A study of some Chinese Plagiochila species (Plagiochilaceae, Hepaticae)

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Descriptions, illustrations and distinctive characters based on type specimens are provided for eleven poorly known Plagiochila species from China: Plagiochila biondiana Steph., P. debilis Mitt., P. delavayi Steph., P. determii Steph., P. hamulispina Herz., P. hokinensis Steph., P. maireana Steph., P. perserrata Herz., P. sikutzuisana Mass., P. torquescens Herz., and P. wilsoniana Steph. Their taxonomy and distribution are discussed.

Key words: China, descriptions, Hepaticae, Himalayas, illustrations, Plagiochila, taxonomy

INTRODUCTION


In the present paper, 11 poorly known species of Plagiochila are described and illustrated. None of these species has been properly illustrated previously. Herzog (1930) provided descriptions for his own new taxa. Most of the species studied are known from Shaanxi, Yunnan, and Sichuan; some have wider ranges extending to Hubei, Taiwan, and Xizang. Plagiochila biondiana Mass., P. hamulispina Herz., P. hokinensis Steph., P. maireana Steph., P. sikutzuisana Mass., and P. wilsoniana Steph. are restricted to China, but P. debilis Mitt., P. delavayi Steph., P. determii Steph. (also from Thailand), P. perserrata Herz., and P. torquescens Herz. are known also from the Himalayas outside China.
Plagiochila biondiana Mass. (Fig. 1a–d)


Plants fairly rigid, to 5 cm long and to 1.2 mm wide on main shoots, grayish olive brown when dry, erect or obliquely arising from substrate. Stem brownish. Branches very few, lateral-intercalary, often with reduced stolon-like leaves. Leaves on leading stem clasping, ventrally secund, imbricate, suborbicular, 1.0–1.1 mm long and 0.8–1.0 mm wide, obliquely spreading; branch leaves often smaller. Dorsal leaf margin somewhat arched, long decurrent, revolute; ventral margin somewhat arched, base dilated; apex rounded; teeth 6–12, or margins only crenulate or teeth absent, teeth 1–2 cells long and 1 cell wide at base, 8–13 µm long and wide. Apical cells 8–13 µm long and wide, cells of middle portion of leaves 8–18 µm long and 8–19 mm wide, at base 18–30 µm long and 11–15 µm wide, not differentiated as vitta; cells thin- to somewhat thick-walled, trigones absent, cuticle slightly verrucose. Underleaves absent. Asexual reproduction not present. Androecia and gynoecia not present.

Illustration: Massalongo 1897: Tav. I (fig. II).

Characteristic for Plagiochila biondiana are: 1) fairly long shoots, 2) branches often with reduced leaves, 3) leaves clasping and secund, 4) leaves suborbicular, 5) margins toothed with small teeth or only crenulate, 6) leaf cells small and triangular, 7) basal cells not differentiated as vitta.

Plagiochila biondiana and P. delavayi are somewhat similar to each other (see the discussion under the latter species). Inoue (1965) placed P. biondiana together with P. sikutuisana, P. recurvata (Nicholson) Grolle, P. duthiana Steph., and P. poeltii Inoue & Grolle in section Poeltiae Inoue. The section is characterized by usually a simple stem, reniform or suborbicular leaves with a long decurrent dorsal margin, absence of vitta at leaf base, cyathiform perianth, and branches intercalary and often stolone-like (Inoue 1965). For characters to distinguish the species from P. wangii Inoue, see Inoue (1962).

Total range: Shaanxi (China; Piippo 1990).

Plagiochila debilis Mitt. (Fig. 2a–d)


Plants filiform, to 4 cm long and to 2 mm wide on main shoots, yellowish brown or grayish olive brown when dry, erect or obliquely arising from substrate. Stem brown or yellowish brown at shoot apices. Branches fairly numerous, terminal and of Frullania type, sometimes lateral-intercalary. Leaves on leading stem distant, oblong-ovate, 0.7–0.9 mm long and 0.2–0.4 mm wide, not narrowing toward apex, obliquely spreading; branch leaves may be reduced. Dorsal leaf margin nearly straight, decurrent; ventral margin almost straight to arched, slightly decurrent, base not dilated; apex acute with teeth; teeth 5–8, 1–2 large apical teeth (= bilobed to 2/5 of leaf length), apical teeth to 12 cells long and to 7 cells wide at base, triangularly acute, other teeth 1–6 cells long and 1–4 cells wide at base, triangularly acuminate, tooth cells 15–35 µm long and 6–15 µm wide. Apical cells 15–25 µm long and 13–18 µm wide, cells of middle portion of leaves 15–33 µm long and 13–20 µm wide, at base 20–35 µm long and 15–20 µm wide, marginal cells lengthened at basal ventral margin in 1–2 rows, 23–35 µm long and 5–9 µm wide; cells thin- to somewhat thick-walled, trigones absent, cuticle smooth. Underleaves absent. Asexual reproduction not present. Androecia not seen. Gynoecia usually with one innovation. Perianth 1.2 mm long and 1.2 mm wide, obdeltoid, mouth and keels toothed, teeth 6–12 cells long and 2–6 cells wide at base, dorsal keel distinctly winged.

Illustrations: none.

Characteristic for Plagiochila debilis are: 1) filiform shoots, 2) leaves distant and oblong-ovate, 3) leaf apex with 1–2 large apical teeth, 4) trigones absent, and 5) perianth obdeltoid, dorsal keel distinctly winged, teeth well-developed. A description for the species was given by Inoue (1965).

The leaf shape of the species is fairly similar to that of quite a few other species especially in Section Firmae Carl, but the absence of trigones
Fig. 1. — a–d: Plagiochila biondiana Mass., e–h: P. delavayi Steph. — a, e: Leaves. — b, f: Teeth and marginal cells. — c, g: Cells from middle portion of leaves. — d, h: Basal cells. — a and e according to 1 mm scale; b–d, f–h to 100 µm scale. — Drawn from the types (G).
Fig. 2. — a–d: Plagiochila debilis Mitt., e–h: P. determii Steph. — a, e: Leaves. — b, f: Teeth and marginal cells. — c, g: Cells from middle portion of leaves. — d, h: Basal cells. — a and e according to 1 mm scale, and b–d, f–h to 100 µm scale. — Drawn from the types (G), P. debilis from the type of P. capillaris Schiffn. ex Steph.

is a good distinguishing character. The species may be compared with Plagiochila togashii Inoue from Japan, which also has no trigones (Inoue 1967, 1984).

**Plagiochila delavayi** Steph. (Fig. 1e–h)


Plants small, to 1 cm long and to 1 mm wide on main shoots, grayish olive green when dry, erect. Stem yellowish, brownish or blackish. Branches few, lateral-intercalary. Leaves on leading stem clearly clasping and ventrally secund, at shoot apex imbricate, at base distant, suborbicular, 0.3–0.8 mm long and 0.3–0.5 mm wide, not narrowing toward apex, subvertical; branch leaves similar but smaller. Dorsal margin arched, decurrent, revolute; ventral margin arched, base dilated; apex rounded; teeth 6–16, 1–3 cells long and 1–2 cells wide at base, margins often only crenulate, tooth cells 15–23 µm long and 5–15 µm wide. Apical cells 5–18 µm long and 13–23 µm wide, cells of middle portion of leaves 8–23 µm long and 10–18 µm wide, at base 25–40 µm long and 15–20 µm wide, basal cells somewhat differentiated and yellow; cells thick-walled but especially apical and marginal cells sometimes thin-walled, trigones small to moderate but may be inconspicuous at apex, cuticle verrucose. Underleaves absent. Asexual reproduction not seen. Androecia and gynoecia not seen.

Illustrations: none.

Characteristic for *Plagiochila delavayi* are: 1) plants small, 2) leaves clasping and secund, 3) leaves suborbicular, 4) marginal teeth small and leaves often only crenulate, 5) basal cells somewhat differentiated, 6) trigones variable but distinguishable, except sometimes at the apex, and 7) cuticle verrucose, and perianth cylindrical.

This species needs to be compared with many more or less similar species with suborbicular leaves and a basal vitta, e.g., *Plagiochila chinensis* Steph. (Inoue 1959), *P. orbicularis* (Hatt.) Hatt. (Inoue 1976), *P. microphylla* Steph. (= *P. wichurae* Steph., Inoue 1981), *P. zonata* Steph. (= *P. handelii* Herz., Inoue 1965), the variable *P. semidecurrens* (Lehm. & Lindenb.) Lindenb., and *P. satoi* Hatt. (Inoue 1974b, 1984).

**Plagiochila chinensis** differs from *P. delavayi* by its cell margins being visible inside trigones, the distinct vitta, the nearly straight dorsal margin of the leaves, and the leaf apex with two prominent teeth. These characters were studied also by Inoue (1959), and by the present author on the basis of the type (China, Yunnan, Tsang yang Tchang, 1889 *Delavay*, hb. Bescherelle 198, G!). Both species have a cylindrical perianth. *P. zonata*, as *P. biondiana* (see above), has an obdeltoid or cyathiform perianth (Herzog 1930: 16, Abb. 5: 1–9, 10–16).

Total range: China, Nepal (Grolle 1966).

**Plagiochila determii** Steph. (Fig. 2e–h)


Plants to 4.8 cm long and to 2.5 mm wide on main shoots, grayish olive green when dry, obliquely arising from substrate. Stem brown or blackish. Branches few, terminal and of *Frullania* type, sometimes lateral-intercalary. Leaves on leading stem contiguous or imbricate, triangularly oblong, 1.5 mm long and 1 mm wide, narrowing toward apex, subvertical; branch leaves similar. Dorsal leaf margin nearly straight, revolute, decurrent; ventral margin arched, basally revolute, base distinctly dilated; apex subtruncate; teeth 20–25, flaccid and curved, up to 11 cells long, basal tooth cells 25–35 µm long and 10–23 µm wide, apical tooth cells 30–62 µm long and 8–13 µm wide. Apical cells 15–30 µm long and wide, cells of middle portion of leaves 20–30 µm long and wide, at base 23–48 µm long and 20–28 µm wide; cells thick-walled, trigones large and nodulose, confluent, at apical portion thickenings confluent and walls seemingly thick-walled and trigones obscure, cuticle smooth. Underleaves vestigial. Asexual reproduction not verified, but fragile leaves perhaps serving as such. Androecia not seen. Gynoecia terminal on branches, bract margins with long hairs. Perianth not seen.

Illustrations: none.
Plagiochila determii belongs to Sect. Yokoguren­ses Inoue, which currently is placed in Sect. Subtropical­cae Carl (Inoue 1965). Characteristic for the species are: 1) branches usually of Frullania type, 2) leaves triangularly oblong, 3) leaves apparently fragmenting, 4) teeth of leaf margins flaccid and curved, long with apical cells especially long, and 5) large trigones. The species was compared with P. kitagawae Inoue from Thailand by Inoue (1974a).


Total range: India (Sikkim), Nepal, Thailand, China (Inoue 1965, Grolle 1966, Hattori 1975, Mizutani 1979).

Plagiochila hamulispina Herz. (Fig. 3)

Symb. Sin. 5: 19. 1930. — Type: China. Yunnan bor.-occid.: prope fines Tibeto-Birmancas inter fluvios Lu-djiang (Sal­ween) et Dijou-djiang (Irrawadi or. sup.), in jugi Tschiang­prope fines Tibeto-Birmancas inter fluvios Lu-djiang (Sal­ween) et Dijou-djiang (Irrawadi or. sup.), in jugi Tschiang­prope fines Tibeto-Birmancas inter fluvios Lu-djiang (Sal­ween) et Dijou-djiang (Irrawadi or. sup.), in jugi Tschiang. Subst. truncis, alt. ca. 2 800–3 450 m, 1916 Handel-Mazzetti (Diar. Nr. 1769) 4326 (JE!, syntype).

Plants fairly rigid, to 4 cm long and to 4 mm wide on main shoots, shoots characteristically curved at apices, olive green or brownish when dry, erect or obliquely arising from substrate. Stem brown. Branches irregular, numerous and making the plants fan-shaped, many branches very closely originating, lateral-intercalary, some branches different from those, yellowish, with smaller and distant caducous (?) leaves. Leaves on leading stem contiguous, sometimes imbricate, triangularly oblong, 1.2–2.0 mm long and 0.8–1.5 mm wide, narrowing toward apex, obliquely spreading; branch leaves often much smaller. Dorsal leaf margin nearly straight, revolute, long decurrent; ventral margin long-decurrent, base diluted; apex rounded; teeth 17–26, spinose, 2–11 cells long and 1–8 cells wide at base, the apical cell longest, 10–35 µm long and 5–20 µm wide, teeth both on dorsal and on ventral margins. Apical cells 15–20 µm long and 10–25 µm wide, cells of middle portion of leaves 18–25 µm long and 15–23 µm wide, at base 25–62 µm long and 18–25 µm wide, basal cells differentiated, vitta area small and not very conspicuous, yellow; cells with intermediate thickenings, fairly thin-walled but may be thick­walled, trigones large, nodulose, sometimes confluent, cuticle slightly verrucose. Underleaves abs­sent. Asexual reproduction not seen. Androecia not seen. Gynoe­cia usually with one innovation. Perianth 4.5 cm long and 1.2 mm wide, long-cylindrical, mouth with long teeth (similar as on leaf margins), no keels or wings.


Characteristic for Plagiochila hamulispina are: 1) shoots characteristically curved at apices, 2) branches numerous, lateral-intercalary, making the plant fan-shaped, 3) some branches with small and perhaps caducous leaves, 4) leaves triangularly oblong, 5) teeth spinose, present throughout dorsal and ventral margins, 6) basal cells of leaves differentiated, 7) trigones large, and 8) perianth long-cylindrical.

Herzog (1930) compared this species with Plagiochila vittata Steph. and Carl (1931) placed it in Sect. Hamulispinae Carl with Plagiochila per­serrata Herz. Both species have triangularly oblong leaves with revolute margins. Basal cells are differentiated as vitta. The trigones of leaf cells of P. hamulispina are larger than those of P. per­serrata.

Total range: Yunnan (China; Piippo 1990).

Plagiochila hokinensis Steph. (Fig. 4a–d)


Plants fairly rigid, to 4 cm long and to 2 mm wide on main shoots, pale olive brown when dry, obliquely arising from substrate. Stem brown to brownish. Branches numerous, lateral-intercalary, shoot or branch apices may be tapering. Leaves on leading stem distant to contiguous, triangularly oblong, 1.0–1.1 mm long and 0.4 mm wide, narrowing toward apex, flaccid, obliquely spreading; branch leaves similar. Dorsal leaf margin nearly straight, revolute, very long decurrent; ventral margin slightly arched, revolute, base slightly dil­ated; apex subtruncate; teeth 2–12, short, apical cell sharp, 1–3 cells long and 1–2 cells wide at base, 15–30 µm long and 8–23 µm wide, smaller leaves with only 1–3 crenulate teeth. Apical cells 15–25 µm long and wide, cells of middle portion of leaves 15–28 µm long and wide, at base 28–40 µm long and 18–28 µm wide; cells thin-walled,

Characteristic for Plagiochila hokinensis are: 1) shoot and branch apices often tapering and have smaller leaves, 2) leaves distant to contiguous, 3) leaves triangularly oblong, dorsal margin very long decurrent, 4) leaf margins often conspicuously revolute, 5) leaves with up to 12 teeth, but

Illustrations: none.
Fig. 4. a–d: Plagiochila hokinensis Steph., e–h: P. maireana Steph. — a, e: Leaves. — b, f: Teeth and marginal cells. — c, g: Cells from middle portion of leaves. — d, h: Basal cells. — a and e according to 1 mm scale, and b–d, f–h to 100 µm scale. — Drawn from the types (G).
smaller leaves with only 1–3 apical teeth, teeth small, and 6) trigones large except at leaf apex.

*Plagiochila hokinensis* was placed in Sect. *Renitentes* Carl (= Sect. *Zonatae* Carl) by Carl (1931) with *P. sikutziuisana* (but see under *P. biondiana* and Inoue 1965), *P. torquescens* and *P. wilsoniana*. Characters given by Inoue (1984) for the section do not, however, match these species.

Total range: Yunnan (China; Piippo 1990).

**Plagiochila maireana** Steph. (Fig. 4e–h)


Plants soft, small, to 2 cm long and to 1.5 mm wide on main shoots, yellowish brown when dry, erect or obliquely arising from substrate. Stem yellowish brown to brown. Branches fairly numerous, lateral-intercalary. Leaves on leading stem imbricate to distant especially when leaf margins very revolute, broadly ovate to triangularly ovate, 0.9–1 mm long and 0.6–0.7 mm wide, obliquely spreading; branch leaves similar. Dorsal leaf margin nearly straight, revolute, long decurrent; ventral margin arched, base dilated or not; apex rounded; teeth 15–23, spinose, on dorsal margin only on upper margin, 1–4 cells long and 1–3 cells wide at base, the apical cell narrowest, 18–25 µm long and 4–20 µm wide. Apical cells 15–28 µm long and 10–23 µm wide, cells of middle portion of leaves 18–28 µm long and 13–25 µm wide, at base 25–61 µm long and 18–25 µm wide; cells thin-walled, trigones large, nodulose throughout the leaves, cuticle faintly verrucose. Underleaves absent. Asexual reproduction not present. Androecia terminal or intercalary on branches. Gynoecia usually without or with one innovation. Perianth nearly straight, revolute, long decurrent, even on the decurrent part, teeth spinose, 4) teeth present only on upper part of dorsal margin, teeth fairly short, 5) trigones large, and 6) perianth long-cylindrical.

Total range: Yunnan (China; Piippo 1990).

**Plagiochila perserrata** Herz. (Fig. 5)


Plants rigid, to 5 cm long and to 3.5 mm wide on main shoots, grayish olive brown or bluish green when dry, erect or obliquely arising from substrate. Stem brownish to brown. Branches fairly numerous, lateral-intercalary. Leaves on leading stem contiguous or imbricate, triangularly oblong, 1.0–1.8(–2.5) mm long and 0.8–1(–1.8) mm wide, narrowing toward apex, obliquely spreading; branch leaves similar. Dorsal leaf margin nearly straight, long decurrent, always long revolute; ventral margin arched, long decurrent, base dilated; apex rounded; teeth 10–28, rarely only 10, spinose, 2–8 cells long and 1–3 cells wide at base, narrowly triangular, teeth present on whole dorsal margin, even on the decurrent portion, 23–40 µm long and 9–23 µm wide. Apical cells 18–25 µm cells long and 20–30 µm wide, cells of middle portion of leaves 25–38 µm long and wide, at base 33–85 µm long and 13–23 µm wide, basal cells differentiated, long and yellow; cells fairly thick-walled, trigones very small to small, intermediate thickenings sometimes above basal cells, cuticle verrucose. Underleaves absent. Asexual reproduction not present. Androecia not present. Perianth long-cylindrical, 4 mm long and 1.5–1.8 mm wide, no keels or wings, mouth toothless.


Characteristic for *Plagiochila perserrata* are: 1) plants rigid, 2) leaves triangularly oblong, 3) marginal teeth present on the whole dorsal margin, even on the decurrent part, teeth spinose, 4) basal cells differentiated, 5) cuticle verrucose, and 6) perianth long-cylindrical. See also under *P. halamulispina*.

Range in China: Yunnan (China), Taiwan (Piippo 1990).
Fig. 5. *Plagiochila perserrata* Herz. — a: Leaves. — b: Teeth and their cells. — c: Cells from middle portion of leaves. — d: Basal cells. — a according to 1 mm scale, and b–d to 100 µm scale. — Drawn from the syntype (JE).
Plagiochila sikutzuisana Mass. (Fig. 6)


Plants fairly soft, to 4.5 cm long and to 3 mm wide on main shoots, olive green when dry, erect or obliquely arising from substrate. Stem brown or olive green. Branches rare, usually only flagelliform lateral-intercalary branches, more rarely regularly developed lateral-intercalary branches. Leaves on leading stem ± or distinctly ventrally secund, contiguous to distant, broadly ovate, 1.1–1.6 mm long and 1.2 mm wide, narrowing toward apex, obliquely spreading; branch leaves similar if branches well-developed. Dorsal leaf margin slightly arched, exceedingly revolute, long decurrent; ventral margin arched, base dilated; apex obtuse; teeth 20–30, on dorsal margin only on up-
per part, 1–4 cells long and 1–2 cells wide at base, their cells 15–25 μm long and 8–20 μm wide. Apical cells 15–25 μm long and 13–30 μm wide, cells of middle portion of leaves 18–35 μm long and 18–38 μm wide, at base 18–38 μm long and wide, slightly differentiated; cells fairly thin-walled, trigones middle-sized to fairly large, not clearly nodulose, cuticle slightly verrucose. Underleaves absent. Asexual reproduction not present. Androecia and gynoecia not present.

Illustration: Massalongo 1897: Tav. I (fig. I).

Characteristic for Plagiochila sikutzuisana are: 1) fairly large but soft plants, 2) usually only flagelliform branches present, 3) leaves broadly ovate, 4) dorsal leaf margin exceedingly revolute, 5) teeth on dorsal margin present only on upper part, teeth fairly small, and 6) trigones middle-sized to fairly large. Massalongo (1897) compared the species with P. semidecurrens.

Total range: Shaanxi, Taiwan (Piippo 1990).

**Plagiochila torquescens** Herz. (Fig. 7)


Plants to 4 cm long and to 3 mm wide on main shoots when dry, olive brown when dry, erect or obliquely arising from substrate. Stem brownish. Branches fairly numerous, lateral-intercalary. Leaves on leading stem contiguous to imbricate, ventrally secund, often both margins conspicuously revolute so the leaves seem very narrow and distant, trian
gularly oblong, 1.5–1.8 mm long and 0.8–1.2 mm wide, narrowing toward apex, obliquely spreading or often squarrose; branch leaves similar. Dorsal leaf margin nearly straight, narrowly revolute, long decurrent; ventral margin decurrent, above base dilated but again narrowing at base; apex obtuse or somewhat truncate; teeth 15–23, 1–3 teeth at upper portion of dorsal margin, ciliate-spinose, 3–10 cells long and 3–8 cells wide at base, uppermost cell longest, 18–30 μm long and 3–20 μm wide. Apical cells 13–25 μm long and wide, cells of middle portion of leaves 25–30 μm long and 20–30 μm wide, at base 38–80 μm long and 10–23 μm wide, vitta area differentiated, small, yellow; cells thin-walled, trigones large, intermediate thickenings present, cuticle smooth. Underleaves absent. Asexual reproduction not seen. Androecia terminal or intercalary on branches. Perianth long-cylindrical, to 4.5 mm long and 1 mm wide, mouth crenulate or toothed, keels very narrow.


Characteristic for Plagiochila torquescens are: 1) branches fairly numerous, 2) leaves often squarrose, 3) leaves triangularly oblong, 4) often both leaf margins conspicuously revolute, 5) marginal teeth present on dorsal margin only on upper part, teeth spinose, 6) basal leaf cells differentiated, 7) trigones large, and 8) perianth long-cylindrical. According to Inoue (1965), who studied the type in W, the perianth has distinct dorsal and ventral wings, and the keels are bilobed up to 1/4 of their length. These characters are used also in his key. Apparently his observations are based on specimens other than the actual type. Inoue (1967) gives differences of this species with P. harae Inoue and P. alata Inoue (see also Inoue 1969).

Range in China: Xizang, Yunnan (Piippo 1990).


**Plagiochila wilsoniana** Steph. (Fig. 8)


Plants fairly rigid, to 3 cm long and to 3.1 mm wide on main shoots, olive green when dry, erect or obliquely arising from substrate. Stem brown. Branches few, lateral-intercalary. Leaves on leading stem distant, ovate, 1.0–1.1 mm long and 0.7–0.8 mm wide, quite widely spreading; branch leaves similar. Dorsal leaf margin nearly straight up to half its length, may be revolute, decurrent; ventral margin arched, base usually not dilated; apex almost as wide as base, obtuse; teeth 18–22, spinose, teeth present usually only on upper half of dorsal margin, 1–6 cells long and 1–3 cells wide at base, uppermost cell sharp, narrow and the longest, often very narrow, 15–28 μm long and 10–
Fig. 7. *Plagiochila torquescens* Herz. — a: Habitus. — b: Leaves. — c: Teeth and marginal cells. — d: Cells from middle portion of leaves. — e: Basal cells. — a according to 1 mm scale, and b–d to 100 µm scale. — Drawn from the syntype (JE).

23 µm wide, the apical one 18–30 µm long and 3–18 µm wide. Apical cells 15–25 µm long and 15–28 µm wide, cells of middle portion of leaves 18–30 µm long and 18–25 µm wide, at base 18–
Characteristic for *Plagiochila wilsoniana* are:

1) leaves distant and widely spreading, 2) leaves ovate, 3) uppermost tooth cell sharp and narrow.

Illustrations: none.

35 \( \mu \)m long and 18–28 \( \mu \)m wide; cells thin-walled, trigones large and nodulose, cuticle smooth. Underleaves absent. Asexual reproduction not present. Androecia and gynoecia not present.
4) trigones large, and 5) cuticle smooth. Inoue (1967) discussed differences between *P. wilsoniana* and *P. grollei* Inoue.

Total range: Hubei, Yunnan, Sichuan (China; Piippo 1990, Piippo et al. 1997).

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