, thick or rarely thin; chemistry variable 13
- 13(12) Apothecial margin entire (e.g., Fig. 3B, C, F, I–N) ... 14
- Apothecial margin papillose (e.g., Fig. 3D, H) ... 18
- 14(13) Apothecial disc medium to dark brown; apothecial margin thin (e.g., Fig. 3C) 15
- Apothecial disc dark brown to brownish black; apothecial margin usually thicker (e.g., Fig. 3B, L, M) 16
- 15(14) Medulla K+ orange-red (xantholepinones; thallus with atranorin); apothecial margin thin; ascospores 10–14 ×

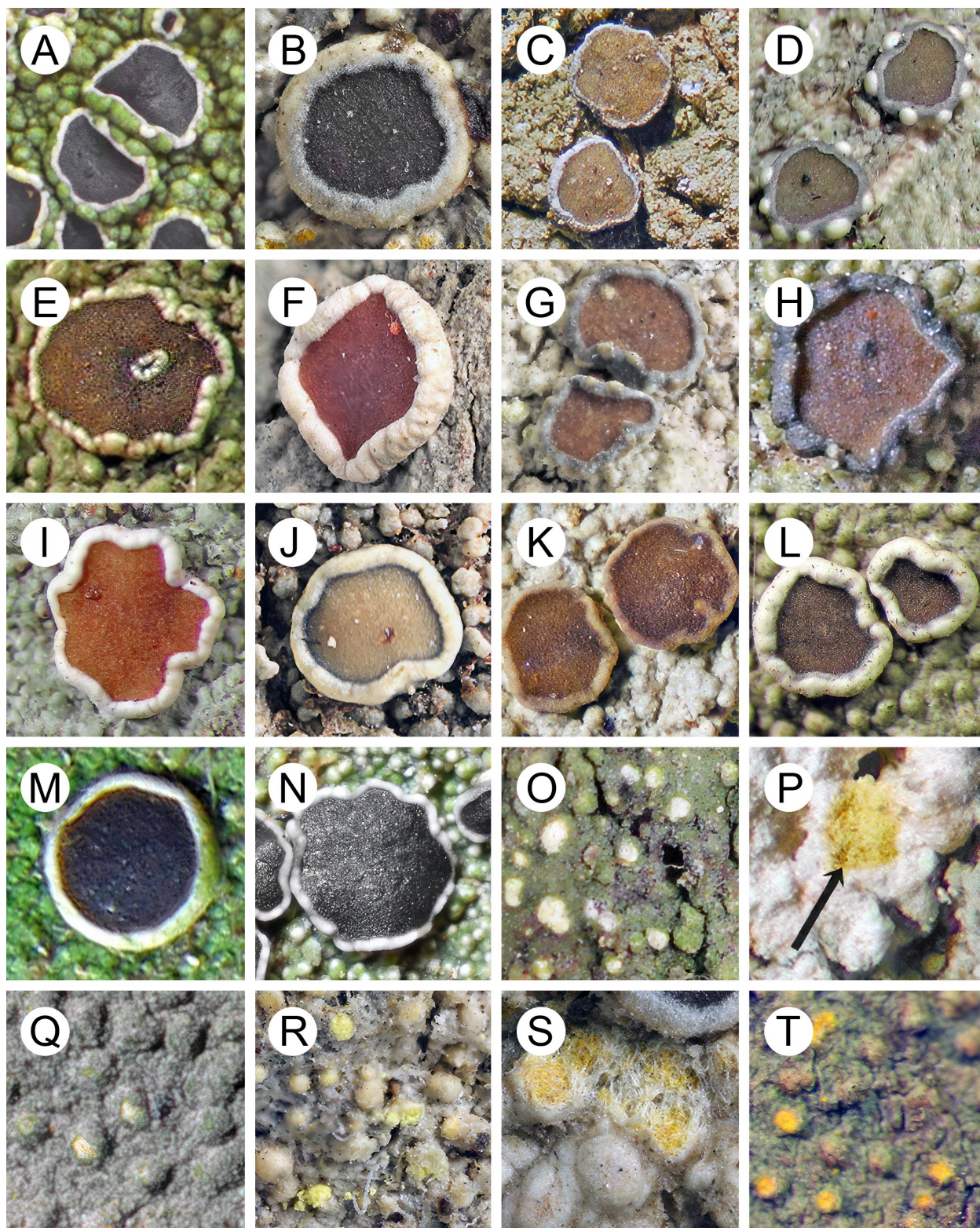


Figure 3. Diagnostic features in species of the *Malmidea granifera* complex. A – zeorine double margin, with outer margin containing algae (not treated in key); B – entire thick margin; C – entire thin margin; D – papillate margin; E – crenulate thin margin; F – whitish to cream colored margin (brownish red disc); G, H – grey to dark grey margin (papillate); I–N – apothecial disc colors: brownish orange to orange-brown (I), light brown (J), medium brown (K), dark brown (L), blackish brown (M), (brownish) black (N). O–T, color of medulla in verrucae: whitish (O), whitish with K+ yellow reaction (P), pale yellowish (Q), lemon-yellow (R), golden-yellow (S), orange-yellow (T).

- 6–9 µm; Neotropics (Venezuela: Kalb 2021) *M. albomarginata*
Medulla K+ lemon-yellow (xantholepinones; thallus lacking atranorin); ascospores 13–17 × 7–9 µm; asci 6–8-spored; Neotropics (Venezuela: Kalb 2021) *M. hechicerae*
- 16(14) Thallus verrucae conspicuous, up to 0.3 mm diam.; medulla K+ orange (xantholepinones); pantropical (Brazil, India, Thailand, Papua New Guinea: Kalb et al. 2011; Cáceres & Aptroot 2016; Islary et al. 2023; Aptroot & Cáceres 2024) *M. coralliformis*
Thallus verrucae finer, up to 0.15 mm diam.; medulla K+ yellow(-orange) (chemistry variable) 17
- 17(15) Asci mostly 4-spored; ascospores 10–15 × 6–9 µm; pantropical (Panama, St. Eustatius, Brazil, India: Lücking & Kalb 2000; Etayo & Aptroot 2017; Aptroot & Stech 2018; Sinha et al. 2018; Islary et al. 2023; Aptroot et al. 2025) *M. psychotrioides*
Asci (6–)8-spored; ascospores 11–18 × 7–12 µm; eastern Paleotropics (Seychelles, India, Sri Lanka, Philippines, Papua New Guinea, Australia: Kalb 2001; Weerakoon & Aptroot 2014; Diederich et al. 2017; Singh & Singh 2019; Aptroot & Cáceres 2024; Nayana Prakash et al. 2024; Fajardo & Doria 2025) *M. subgranifera*
- 18(13) Ascospores 11–16 × 8–10 µm; medulla K+ yellowish (xantholepinones; thallus with atranorin); pantropical (Brazil, India, Myanmar, Thailand; Kalb et al. 2011; Gupta & Sinha 2016; Joseph et al. 2018; Ohmura et al. 2020; Aptroot et al. 2025) *M. bakeri*
Ascospores 9–14 × 6–8 µm; medulla K+ orange(-red) (chemistry variable) 19
- 19(18) Ascospores 9–12 × 6–8 µm; medulla K+ orange (unknowns; thallus with atranorin); pantropical (Colombia, India, Thailand: Kalb et al. 2011; Joseph et al. 2018; García-Martínez & Mercado-Gómez 2020) *M. variabilis*
Ascospores 10–14 × 7–8 µm; medulla K+ orange-red (xantholepinones; thallus lacking atranorin); atranorin absent; Neotropics (Brazil: Kalb 2021) . . . *M. allobakeri*
- [Subgroup 4: Species with ascospores mostly < 20 µm long; medulla pigmented, pale yellowish to orange-red]
- 20(11) Apothecial disc light to medium brown (e.g., Fig. 3J, K); medulla orange-yellow to orange-red 21
Apothecial disc dark brown to brownish black (e.g., Fig. 3L, M); medulla pale yellowish to orange-yellow 23
- 21(20) Apothecial disc medium brown; medulla orange-red, K+ red (unknowns; thallus with atranorin); ascospores 14–20 × 6–9 µm; asci 4–8-spored; eastern Paleotropics (India; Adhikari et al. 2024) *M. rubra*
Apothecial disc light brown to tan 22
- 22(21) Medulla orange-yellow, K+ orange-red (unknown anthraquinone; thallus with atranorin); ascospores 12–17 × 8–9 µm; asci (4–)6–8-spored; Neotropics (Brazil; Kalb 2021) *M. atlanticoides*
Medulla cream to sulphur-yellow, K+ orange(-red) (xantholepinones; thallus lacking atranorin); ascospores 15–20 × 8–11 µm, 4–6(–8) per ascus; eastern Paleotropics (Sri Lanka, Thailand: Kalb et al. 2011; Weerakoon et al. 2016) *M. eeuuae*
- 23(20) Apothecial margins becoming papillate (e.g., Fig. 3D) 24
Apothecial margins entire (e.g., Fig. 3B, J, L, M) . . . 25
- 24(23) Ascospores 10–14 × 5–8 µm, usually 8 per ascus; apothecial disc brownish black; medulla sulphur-yellow, K+ orange(-red) (xantholepinones; thallus with atranorin); pantropical (Costa Rica, Colombia, Ecuador, Brazil, India, Sri Lanka, Taiwan: Weerakoon et al. 2016; Lücking et al. 2023; Aptroot & Cáceres 2024; Adhikari et al. 2024; Aptroot et al. 2025) *M. piperina*
[If atranorin absent but ascospore dimensions fit, compare *M. allobakeri* with mostly whitish medulla (Kalb 2021); see above; if thallus isidiate, compare *M. attenboroughii* with granulose, greenish thallus, medulla of verrucae, pale yellow, K+ orange-yellow, ascospores 12–16 × 7–9 µm (Guzow-Krzemińska et al. 2019); *M. isidiopiperina* with verrucose, greyish thallus, medulla of verrucae pale yellow, K+ yellow-orange, ascospores 12–17 × 7–8 µm (Lücking et al. 2023; and *M. densisidiata* with verrucose, greyish-green thallus, medulla of verrucae pale yellowish K+ orange(-red), ascospores 11–13 × 4.5–5.5 µm (Aptroot et al. 2022)].
Ascospores 12–21 × 9–13 µm, (4–)6(–8) per ascus; apothecial dark (orange-)brown; medulla orange-yellow, K+ orange(-red) (xantholepinones, unknown, secalonic acid A; thallus lacking atranorin); pantropical (Brazil, India, Sri Lanka, Myanmar, Philippines: Vainio 1921; Kalb et al. 2011; Weerakoon et al. 2016; Joseph et al. 2018; Ohmura et al. 2020; Aptroot et al. 2025) *M. subaurigera*
[If atranorin present and ascospore dimensions fit, compare *M. allopapillosa* Kalb in which the apothecial margin loses the medullary papillae with age (Kalb 2021)]
- 25(23) Medulla orange-yellow, K+ purple (7-chloroemodin, emodin), ascospores 10–15 × 6–8 µm; asci 6(–8)-spored; Neotropics (Brazil: Cáceres 2007; Aptroot et al. 2025) *M. atlantica*
Medulla pale yellowish to peach-colored, K+ orange(-red) (xantholepinones) 26
- 26(24) Ascospores 10–14 × 5–8 µm; apothecial margin rather thin; medulla pale yellowish, K+ orange(-red) (xantholepinones; thallus with atranorin); pantropical (Costa Rica, Brazil, Thailand: Kalb et al. 2011; Mardones et al. 2024; Aptroot et al. 2025) *M. aurigera*
Ascospores 12–18 × 7–10 µm; apothecial margin distinct to thickened; medulla yellowish to peach-colored, K+ orange (xantholepinones; thallus lacking atranorin); pantropical (Costa Rica, Colombia, Brazil, India: Thangjam et al. 2022; Lücking et al. 2023; Mardones et al. 2024; Aptroot et al. 2025) *M. granifera*

Taxonomic position of *Megalospora simplex*

Megalospora simplex Vězda was established as a foliicolous lichen from Tanzania (Vězda 1975). Vězda placed it in *Megalospora* Meyen due to a presumably basally interspersed hymenium and thick-walled ascospores, but also discussed a possible relationship with *Mycoblastus* Norman. Sipman (1983) excluded the taxon from *Megalosporaceae* and suggested a relationship with *Mycoblastus* (*Tephromelataceae*). Upon closer examination, the species clearly represents a member of *Malmidea*, with a rather typical, verrucose thallus, the white medulla of



Figure 4. Type of *Megalospora simplex*. Scale = 1 mm.

the verrucae reacting K⁺ yellow-orange, and with typical non-septate, broadly ellipsoid ascospores. We therefore propose the following combination *Malmidea simplex* (Vězda) Kalb, Schumm & Lücking comb. nov. [Mycobank MB 864654]; basionym: *Megalospora simplex* Vězda, Folia Geobot. Phytotax. 10: 428. 1975; type: Tanzania. Morogoro: Uluguru-Gebirge, Tumbako, nördlich des Dorfes Kinole, 1,480–1,530 m, moosreicher montener Wald, epiphyll; 5. II. 1973, T. Pócs 6877 [PRA (former herbarium of A. Vězda integrated there) – holotype!].

Given the external appearance (Fig. 4), we first suspected *Malmidea simplex* to belong in the *M. granifera* group. However, the excipulum lacks a medullary layer. In the key provided by Breuss & Lücking (2015), only few species combine such an apothecial anatomy with a verrucose thallus. They can be distinguished as follows:

Key to species similar to *Malmidea simplex*

- 1 Ascospores 20–25 × 13–16 µm; medulla of verrucae white, K⁺ yellow-orange; African Paleotropics (Tanzania: Vězda 1975). ***M. simplex***
Ascospores 9–18 × 5–11 µm; medulla of verrucae variable. 2
- 2(1) Medulla of verrucae white, K⁺ yellow; ascospores 9–13 × 5–6 µm; pantropical (Brazil, India, Thailand, Papua New Guinea: Aptroot & Cáceres 2024; Kalb et al. 2012; Islary et al. 2023; Aptroot et al. 2025) ***M. tratiانا***
Medulla of verrucae pale yellow to yellow-orange, K⁺ orange to red; ascospores 10–18 × 6–11 µm 3
- 3(2) Medulla of verrucae pale yellow, K⁺ orange; ascospores 15–18 × 9–11 µm; pantropical (Brazil, India, Sri Lanka: Weerakoon & Aptroot 2014; Joseph et al. 2018; Aptroot et al. 2025). ***M. papillosa***
Medulla of verrucae yellow-orange, K⁺ red; ascospores 10–16 × 6–8 µm; Neotropics (Costa Rica, Puerto Rico, Colombia, Bolivia, Brazil: Flakus et al. 2013; Mercado-Díaz et al. 2015; Lücking et al. 2023; Mardones et al. 2024; Aptroot et al. 2025). ***M. amazonica***

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