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Type studies in marasmiod and collybioid fungi (Tricholomataceae) - IV. Species described by Kuulo Kalamees from the Caucasus

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Summary: Type specimens of five species described by K. Kalamees from the Caucasus were revised. In this paper, *Collybia fagi* Kalam. is synonymized with *Marasmius torquescens* Quél., *Marasmius buxicolus* Kalam. with *M. buxi* Fr. in Quél., and *Marasmius rubi* Kalam. with *M. scorodoni* (Fr. : Fr.) Fr.. *Marasmius epirhododendron* Kalam. and *Marasmius rhododendrorum* Kalam. represent well delimited species.

Zusammenfassung: Die Typusbelege von fünf aus dem Kaukasus von K. Kalamees beschriebenen Arten wurden revidiert. In diesem Artikel wurden *Collybia fagi* Kalam. mit *M. torquescens* Quél., *Marasmius buxicolus* Kalam. mit *M. buxi* Fr. in Quél. und *M. rubi* Kalam. mit *M. scorodoni* (Fr. : Fr. :) Fr. synonymisiert. Die übrigen zwei (*Marasmius epirhododendron* Kalam. und *M. rhododendrorum* Kalam.) sind gut von allen bisher beschriebenen Sippen abgrenzbar.

Introduction

Five marasmiod species were validly described by the Estonian mycologist Kuulo Kalamees in the Macrofungi of the Caucasian State Nature Reserve (Vaasma, Kalamees et Raitviir 1986). Except for the Latin diagnoses, all species were described in Russian. Three years later, Kalamees (1989) published English descriptions of all new species originally included in the Russian book. All type specimens of the mentioned species are preserved in the herbarium of the Institute of Zoology and Botany of the Academy of Sciences of Estonia in Tartu (TAA).

Collybia fagi Kalamees in Vaasma, Kalamees et Raitviir, Macrofungi of the Caucasian State Nature Reserve, p. 60. 1986. (figs. 1 - 6) = *Marasmius fagi* (Kalamees) Kalamees, Opera Bot. 100 : 139. 1989.

Type specimen revised: TAA 94613 (Holotype); on leaves of *Fagus* in *Abies-Carpinus-Fagus*-forest, 10. IX. 1975 leg. K. Kalamees, M. Vaasma and L. Pihlik; type specimen consists of 2 complete, well preserved carpophores.

Type locality: Russia, region Krasnodar, Caucasian State Nature Reserve, Kisha, ca 800 m above sea level.

Macrofeatures (Kalamees 1989): Pileus 1-2 cm broad, convex-depressed, with obtuse papilla on disc, smooth, hygrophorous, translucently striate all over, pale ochre-brown, on centre blackish-brown, dry. Lamellae adnexed, distant, dirty yellowish. Stipe up to 3 cm long and 0.1-0.2 cm thick, downy all over, dry, dark reddish-brown, white and finely brown-flocculose at apex, with basal tomentum at base. Taste not distinctive, odour foetid. Context thin, brownish.

Microfeatures (Holotype): Basidiospores $8.2-10.8 \times 4.1-5.3 \mu\text{m}$, ellipsoid to slightly lacrymiform, hyaline, non-dextrinoid, smooth. Basidia clavate, 4-spored, clamped. Basidioles $21.0-29.1 \times 3.8-6.3 \mu\text{m}$, clavate to cylindrical, clamped, hyaline. Cheilocystidia $19.0-30.4 \times 8.9-13.3 \mu\text{m}$, clavate to broadly clavate, thin-walled, clamped, hyaline. Pleurocystidia $40.5-51.9 \times 5.1-8.2 \mu\text{m}$, clavate to almost cylindrical, sometimes slightly lageniform and slightly straggulate, thin-walled, hyaline, sometimes with slightly refractive contents, clamped, sometimes slightly granulate at the top, often not exceeding the hymenium. Hyphae dextrinoid, clamped, branched, thin-walled and hyaline (except for those of the stipe cortex which are slightly thick-walled and brownish pigmented), up to $13 \mu\text{m}$ broad. Pileipellis hymeniform, made up of clavate, broadly clavate to vesiculose cells, $17.1-32.9 \times 11.4-20.9 \mu\text{m}$, thin- to slightly thick-walled, clamped, non-dextrinoid, with hyaline to brownish walls. Thick-walled, brownish, dextrinoid setoid caulocystidia, $34.2-98.7 \times 5.1-11.4 \mu\text{m}$ (base), $2.5-4.4 \mu\text{m}$ (top), obtuse to subacute, present on pileus and stipe surface; pileosetae rare to extremely rare, setoid caulocystidia often bifurcate.

According to its features, *Marasmius fagi* (Kalam.) Kalam. belongs to the sect. *Sicci* Sing. emend. Desjardin. Kalamees (1989) ranged this species as close to *Marasmius impudicus* Fr. s. Malençon et Bertault (1975). However, *Marasmius fagi* (Kalam.) Kalam. is undoubtedly identical with *Marasmius torquescens* Quél. (= *M. lupuletorum* /Weinm./Bres. sensu Kühn. et Romagn.). The only discordant feature is a foetid smell described in the original description of *M. fagi*. However, the smell of *M. torquescens* can be slightly unpleasant (stale), as in collections from Czech Republic near Bílovice n. Svit. and Josefov (VA 89/88 and 87/60, BRNM). Therefore, I consider *Marasmius fagi* to be a synonym of *Marasmius torquescens* Quél.

Marasmius buxicolus Kalamees in Vaasma, Kalamees et Raitviir, Macrofungi of the Caucasian State Nature Reserve, p. 63. 1986. (figs. 7-9)

Type specimen revised: TAA 94281 (Holotype); on leaves of *Buxus colchica*, 2. IX. 1974, leg. L. Pihlik et M. Vaasma; type specimen consists of 2 complete basidiocarps, and many sterile stipes.

Type locality: Russia, region Krasnodar, Caucasian State Nature Reserve, Hosta, *Buxus-Taxus* forest.

Macrofeatures (Kalamees 1989): Pileus 1 mm broad, campanulate, glabrous, dry, yellowish-brown, disc fuliginous. Lamellae adnexed, pale brownish. Stipe 1.5 cm long, 0.01 cm thick, filamentous, cylindrical, glabrous or very slightly white-downy, dry, black, at apex blackish-brown. Context very thin, brownish. Taste and odour not distinctive.

Microfeatures (Holotype): Basidiospores $9.1-10.5 (-12.0) \times 4.0-5.1 \mu\text{m}$, ellipsoid, non-dextrinoid, hyaline, thin-walled, smooth. Basidia $24.1 \times 5.7 \mu\text{m}$, clavate, 4-spored, clamped, hyaline. Basidioles $15.2-22.2 \times 2.5-6.0 \mu\text{m}$, clavate, cylindrical-clavate to slightly fusoid, clamped, hyaline. Cheilocystidia $30.4-31.6 \times 7.0-8.9 \mu\text{m}$, lageniform to slightly fusoid, capitate, clamped, thin-walled. Hyphae non-dextrinoid, cylindrical, clamped, up to $7.6 \mu\text{m}$ broad, hyaline and thin-walled, except for those of the stipe cortex that are slightly thick-walled and brown pigmented. Caulocystidia not found; small outgrowths of the cortex hyphae, vesiculose to almost cylindrical, thick-walled, brown, up to $8.9 \times 7.6 \mu\text{m}$ present on the stipe surface. Pileipellis hymeniform, made up of clavate to vesiculose broom cells of the Rotalis-type, rarely mixed with smooth ones, thin to thick-walled (walls up to $6 \mu\text{m}$ thick), clamped, hyaline below, brown above, with obtuse to subacute projections, $1.0-3.8 (-5.0) \times 1.0-1.5 \mu\text{m}$. Pileocystidia not found.

Marasmius buxicolus Kalam. belongs undoubtedly in sect. *Hygrometrici* Kühn. According to Kalamees (1986, 1989), *Marasmius buxicolus* differs from the closely related species *M. buxi* Fr. in Quél. by the length of its basidiospores that are more than $13 \mu\text{m}$ (Kühner et Romagnesi 1953). However, my studies of carpophores of *M. buxi* from various regions showed that the size of its basidiospores were $(7-8.5 -12.5 (-13.0) \times 3.5-4.0(-4.5) \mu\text{m}$. The other micro- and macrofeatures of *M. buxicolus* also agree well with those of *M. buxi*. Therefore, I consider *Marasmius buxicolus* Kalam. to be a synonym of *Marasmius buxi* Fr. in Quél.

Marasmius epirhododendron Kalamees in Vaasma, Kalamees et Raitviir, Macrofungi of the Caucasian State Nature Reserve, p. 64. 1986. (figs. 10-12)

Type specimens revised: TAA 63355 (Holotype); on leaves of *Rhododendron ponticum*, 21. V. 1975 leg. A. Raitviir; type specimen consists of 3 complete, well preserved carpophores.

Type locality: Russia, region Krasnodar, Caucasian State Nature Reserve, Guzeripl.

Macrofeatures (Kalamees 1989): Pileus 0.5 cm broad, plane-convex, with inrolled tomentose margin when young, dry, finely but densely white-granular-velutinous, finally fine-grained on disc, light reddish-brown. Lamellae adnexed, rather distant, moderately thick, whitish. Stipe 1-2 cm long, 0.05-0.1 cm thick, filamentous, dry, at apex yellowish-brown, glabrous, shining, underneath light reddish-brown, sometimes minutely cottony-fibrillose, with thin ochre-

brown basal tomentum at base. Context thin, brownish. Taste and odour inconspicuous.

Microfeatures (Holotype): Basidiospores $7.8\text{--}10.1 \times (2.8\text{--})3.2\text{--}4.0\text{--}(4.4) \mu\text{m}$, ellipsoid to slightly fusoid, smooth, hyaline, non-dextrinoid. Basidia $24.6\text{--}29.1 \times 7.0\text{--}7.6 \mu\text{m}$, 4-spored, clavate, thin-walled. Basidioles $16.5\text{--}35.4 \times 3.2\text{--}6.3 \mu\text{m}$, clavate to fusoid, clamped, hyaline. Cheilocystidia in form of Siccus-type broom cells, $12.0\text{--}19.0 \times 4.7\text{--}6.3 \mu\text{m}$, clavate, thin-walled or slightly thick-walled above, with obtuse, sometimes furcate projections, up to $7 \times 2 \mu\text{m}$. Hyphae non-dextrinoid, clamped, cylindrical, branched, up to $6.5 \mu\text{m}$ broad, hyaline and thin-walled except for those of the stipe cortex that are slightly thick-walled and brownish. Caulocystidia absent; only small hyphal outgrowths present (pruinose stipe surface). Pileipellis hymeniform, made up of both smooth and broom cells of the Siccus-type, $16.5\text{--}24.1 \times 7.0\text{--}15.2 \mu\text{m}$, clavate, rarely slightly fusoid, thin- to slightly thick-walled, hyaline to brownish, non-dextrinoid, projections up to $4.0 \times 1.2 \mu\text{m}$, obtuse, simple to furcate, mostly brownish.

Kalamees (1989) placed *Marasmius epirhododendron* in sect. *Sicci* Sing. In having non-dextrinoid hyphae and broom cells of Siccus-type, it belongs in sect. *Inaequales* (Sing.) Sing. (Singer 1986). A comparison with described species of that section showed, that *Marasmius epirhododendron* Kalam. represents a separate and well delimited species.

Marasmius rhododendrorum Kalamees in Vaasma, Kalamees et Raitviir,

Macrofungi of the Caucasian State Nature Reserve, p. 66. 1986 (figs. 13-17)

Type specimen revised: TAA 94939 (Holotype), TAA 94679 and TAA 94135 (Topotypes); in Fago-Abietetum-forest, 1000 m above sea level, 21. V. 1975 leg. K. Kalamees, L. Pihlik et M. Vaasma; the holotype specimen consists of ca 6 complete well preserved carpophores.

Type locality: Russia, region Krasnodar, Caucasian State Nature Reserve, Guzeripl.

Macrofeatures (Kalamees 1989): Pileus 0.1-0.5 cm broad, convex, dry, radially uneven-sulcate or slightly undulate, sparse white- or brown-pilose, hygrophanous, snow-white when young then pale brownish. Hymenophore almost even, or slightly venose. Veins very distant (5-6 of them), furcate, anastomosing, subdecurrent, white. Stipe 1-2 cm long, 0.05 cm thick, filamentous, dry, sparse white- or brown-pilose as pileus, blackish-brown, at apex white. Context very thin, white. Taste and odour not distinctive.

Microfeatures (Holotype): Basidiospores $11.4\text{--}13.9 \times 3.5\text{--}4.1 \mu\text{m}$, fusoid-ellipsoid to fusoid-cylindrical, smooth, hyaline, non-dextrinoid, thin-walled. Basidia $21.5\text{--}22.8 \times 7.0 \mu\text{m}$, clavate, 4-spored, clamped, thin-walled. Basidioles $13.9\text{--}26.6 \times 2.5\text{--}7.6 \mu\text{m}$, clavate to cylindrical, clamped, hyaline, thin-walled. Cheilocysti-

dia of two types: 1) sparse, $29.1\text{--}39.2 \times 7.6\text{--}11.4 \mu\text{m}$, fusoid, rarely sublageniform, mostly capitate cells, thin-walled, hyaline; 2) broom cells, rare, e.g. $26.8 \times 7.6 \mu\text{m}$, clavate, subcapitate, hyaline, thin-walled. Hyphae non-dextrinoid, clamped, cylindrical, up to $7.6 \mu\text{m}$ broad, hyaline, thin-walled except for those of the stipe cortex that are slightly thick-walled (up to $1.5 \mu\text{m}$) and brown. Typical caulocystidia absent; thick-walled, cylindrical to lageniform, hyaline to brown, obtuse to subacute, amyloid (!), $6.3\text{--}161.2 \times 3.8\text{--}10.1 \mu\text{m}$, rarely furcate setae commonly present on the stipe surface. Pileipellis hymeniform, made up of clavate, broadly clavate, broadly fusoid, vesiculose to cylindrical-clavate cells of the Rotalis-type, rarely mixed with smooth cells, $17.7\text{--}30.4 \times 10.8\text{--}15.2 \mu\text{m}$, non-dextrinoid, rarely slightly amyloid, thin- to slightly thick-walled, hyaline to brown, projections $1.0\text{--}3.8 \times 0.7\text{--}1.2 \mu\text{m}$, obtuse to subacute, mostly brown, rarely hyaline. Pileosetae $36.7\text{--}210.2 \times 8.9\text{--}17.7 \mu\text{m}$ (base), $5.1\text{--}9.5 \mu\text{m}$ (central part), lageniform to fusoid, hyaline or brownish, thick-walled (up to $6.5 \mu\text{m}$), base often thin-walled, amyloid (!), especially in the thick-walled portions.

Marasmius rhododendrorum undoubtedly belongs in sect. *Hygrometrici* Kühn., and seems to be a separate, well delimited species. *Marasmius hudsonii* (Pers.: Fr.) Fr. represents the closest related species. *Marasmius rhododendrorum* differs especially macroscopically by hyaline hairs (setae) at the pileus and stipe apex, and microscopically by narrower basidiospores ($7.5\text{--}13.0 \times 4\text{--}6.5 \mu\text{m}$ in *M. hudsonii*), absence of typical caulocystidia, amyloid setae, and ecologically by growing on *Rhododendron* leaves. It is the only known *Marasmius*-species with some amyloid structures!

Marasmius rubi Kalamees in Vaasma, Kalamees et Raitviir, *Macrofungi of the Caucasian State Nature Reserve*, p. 67, 1986. (figs. 18–20)

Type specimen revised: TAA 63354 (Holotype): on decaying stem of *Rubus ceasius*, 21. V. 1975 leg. A. Raitviir; type specimen consists of 3 complete well preserved carpophores.

Type locality: Russia, region Krasnodar, Caucasian State Nature Reserve, Guzeripl.

Macrofeatures (Kalamees 1989): Pileus 0.5–1 cm broad, convex-plane, slightly glutinous, reddish-brown, densely whitish-grey cottony-tomentose when young, then whitish granular-tomentose. Lamellae attached to a pilose, rusty brown collar free of stipe, distant, thick, white. Stipe 0.5–1 cm long, 0.1 mm thick, reddish-brown when young, rusty brown cottony-tomentose-shaggy at first, then light yellowish-brown, almost glabrous at apex, with dense basal tomentum at base, dry. Strong odour of garlic. Taste similar. Context thin, brownish.

Microfeatures (Holotype): Basidiospores $8.2\text{--}10.4 \times 3.6\text{--}4.9 \mu\text{m}$, ellipsoid to fusoid-ellipsoid, hyaline, smooth, non-dextrinoid. Basidia $29.1\text{--}35.4 \times 7.0\text{--}9.5$

µm, 4-spored, clamped, thin-walled. Basidioles 15.9-35.4 x 2.5-8.9 µm, clavate to fusoid, thin-walled, clamped, hyaline, non-dextrinoid. Cheilocystidia 12.7-15.2 x 5.1-6.3 µm, clavate, clamped, hyaline, thin-walled below, sometimes slightly thick-walled above, with digitate, sometimes branched, obtuse projections, 3.8-6.3 x 2.2-2.5 µm. Hyphae non-dextrinoid, clamped, cylindrical, up to 8 µm broad, hyaline and thin-walled except for those of the stipe cortex that are slightly thick-walled and brownish. Pileipellis hymeniform, made up of clavate, sometimes slightly capitate, rarely slightly lobate cells, 19.0-29.1 x 8.3-20.3 µm, thin- to thick-walled (walls up to 3 µm thick), clamped, hyaline to brownish, non-dextrinoid, smooth or rarely with some obtuse, digitate projections above (but never typical broom cells).

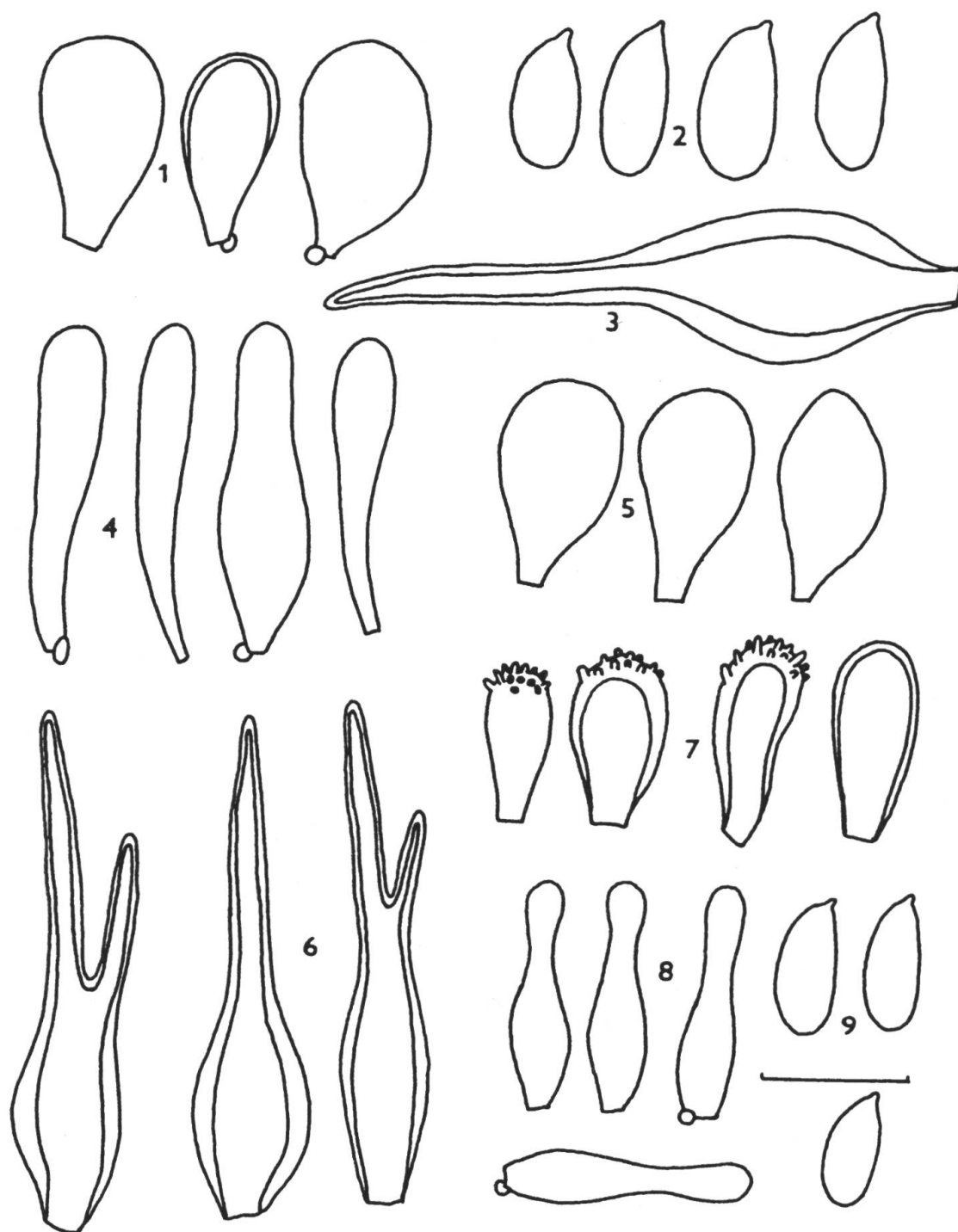
According to its microfeatures, *Marasmius rubi* Kalam. belongs in sect. *Chordales* Fr. (= *Alliacei* Kühn.). Kalamees (1986, 1989) placed it in sect. *Rotulae* Kühn. (=sect. *Marasmius*) close to *M. graminum* (Lib.) Berk. et Br. (= *M. curreyi* Berk. et Br., see Antonín 1989) because of the presence of collarium. However, carpophores of the holotype specimen did not form a true collarium. Lamellae are adnexed to false collarium connected with stem by hairs. According to all studied microfeatures as well as to macrofeatures described by Kalamees (e.g. garlic smell and taste), I consider *Marasmius rubi* Kalam. to be a synonym of *Marasmius scorodonius* (Fr. : Fr.) Fr.

Acknowledgements

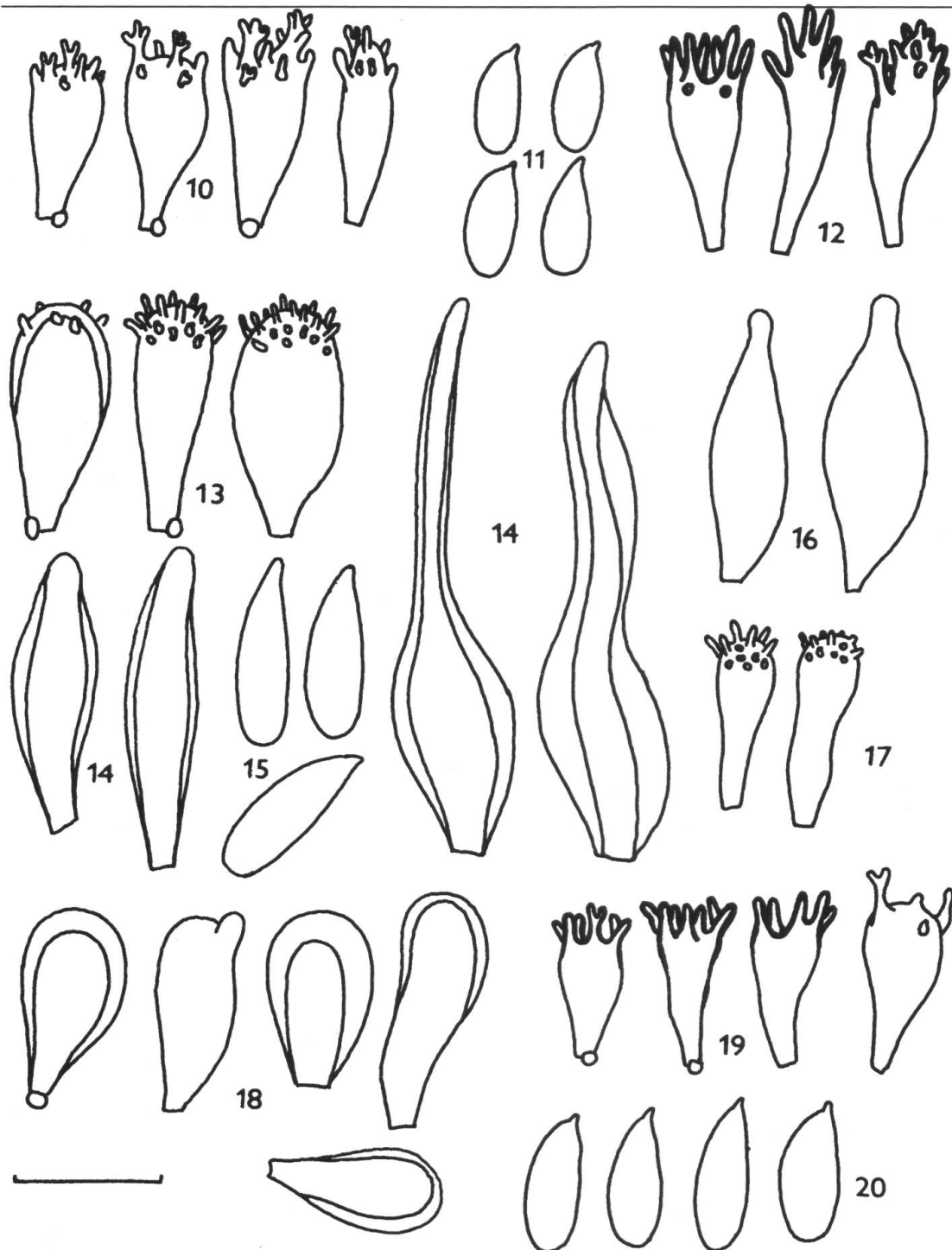
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Figs. 1-6. *Collybia fagi* (Holotype): 1. pileipellis cells, 2. basidiospores, 3. pileoseta, 4. pleurocystidia, 5. cheilocystidia, 6. stipe surface setae. Figs. 7-9. *Marasmius buxicolus* (Holotype): 7. pileipellis cells, 8. cheilocystidia, 9. basidiospores. Scale bar = 10 μ m for basidiospores, 20 μ m for other structures.



Figs. 10-12. *Marasmius epirhododendron* (Holotype): 10. pileipellis cells, 11. basidiospores, 12. cheilocystidia. Figs. 13-17. *Marasmius rhododendronun* (Holotype): 13. pileipellis cells, 14. pileosetae, 15. basidiospores, 16. and 17. cheilocystidia. Figs. 18-20. *Marasmius rubi* (Holotype): 18. pileipellis cells, 19. cheilocystidia, 20. basidiospores. Scale bar = 10 μ m for basidiospores, 20 μ m for other structures.