

THREE NEW SPECIES OF *TRICHARIA*
(LICHENES, ASTEROTHYRIACEAE)
FROM NEW GUINEA¹

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ABSTRACT

Three new species of *Tricharia* are described from New Guinea: *T. demoulinii*, *T. elegans*, and *T. novoguineensis*. A key to all accepted species of the genus is provided.

Key Words: Asterothyriaceae, *Tricharia*, New Guinea.

The genus *Tricharia* Fée emend. R. Sant. is a typical representative of the lichen family Asterothyriaceae as circumscribed by Vězda (1979). It is characterized by the following features: apothecial excipulum with highly gelatinized walls, formed by branched and radiately elongated hyphae, paraphyses branched and anastomosed, forming a network throughout the hymenium and almost impossible to distinguish from excipular hyphae, and sterile hairs always present on the thallus and usually hyphophores as well. The genus is very close to *Gyalideopsis* Vězda from which it is only separated by the presence of sterile hairs on the thallus.

Hyphophores are quite enigmatic structures present on the thallus of some genera of the Asterothyriaceae (*Aulaxina* Fée, *Calenia* Müll. Arg. emend. R. Sant., *Echinoplaca* Fée, *Gyalectidium* Müll. Arg., *Gyalideopsis* Vězda, and *Tricharia* Fée emend. R. Sant.). They were first described by Vězda (1973) who also provided a complete survey of their morphology in 1979. However as pointed out by Vobis and Hawksworth (1981), a detailed study of their development and structure has not been carried out but is necessary for their interpretation in mycological terms. Hyphophores are usually upright structures, either hair-like, peltate, or with a radiate symmetry; they produce one or several balls of hyphae, which are very much like conidiophores and conidia. Indeed they appear to be an integral part of the lichen rather than a lichenicolous fungus. They are interpreted as modified synnema and thus generating asexual diaspores, but so far this is merely an assumption. Attention must also be drawn to another highly specialized type of coniodiomata produced by some other genera of foliicolous lichens (*Tapellaria* Müll. Arg. emend. R. Sant., *Sporopodium* Mont. emend. R. Sant., *Lasioloma* R. Sant. and *Lobaca* Vězda ad. int. 1983). They are usually erect, ear- or helmet-shaped, and were incorrectly considered as the coniodiomata of parasitic or parasymbiotic fungi (mainly under the name of *Pyrenotrichum* Mont., . . .). I agree with Vězda's statement (1983) that they are an integral part of the lichen and that they must be called camphyllidia following Müller Argovie (1881).

In his monograph on foliicolous lichens, Santesson (1952) accepted nine species of *Tricharia*; new species have since been described by Hawksworth (1972), Vězda (1973, 1975, 1979) and Buck (1980). Three new species were discovered in a very rich collection of epiphyllous lichens from New Guinea; they are described in this

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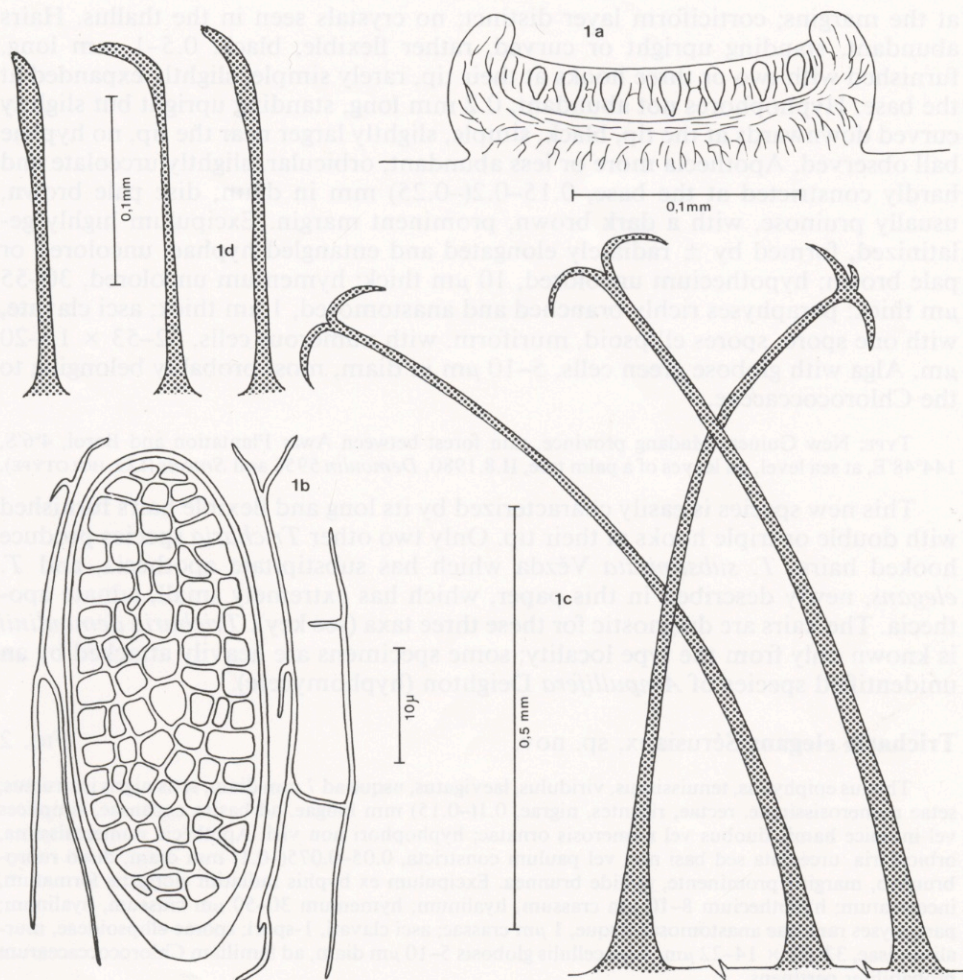


FIG. 1. *Tricharia demoulinii*, holotype. a. Cross section through apothecia. b. Part of hymenium with a mature ascospore in ascus. c. Cilia. d. Hyphophores.

paper. A key to all accepted species within the genus is provided, based on the work by Vězda (1979).

***Tricharia demoulinii* Sérusiaux, sp. nov.**

FIG. 1

Thallus epiphyllus, tenuis, cinereo-viridis vel viridi-albus, laevigatus, ± orbicularis, 2–4 mm diam, setis nigris et hyphophoris instructus; setae rectae vel arcuatae, flexibiles, nigrae, 0.5–1 mm longae, in apice hamis duobus vel tribus ornatae; hyphophori recti sed ad apicem leviter arcuati, nigri, simplices. Apothecia orbicularia, leviter urceolata et paulum basi constricta, 0.15–0.2(–0.25) mm diam, disco pallide brunneo et pruinoso, margine prominente et atrobrunnea. Excipulum ex hyphis radiatim elongatis formatum, incoloratum; hypothecium 10 μm crassum, hyalinum; hymenium 30–55 μm crassum, hyalinum; paraphyses ramosae anastomosantesque, 1 μm crassae; asci clavati, 1-spori; spores ellipsoideae, murali-divisae, 32–53 × 15–20 μm. Alga cellulis globosis, 5–10 μm diam, ad familiam Chlorococcacearum probabiliter pertinens.

Thallus epiphyllous, thin, not exceeding 25–35 μm thick, continuous, ± circular, 2–4 mm in diam, greyish green to whitish green, smooth, hardly delimited

at the margins; corticiform layer distinct; no crystals seen in the thallus. Hairs abundant, standing upright or curved, rather flexible, black, 0.5–1 mm long, furnished with two or three hooks at their tip, rarely simple, slightly expanded at the base. Hyphophores not abundant, 0.2 mm long, standing upright but slightly curved downwards at the tip, black, simple, slightly larger near the tip, no hyphae ball observed. Apothecia more or less abundant, orbicular, slightly urceolate and hardly constricted at the base, 0.15–0.2(–0.25) mm in diam; disc pale brown, usually pruinose, with a dark brown, prominent margin. Excipulum highly gelatinized, formed by \pm radiately elongated and entangled hyphae, uncolored or pale brown; hypothecium uncolored, 10 μ m thick; hymenium uncolored, 30–55 μ m thick; paraphyses richly branched and anastomosed, 1 μ m thick; asci clavate, with one spore; spores ellipsoid, muriform, with numerous cells, 32–53 \times 15–20 μ m. Alga with globose green cells, 5–10 μ m in diam, most probably belonging to the Chlorococcaceae.

TYPE: New Guinea, Madang province, rain forest between Awar Plantation and Boro, 4°6'S, 144°48'E, at sea level, on leaves of a palm tree, II.8.1980, *Demoulin* 5956 and *Smeets* (LG, HOLOTYPE).

This new species is easily characterized by its long and flexible hairs furnished with double or triple hooks at their tip. Only two other *Tricharia* species produce hooked hairs: *T. substipitata* Vězda which has substipitate apothecia, and *T. elegans*, newly described in this paper, which has extremely small, adnate apothecia. The hairs are diagnostic for these three taxa (see key). *Tricharia demoulinii* is known only from the type locality; some specimens are heavily attacked by an unidentified species of *Ampullifera* Deighton (hyphomycete).

Tricharia elegans Sérusiaux, sp. nov.

FIG. 2

Thallus epiphyllus, tenuissimus, viridulus, laevigatus, usque ad 7 mm diam, setis nigris instructus; setae numerosissimae, rectae, rigentes, nigrae, 0.1(–0.15) mm longae, ad basim expansae, simplices vel in apice hamis duobus vel numerosis ornatae; hyphophori non visi. Apothecia numerosissima, orbicularia, urceolata sed basi non vel paulum constricta, 0.05–0.075(–0.1) mm diam, disco rubro-brunneo, margine prominente, pallide brunnea. Excipulum ex hyphis radiatim elongatis formatum, incoloratum; hypothecium 8–10 μ m crassum, hyalinum; hymenium 30–50 μ m crassum, hyalinum; paraphyses ramosae anastomosantesque, 1 μ m crassae; asci clavati, 1-spore; sporeae ellipsoideae, murali-divisae, 32–50 \times 14–22 μ m. Alga cellulis globosis 5–10 μ m diam, ad familiam Chlorococcacearum probabiliter pertinens.

Thallus epiphyllous, very thin and pellucid, not exceeding 15–25 μ m thick, continuous, \pm circular, not more than 7 mm in diam, greenish, smooth, hardly delimited at the margins; corticiform layer hardly distinct; no crystals seen in the thallus. Hairs very abundant, upright, rigid, black, 0.1(–0.15) mm long, largely expanded at the base, simple or more frequently furnished with two to six hooks at the tip (thus forming a short crown of stiff setae). Hyphophores not seen. Apothecia very common, orbicular, urceolate, but hardly or not constricted at the base, extremely small, 0.05–0.075(–0.1) mm in diam; disc reddish brown or brown, non-pruinose, with a paler prominent margin. Excipulum highly gelatinized, formed by radiately elongated and entangled hyphae, uncolored or pale brown; hypothecium uncolored, 8–10 μ m thick; hymenium uncolored, 30–50 μ m thick; paraphyses richly branched and anastomosed, 1 μ m thick; asci clavate, with one spore; spores ellipsoid, muriform, with numerous cells, 32–50 \times 14–22 μ m. Alga with globose green cells, 5–10 μ m in diam, most probably belonging to the Chlorococcaceae.

TYPE: New Guinea, Madang province, rain forest on hills west of Yoro (=Mugamat), 4°28'S, 145°10'E, 100–300 m elev., on leaves of a palm tree, II.6.1980, *Demoulin* 5943 and *Smeets* (LG, HOLOTYPE).

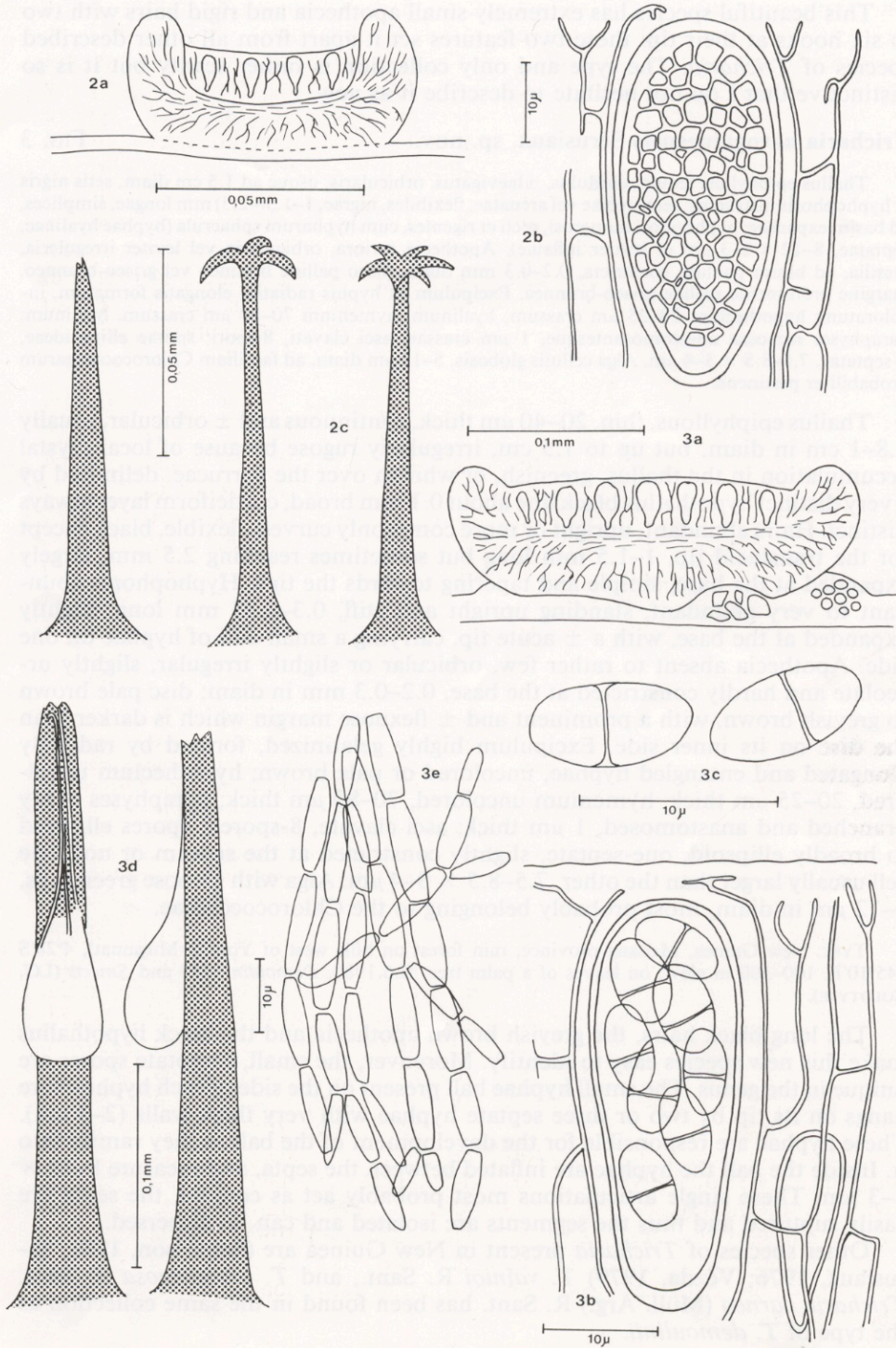


FIG. 2. *Tricharia elegans*, holotype. a. Cross section through apothecia. b. Part of hymenium with a mature ascospore in ascus. c. Cilia. FIG. 3. *Tricharia novoguineensis* holotype. a. Cross section through apothecia. b. Part of hymenium with mature ascospores in ascus. c. Ascospores. d. Hyphophores. e. Hyphae present in the ball of hyphophore.

This beautiful species has extremely small apothecia and rigid hairs with two to six hooks at their tip; these two features set it apart from all other described species of *Tricharia*. The type and only collection is rather scanty but it is so distinctive that I do not hesitate to describe it as new.

***Tricharia novoguineensis* Sérusiaux, sp. nov.**

FIG. 3

Thallus epiphyllus, tenuis, viridulus, \pm laevigatus, orbicularis, usque ad 1.5 cm diam, setis nigris et hyphophoris instructus; setae rectae vel arcuatae, flexibiles, nigrae, 1–1.5(–2.5) mm longae, simplices, ad basim expansae; hyphophori numerosi, recti et rigentes, cum hypharum sphaerula (hyphae hyalinae, septatae, 8–12 \times 2–3 μ m et leviter inflatae). Apothecia rariora, orbicularia vel leviter irregularia, sessilia, ad basim paulum constricta, 0.2–0.3 mm diam, disco pallide brunneo vel griseo-brunneo, margine prominente pallide griseo-brunnea. Excipulum ex hyphis radiatim elongatis formatum, incoloratum; hypothecium 20–25 μ m crassum, hyalinum; hymenium 70–80 μ m crassum, hyalinum; paraphyses ramosae anastomosantesque, 1 μ m crassae; asci clavati, 8-sporei; spores ellipsoideae, 1-septatae, 7.5–8.5 \times 3–4 μ m. Alga cellulis globosis, 5–12 μ m diam, ad familiam Chlorococcacearum probabiliter pertinens.

Thallus epiphyllous, thin, 20–40 μ m thick, continuous and \pm orbicular, usually 0.8–1 cm in diam, but up to 1.5 cm, irregularly rugose because of local crystal accumulation in the thallus, greenish, or whitish over the verrucae, delimited by a very distinct hypothallus black line about 0.1 mm broad; corticiform layer always distinct. Hairs abundant, upright or more commonly curved, flexible, black except for the translucent tip, 1–1.5 mm long but sometimes reaching 2.5 mm, largely expanded at the base, simple and tapering towards the tips. Hyphophores abundant to very abundant, standing upright and stiff, 0.3–0.35 mm long, slightly expanded at the base, with a \pm acute tip, carrying a small ball of hyphae on one side. Apothecia absent to rather few, orbicular or slightly irregular, slightly urceolate and hardly constricted at the base, 0.2–0.3 mm in diam; disc pale brown to greyish brown, with a prominent and \pm flexuose margin which is darker than the disc on its inner side. Excipulum highly gelatinized, formed by radiately elongated and entangled hyphae, uncolored or pale brown; hypothecium uncolored, 20–25 μ m thick; hymenium uncolored, 70–80 μ m thick; paraphyses richly branched and anastomosed, 1 μ m thick; asci clavate, 8-spored; spores ellipsoid to broadly ellipsoid, one-septate, slightly constricted at the septum or not, one cell usually larger than the other, 7.5–8.5 \times 3–4 μ m. Alga with globose green cells, 5–12 μ m in diam, most probably belonging to the Chlorococcaceae.

TYPE: New Guinea, Madang province, rain forest on hills west of Yoro (=Mugamat), 4°28'S 145°10'E, 100–300 m elev., on leaves of a palm tree, II.6.1980, *Demoulin* 5143 and *Smeets* (LG, HOLOTYPE).

The long black hairs, the greyish brown apothecia and the black hypothallus make this new species easy to identify. Moreover, the small, 1-septate spores are unique in the genus. The small hyphae ball present on the side of each hyphophore hangs on its tip by two or three septate hyphae with very thick walls (2–3 μ m). These hyphae are responsible for the development of the ball as they ramify into it. Inside the ball the hyphae are inflated between the septa, and measure 8–12 \times 2–3 μ m. These single articulations most probably act as conidia; the septa are easily ruptured and thus the segments are isolated and can be dispersed.

Other species of *Tricharia* present in New Guinea are (Santesson, 1952; Sérusiaux, 1976; Vězda, 1979) *T. vainioi* R. Sant., and *T. albostrigosa* R. Sant. *Tricharia carnea* (Müll. Arg.) R. Sant. has been found in the same collection as the type of *T. demoulinii*.

KEY TO SPECIES OF TRICHARIA

1. Thallus hairs black or nearly black, rarely brownish or bleached at the tip, never entirely white or translucent 2

1. Thallus hairs entirely white or translucent 15
 2. Spores with transverse septa only 3
 2. Spores muriform or submuriform (most spores have at least one longitudinal septum) 5
3. Spores two-celled, $7.5\text{--}8.5 \times 3\text{--}4 \mu\text{m}$; asci 8-spored. Apothecia 0.2–0.3 mm in diam, with a greyish brown disc, slightly constricted at the base. Hairs flexible, up to 2.5 mm long. New Guinea *T. novoguineensis* 4
3. Spores with at least three septa 4
 4. Spores 3-septate, $11\text{--}14 \times 4\text{--}5 \mu\text{m}$; asci 8-spored. Apothecia 0.15–0.3 mm in diam, pale or dark brown, constricted at the base. Hairs black. Brazil and Zaïre *T. triseptata* R. Santesson 4
 4. Spores 7–15(–19)-septate, $48\text{--}70 \times 6\text{--}8 \mu\text{m}$; asci 4–8-spored. Apothecia 0.15–0.25 mm in diam, pale yellowish, strongly constricted at the base. Hairs usually pale brown and bleached at their tip. Zaïre and SE Asia *T. helminthospora* R. Santesson 4
5. Asci always with at least 2 spores 6
5. Asci usually with one spore, occasionally some asci 2- or 4-spored 9
 6. Apothecia whitish or very pale violet, 0.3–0.4 mm in diam, strongly constricted at the base. Spores $25\text{--}30 \times 9\text{--}12 \mu\text{m}$, muriform; asci (2–)4-spored. Zaïre *T. pallida* Vězda 9
 6. Apothecia brown to dark brown, never whitish 7
7. Hairs stiff, upright. Apothecia very strongly constricted at the base, almost stipitate, 0.4–0.6 mm in diam. Spores $13\text{--}30 \times 7\text{--}9 \mu\text{m}$, muriform, asci 4–8-spored². Zaïre *T. similis* Vězda 7
7. Hairs rather flexible, upright or not. Apothecia sessile or slightly constricted at the base. Spores submuriform 8
 8. Plant epiphyllous. Hyphae on the hyphophores not swollen and with very few septa. Apothecia 0.2–0.5 mm in diam. Spores $17\text{--}25 \times 6\text{--}11 \mu\text{m}$; asci 4–6-spored. U.S.A., Hong Kong *T. santessonii* Hawksworth 8
 8. Plant corticolous. Hyphae on the hyphophores strongly swollen between the numerous septa. Apothecia 0.3–0.5 mm in diam. Spores $23\text{--}28 \times 15 \mu\text{m}$; asci 2–4-spored. U.S.A. *T. vezdae* Buck 8
9. Hairs, at least some of them, bifid, trifid or with a multiple-branched tip 10
9. Hairs always simple 12
 10. Apothecia substipitate, 0.4–0.6 mm in diam. Spores cylindrical, (70–)100–110 \times 12–15 μm . Two types of hairs present: 1.5–1.8 mm long, flexible and simple, or 0.3–0.4 mm long, stiff, bifid or trifid. Zaïre *T. substipitata* Vězda 12
 10. Apothecia almost sessile, slightly constricted at the base, not exceeding 0.25 mm in diam. Spores ellipsoid. Hairs of one type only 11
11. Apothecia 0.05–0.075 mm in diam. Spores $32\text{--}50 \times 14\text{--}22 \mu\text{m}$. Hairs upright, stiff, 0.1 mm long, bifid, trifid or with a multiple branched tip, rarely simple. New Guinea *T. elegans* 11
11. Apothecia 0.15–0.2(–0.25) mm in diam. Spores $32\text{--}53 \times 15\text{--}20 \mu\text{m}$. Hairs upright or not, flexible, 0.5–1 mm long, bifid or trifid, rarely simple. New Guinea *T. demoulinii* 11
12. Apothecial disc pruinose 13
12. Apothecial disc never pruinose 14
13. Apothecia 0.3–0.6 mm in diam; disc concave, pale brown, with a bluish-white pruina. Spores $53\text{--}125 \times 17\text{--}40 \mu\text{m}$. Tropical America, Vietnam, New Guinea *T. carnea* (Müller Argovie) R. Santesson 13
13. Apothecia 0.1–0.2 mm in diam; disc almost flat, brown, covered by a dark-brown pruina. Spores $55\text{--}78 \times 16\text{--}38 \mu\text{m}$. Brazil *T. farinosa* R. Santesson 13
14. Apothecia sessile, not or slightly constricted at the base, dark brown. Spores $32\text{--}54 \times 15\text{--}28 \mu\text{m}$. Africa, Asia and Australia *T. vaintoi* R. Santesson 14
14. Apothecia strongly constricted at the base, pale or dark brown. Spores $32\text{--}80 \times 14\text{--}35 \mu\text{m}$. Tropical America *T. urceolata* (Müller Argovie) R. Santesson 14
15. Thallus whitish and shiny, verrucose, filled with crystals 16
15. Thallus whitish or not, mat, not verrucose, without crystals 17
 16. Thallus thin, epiphyllous. Apothecia 0.3–0.7 mm in diam, yellow or pale brown; disc non-pruinose. Asci 1-spored; spores muriform, $28\text{--}60 \times 14\text{--}20 \mu\text{m}$. Epithelial algae present. Hairs usually few, 0.1–0.3 mm long. True hyphophores unknown. Tropical America *T. vulgaris* (Müller Argovie) R. Santesson 17
 16. Thallus almost squamulose, growing on dead plants on rock. Apothecia 0.6–0.8 mm in diam, pale to dark brown; disc pruinose. Mature spores unknown. Hairs \pm abundant, 0.8–1.0 mm long, with a hyphae ball on their tip (=hyphophores?). U.S.A. *T. cretacea* Vězda 17

² In the original description based on one collection only, Vězda (1979: 75) states that there are only 4(–5) spores per ascus. More material from Zaïre (e.g., Kivu, Lambinon 78/273, LG) show many asci with 8 spores.

17. Hairs with small spiny arms or thorns. Apothecia 0.3–0.5 mm in diam, adnate, almost spreading on the thallus; disc brownish and margin almost translucent. Asci 1-spored; spores muriform, $40\text{--}45 \times 20\text{--}25 \mu\text{m}$. Africa (incl. La Réunion) *T. armata* Vězda
17. Hairs smooth, without any spiny arms or thorns 18
18. Apothecia strongly constricted at the base, 0.2–0.35 mm in diam, pale yellow to dark brown. Asci 1-spored; spores $38\text{--}71 \times 17\text{--}28 \mu\text{m}$. Pantropical *T. albostrigosa* R. Santesson
18. Apothecia adnate or slightly constricted at the base, 0.4–1 mm in diam, usually brown to dark brown 19
19. Asci 1–2-spored; spores $35\text{--}60 \times 17\text{--}20 \mu\text{m}$. Hyphophores hand-shaped. Africa and perhaps Belize *T. dilatata* Vězda
19. Asci (2–)4-spored; spores $32\text{--}40 \times 13\text{--}16 \mu\text{m}$. Hyphophores like small cilia. Zaïre *T. plana* Vězda

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