

THE STUDY OF TYPE COLLECTION IN CONSERVATOIRE ET JARDIN BOTANIQUE  
DE LA VILLE DE GENÈVE (G):  
THE HEPATIC GENERA *JUNGERMANNIA*, *SOLENOSTOMA* AND *PLECTOCOLEA*  
ИЗУЧЕНИЕ ТИПОВЫХ ОБРАЗЦОВ В ГЕРБАРИИ ЖЕНЕВСКОГО  
БОТАНИЧЕСКОГО САДА (G):  
РОДЫ ПЕЧЕНОЧНИКОВ *JUNGERMANNIA*, *SOLENOSTOMA* И *PLECTOCOLEA*

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Abstract

Type specimens of 75 hepatics taxa currently accepted in *Jungermannia*, *Solenostoma* and *Plectocolea* were studied in the type collection of G. Their systematic position and correct names are discussed. Nomenclature citations (including data from original specimen labels) are presented, most of them are accompanied by morphological descriptions and newly compiled pictures. New lectotypes are selected for *Aplozia stephanii* Schiffn. and *Jungermannia spongiosa* Steph. The neotype for *Jungermannia thermarum* Steph. is designated. *Jungermannia danicola* Gottsche ex Underw. is synonymized with *Solenostoma sphaerocarpum* (Hook.) Steph. and *Solenostoma purpuratum* var. *koponenii* Bakalin et Li Wei is synonymized with *Solenostoma purpuratum* (Mitt.) Steph. var. *gollanii* (Steph.) Bakalin. Fifteen new combinations (*Solenostoma papulosum* (Steph.) Bakalin comb. nov., *Plectocolea callithrix* (Lindenb. et Gott.) Bakalin comb. nov., *Plectocolea gollanii* (Steph.) Bakalin comb. nov., *Plectocolea glauca* (Amak.) Bakalin comb. nov., *Plectocolea montana* (Steph.) Bakalin comb. nov., *Solenostoma gracillimum* var. *heteromorpha* (Gott. et Rabenh.) Bakalin comb. nov., *Plectocolea decolor* (Schiffn.) Bakalin comb. nov., *Plectocolea newellana* (Steph.) Bakalin comb. nov., *Plectocolea renauldii* (Steph.) Bakalin comb. nov., *Plectocolea sexplicata* (Steph.) Bakalin comb. nov., *Plectocolea dusenii* (Steph.) Bakalin comb. nov., *Plectocolea obliquifolia* (Schiffn.) Bakalin comb. nov., *Plectocolea vulcanicola* (Schiffn.) Bakalin var. *tenuiretis* (Schiffn.) Bakalin comb. nov., *Plectocolea vulcanicola* (Schiffn.) Bakalin var. *tenuiretis* (Schiffn.) Bakalin f. *cavifolia* (Schiffn.) Bakalin comb. nov., *Solenostoma purpuratum* (Mitt.) Steph. var. *gollanii* (Steph.) Bakalin comb. nov.) are proposed. The species status of *Solenostoma marcescens* (Mitt.) Bakalin and *Plectocolea yunnanensis* Bakalin is confirmed.

Резюме

Типовые образцы 75 таксонов печеночников из родов *Jungermannia*, *Solenostoma* и *Plectocolea* изучены в гербарии G. Обсуждены систематическая позиция и правильные названия для всех таксонов. Полные номенклатурные цитаты (включая данные с оригинальных этикеток) в большинстве случаев сопровождаются морфологическими описаниями и оригинальными иллюстрациями. Новые лектотипы предложены для *Aplozia stephanii* Schiffn. и *Jungermannia spongiosa* Steph. Для *Jungermannia thermarum* Steph. выбран неотип. *Jungermannia danicola* Gottsche ex Underw. синонимизирована с *Solenostoma sphaerocarpum* (Hook.) Steph., а *Solenostoma purpuratum* var. *koponenii* Bakalin et Li Wei – с *Solenostoma purpuratum* (Mitt.) Steph. var. *gollanii* (Steph.) Bakalin. Предложены 15 новых комбинаций: *Solenostoma papulosum* (Steph.) Bakalin comb. nov., *Plectocolea callithrix* (Lindenb. et Gott.) Bakalin comb. nov., *Plectocolea gollanii* (Steph.) Bakalin comb. nov., *Plectocolea glauca* (Amak.) Bakalin comb. nov., *Plectocolea montana* (Steph.) Bakalin comb. nov., *Solenostoma gracillimum* var. *heteromorpha* (Gott. et Rabenh.) Bakalin comb. nov., *Plectocolea decolor* (Schiffn.) Bakalin comb. nov., *Plectocolea newellana* (Steph.) Bakalin comb. nov., *Plectocolea renauldii* (Steph.) Bakalin comb. nov., *Plectocolea sexplicata* (Steph.) Bakalin comb. nov., *Plectocolea dusenii* (Steph.) Bakalin comb. nov., *Plectocolea obliquifolia* (Schiffn.) Bakalin comb. nov., *Plectocolea vulcanicola* (Schiffn.) Bakalin var. *tenuiretis* (Schiffn.) Bakalin comb. nov., *Plectocolea vulcanicola* (Schiffn.) Bakalin var. *tenuiretis* (Schiffn.) Bakalin f. *cavifolia* (Schiffn.) Bakalin comb. nov., *Solenostoma purpuratum* (Mitt.) Steph. var. *gollanii* (Steph.) Bakalin comb. nov. Подтверждена самостоятельность *Solenostoma marcescens* (Mitt.) Bakalin и *Plectocolea yunnanensis* Bakalin.

KEYWORDS: hepatics, Jungermanniaceae, Solenostomataceae, *Jungermannia*, *Solenostoma*, *Plectocolea*, taxonomy, type specimens.

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## INTRODUCTION

The type collection in Conservatoire et Jardin Botanique de la Ville de Genève (G) is of outstanding value for understanding hepatic species described by Franz Stephani (1842–1927), since this collection includes most of type specimens. In addition, G has also many types of taxa described by other bryologists and accumulated by Stephani in his herbarium. The last sketch of Stephani's life and working activity was published by Gradstein (2006).

The revisions of Stephani's *Jungermannia* s.l. (incl. *Solenostoma*, *Plectocolea* and *Liochlaena*) were undertaken by several bryologists with the most valuable input made by Amakawa (1960, 1966, 1967, 1968, 1969, etc.) and Váňa (1972a, 1972b, 1974a, 1974b, etc.). These works were carried out more than forty years ago and need revision due to two circumstances:

1) In most cases authors of cited works did not provide descriptions and illustrations based entirely on the Stephani's types and just gave generalized descriptions of the species with providing synonyms under priority name. Moreover, miscellaneous works devoted to Asian *Jungermannia* s.l. (Váňa, 1972a, 1972b, 1974d, 1975c) commonly provided only lists of synonyms, including *syn. nov.*, without discussion and, sometimes, only with references to illustrations from unpublished *Icones Hepaticarum*, which were criticized for being too schematic and ill-illustrative (Gradstein, 2006). From the very start of my revision, I found some of these synonyms incorrect. Sometimes type specimens of synonymized taxa differ significantly in morphological characters and sexual condition (Bakalin, 2013).

2) Recent results of molecular phylogenetic analyses of *Jungermannia* s.l. showed that some characters which were considered unimportant, e.g., plant coloration, have taxonomical significance, providing evidence in favor of splitting some species into more narrow entities. Thus, to avoid superfluous descriptions it is essential to make sure that they have not been described earlier under different epithets.

These reasons inspired me to study Stephani types in G and provide their description, which was in addition required as many specimens are very small and in poor condition (loss of original color and shape due to repeated soaking, collapsed leaf cells, etc.). Descriptions presented in this work were compiled during my stay in Genève in October 2013, at the same time I made several photographs of the type material using both translucent and dissecting microscopes and figures presented here are made from these photographs. The figures, descriptions and/or taxonomic discussions are provided for each taxa, which are characterized mainly by five following sections:

1) Basionym, with the nomenclatural citation. All discussed taxa are ranged alphabetically by basionym name.

2) Type status, label citation and G database number(s). In many cases type specimens in G have two

kinds of barcodes: old ones not presented in the available databases, but commonly appearing in publications over 10 years ago, and a new ones, corresponding to a certain number in the on-line accessible database (<http://www.ville-ge.ch/musinfo/bd/cjb/chg/?lang=en>). If both barcodes are present I cite both and divide them by slash (/). No slash used if only one (new) barcode is present on the sheet.

3) Accepted name in accordance with modern taxonomical concept implying recognition of *Plectocolea*, *Solenostoma* and *Endogemma* as distinct genera.

4) Morphological description (for most species except few isotypes of well known species). Sometimes a description is brief due to poor specimen condition, with sometimes collapsed leaf cells not allowing exact measurements of both leaf and cell size.

5) Comments on taxonomy.

## TYPE SPECIMEN DESCRIPTION AND DISCUSSION

1) *Aplozia stephanii* Schiffn., Denkschr. Kaiserl. Akad. Wiss., Wien Math.-Naturwiss. Kl. 67: 195. 1898.

Lectotypus novus: *Aplozia stephanii* Schiffn. Java. Prov. Praenger. in regione superiore montis ignivomi Gedeh infra craterem ad terram. Regio alpina, alt. ~2700 m s. m. 10.VII.1894 V. Schiffner (No. 520) G00120794.

Accepted name: *Solenostoma stephanii* (Schiffn.) Steph., Sp. Hepat. 2: 58. 1901.

Description. Plants prostrate, rarely ascending, yellowish-brownish, 2.5–3.5 mm wide and 7–12 mm long, rather rigid, commonly dorsiventrally flattened. Stem ca. 350–400 µm in diameter, not branched, with exception of lateral subfloral innovations, yellowish-brownish. Rhizoids brownish, originated mostly near ventral leaf base, obliquely spreading or decurrent down the stem, but not forming the fascicle. Leaves concave-canaliculate, obliquely inserted, laterally spreading, sometimes with recurved dorsal leaf margin, shortly (up to 1/4 of stem width) decurrent dorsally, subtransversely to arcuately inserted ventrally, where not or barely decurrent, contiguous to subimbricate, sometimes enclosed one to another, suborbicular to ovate, 1300–1500×1500–1750 µm, mostly narrowly revolute along margin (especially in dorsal side). Midleaf cells subisodiametric to oblong, 37.5–57.0×31.0–42.5 µm, thin-walled, trigones moderate in size, convex, cuticle smooth; cells along leaf margin 25.0–37.5 µm, thin-walled, external wall thickened, trigones moderate in size to large, convex, rarely confluent, cuticle virtually smooth. Dioicous. Perianth 4(-5)-plicate in upper 3/4 or at the whole extent, gradually or more or less suddenly contracted to not or indistinctly beaked mouth, exerted for 1/2–2/5 of its length, ca. 2250×1000 µm, composed by isodiametric cells; perigynium absent or very low; female bracts similar to large leaves, sheathing the perianth, concave to concave-canaliculate. (Fig. 1: 1–5).

Comment. The species was described by Schiffner (1898) based on 11 specimens from Java and western

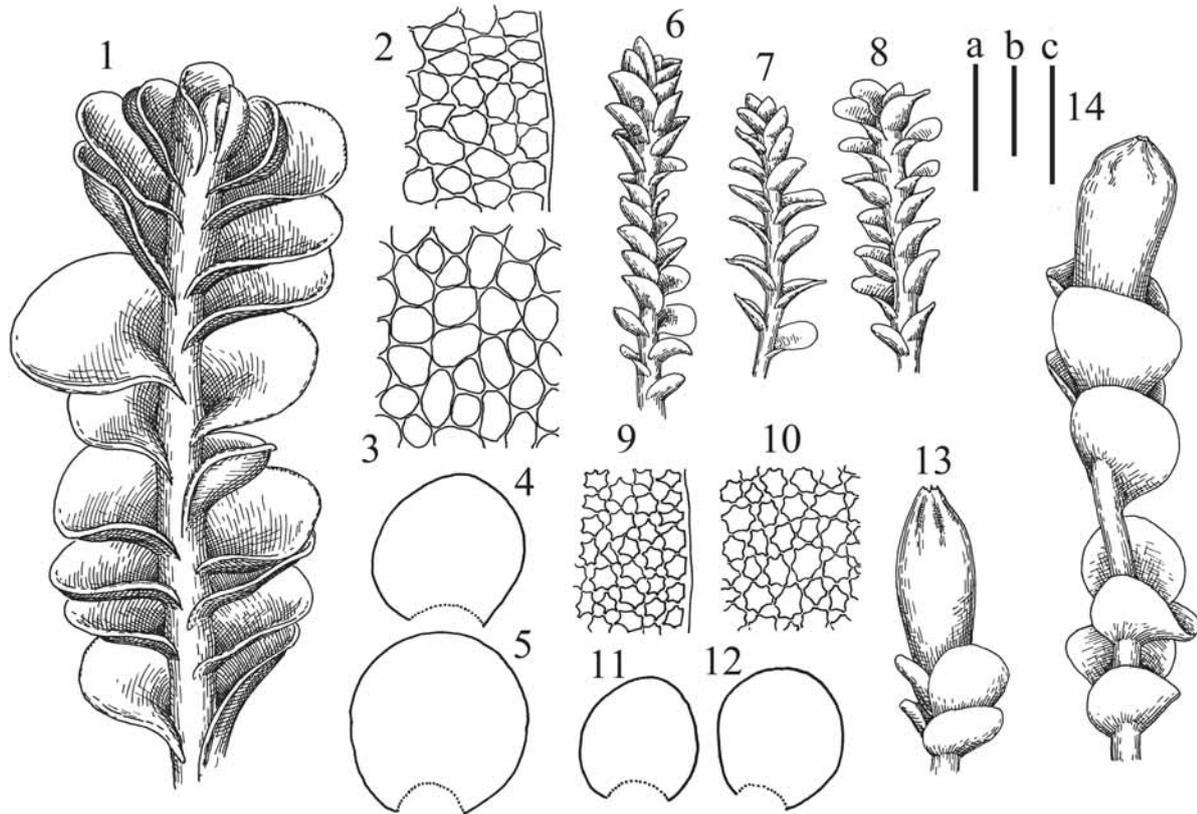


Fig. 1. *Aplozia stephanii* Schiffn., lectotype (G00120794): 1 – plant habit; 2 – cells along leaf margin; 3 – midleaf cells; 4, 5 – leaves; *Aplozia stricta* Schiffn., syntype (G3716/00120987): 6–8 – plant habit; 9 – cells along leaf margin; 10 – midleaf cells, 11, 12 – leaves, 13 – upper part of perianthous plant; *Jungermannia appressifolia* Mitt., isotype (G14665/00120007): 14 – perianthous plant. Scales: a – 1 mm, for 1, 4–8, 13, 14; b – 100  $\mu$ m, for 2, 3, 9, 10; c – 500  $\mu$ m, for 11, 12.

Sumatra. The first of mentioned specimens and only one of two having perianths is from Praenger Province. It fits well to the original description and is selected as the lectotype.

2) *Aplozia stricta* Schiffn., Denkschr. Kaiserl. Akad. Wiss., Wien Math.-Naturwiss. Kl. 67: 194. 1898.

**Syntypus:** Sumatra occidentalis. In monte ignivomo Merapi in silva primaeva ad terram. Regio nubium, alt. 2120 m s. m. 31.VII.1894 V. Schiffner (No. 515) G3716/00120987.

**Accepted name:** *Solenostoma strictum* (Schiffn.) Váňa, Hentschel & J. Heinrichs, Cryptogamie, Bryologie 31(2): 138. 2010.

**Description.** Plants brownish to yellowish-brownish, ascending, in loose mats, rather rigid, 0.75–1.25 mm wide and 5–7 mm long. Stem 125–200  $\mu$ m in diameter, not branched, with the exception of ventral subfloral innovations, brownish to brown. Rhizoids virtually absent to numerous, obliquely spreading in unclear fascicle or decurrent down the stem, but not forming fascicle, colorless to grayish. Leaves obliquely to erect spreading, distant to (rarer) contiguous, concave-canaliculate, transversely to subtransversely inserted, dorsally not or barely decurrent, ventrally arcuately inserted, not or barely decurrent, nearly suborbicular, 300–600 $\times$ 350–600  $\mu$ m. Midleaf cells subsodiametric to shortly oblong, 31.2–

42.5 $\times$ 25.0–37.5  $\mu$ m, thin-walled, cuticle distinctly papillose, trigones large, convex to bulging; cells along leaf margin 12.5–27.5  $\mu$ m, thin-walled, external wall thickened, trigones large, bulging, sometimes confluent, cuticle loosely papillose. Dioicous. Androecia intercalary, with 3–4 pairs of bracts, bracts similar to leaves, but inflated in lower half and erect spreading to recurved in upper third. Perianth ca. 1750 $\times$ 750  $\mu$ m, nearly fusiform to clavate, 3(-4)-plicate in upper 1/4–1/3, gradually narrowed to not or indistinctly beaked mouth; perigynium virtually absent; female bracts similar to leaves, concave-canaliculate, loosely sheathing perianth near base and erect to obliquely spreading above. (Fig. 1: 6–13).

**Comments:** a) The species was described by Schiffner (1898) based on four specimens from Java and western Sumatra. According to protologue, three of four syntypes have perianths and antheridia (Schiffner, 1898). The single syntype in G (cited above) has perianth and agrees with protologue in essential details.

b) Amakawa's (1968) description of this taxon is based on two other syntypes from Java (incorrectly cited by Amakawa as from "F", but really being from FH). That description is slightly different from the given above, especially in the rhizoids characteristic. Amakawa (1968: 105) states that rhizoids are "forming a bundle along the stem", while rhizoids in the specimen from G are com-

monly decurrent down the stem, but not forming a fascicle. Also the size of plant in G is smaller than in Amakawa (l.c.).

3) *Jungermannia abyssinica* Nees, Synopsis Hepaticarum 93. 1844.

Isotypus: Abyssinia. In montis Silke, supra regionem fruticum ad rivules et rupes umbroses. 22.II.1840. W.P. Schimper (s.n.) G14427/00069029.

Accepted name: *Solenostoma abyssinicum* (Nees) Steph., Sp. Hepat. 2: 53. 1901.

Description. Plants erect in dense patches, yellowish-brownish, 2.0–2.75 mm wide, 8–15 mm long, more or less rigid. Stem 300–350 µm in diameter, yellowish-brownish, sometimes slightly flexuous, not branched (even as subfloral innovations). Rhizoids numerous, brownish, originated near ventral leaf base and from other parts of ventral side of stem, obliquely spreading in unclear fascicles or decurrent down along the stem and form fascicle, which is mostly unclear. Leaves obliquely spreading to slightly laterally appressed to the stem, concave to canaliculate-concave, subtransversely inserted, dorsally decurrent for (1/4)1/2–3/4 of stem width, ventrally transversely to arcuately inserted, decurrent for 1/2–3/4 of stem width, contiguous to subimbricate, sometimes (large leaves) slightly undulate at margin, suborbicular, transversely elliptic to widely ovate in shape, 1000–1500×1300–2050 µm. Midleaf cells 25.0–44.0×25.0–30.0 µm, thin-walled, trigones moderate in size to small, triangle to slightly convex, cuticle smooth; cells along leaf margin 12.5–20.0 µm, thin-walled, with moderate in size, triangle to slightly concave or convex trigones, external wall thickened. Paroicous? (Androecia not found). Perianth 4–5-plicate in upper 1/2–2/5 of its length, suddenly contracted to not beaked mouth, composed by subisodiametric to shortly oblong cells, exerted for 3/5–2/3 of its length; perigynium virtually absent or very low; female bracts similar to large leaves, loosely sheathing perianth near base and obliquely spreading above, concave-caliculate. (Fig. 2: 1–7).

Comments: a) Another isotype of *Jungermannia abissinica* G14432/00069033 is identical to above described, although plants are rather ascending than erect and more lax. I suggest this specimen represents a weak phase of the species.

b) The species is commonly regarded as paroicous, but I was not able to find traces of antheridia or their stalks in leaves below the perianth bracts.

c) The detailed description by Vána (1974b) provides size of plants up to 1.9 mm wide, the plants in the specimen described here are slightly wider (up to 2.75 mm).

4) *Jungermannia appressifolia* Mitt., J. Proc. Linn. Soc. 5: 91. 1860[1861].

Isotypus: Himalayae orient. reg. temp. Sikkim, alt. 7000 ft. J.D. Hooker (No. 1326) G14665/00120007.

Accepted name: *Solenostoma appressifolium* (Mitt.) Vána & D.G. Long, Nova Hedwigia 89: 494. 2009.

Comments: a) The specimen contains most common form of the species with concave and appressed to stem leaves; rhizoids in distinct fascicles decurrent down the stem, colorless to grayish in color.

b) This is well known species described many times, full synonymy is given by Vána (1972b) and the best description and illustrations – by Amakawa (1960) under *Jungermannia clavellata*.

5) *Jungermannia baldwinii* Steph., Sp. Hepat. 6: 83. 1917.

Holotypus: Hawaji. In insula Maui occidentalis 1875. D.D. Baldwin (n. 94 p.p.) G14296/00043701.

Accepted name: ?*Plectocolea micrantha* Mitt. in Seeman, Fl. Vitiensis 405. 1871.

Description. Plants rather erect, yellowish-brownish to brownish, 1.5–2.25 mm wide and 20–30 mm long, laterally compressed. Stem 300–375 µm in diameter, not branched, with the exception of ventral leafless stolons, turning into normal branch, flexuous. Rhizoids sparse, brownish to purplish-brown, obliquely spreading. Leaves laterally appressed to the stem, flattened to slightly concave, suborbicular to transversely elliptic, ca. 1150×1750 µm. (Fig. 2: 8).

Comment. Vána (1975b) regarded this name as a synonym of *Jungermannia micrantha*. Due to his observations *Jungermannia baldwinii* is probably an aquatic modification, characterized by large sized, pale green colored plants, with rather large leaf cells almost without trigones. I have shown earlier that the type of *P. micrantha* is paroicous (Bakalin, 2013). Unfortunately, the type material of *J. baldwinii* is sterile and I was unable to check the sex distribution type. Also the material in the holotype is scanty and in bad condition, with cells strongly collapsed probably due to repeated soaking, which precludes further discussion on the systematic position of this taxon.

6) *Jungermannia borgenii* Gottsche, Forhandlinger Vidensk.-Selsk. Kristiania 1892(14): 11. 1893.

Isotypus: Madagascar. M. Borgen G14433/00045605.

Accepted name: *Solenostoma* sp.

Description. Plants pallid, pale greenish-brownish, slightly pellucid, rather prostrate, 0.25–0.4 mm wide, 3–5 mm long, loosely laterally flattened. Stem 40–75 µm in diameter, sparsely laterally and ventrally branched (ventral branches originated as geotropic stolons, but becoming into normal branches soon). Rhizoids colorless, sparse, originated near ventral leaf base, but not only there, obliquely to erect spreading, separated (not united into fascicles). Leaves concave-caliculate, obliquely to erect spreading, contiguous to subimbricate and arranged in tile to each other, obliquely to nearly transversely inserted, dorsally not or barely decurrent, ventrally transversely to nearly arcuately inserted, not or barely decurrent, suborbicular to widely ovate, 250–300×350–375 µm. Midleaf cells shortly elongate, thin-

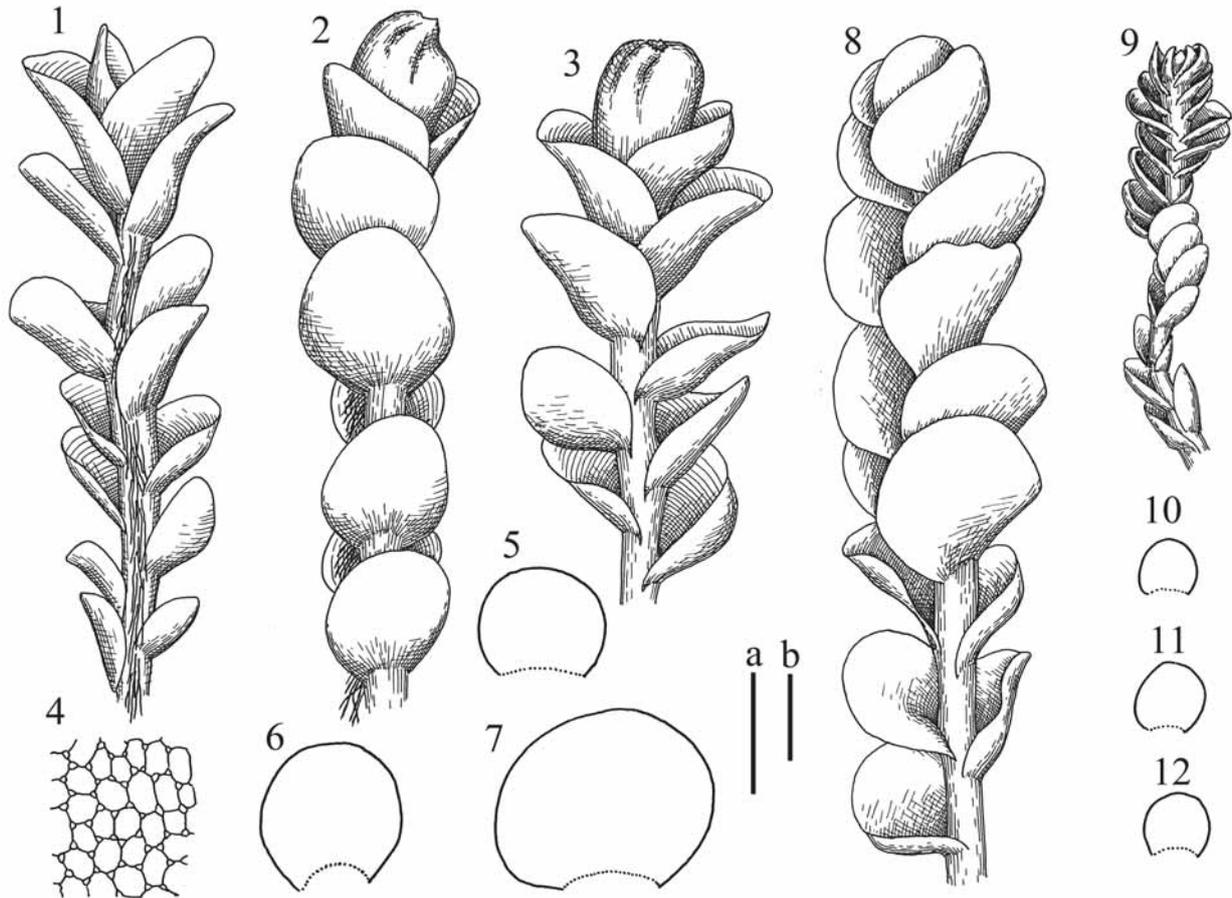


Fig. 2. *Jungermannia abyssinica* Nees, isotype (G14427/00069029): 1 – plant habit, ventral view; 2, 3 – perianthous plants; 4 – midleaf cells; 5–7 – leaves; *Jungermannia baldwinii* Steph., holotype (G14296/00043701): 8 – plant habit; *Jungermannia borgenii* Gottsche, isotype (G14433/00045605): 9 – plant habit; 10–12 – leaves. Scales: a – 1 mm, for 1–3, 5–8; b – 100  $\mu$ m, for 4; a – 500  $\mu$ m, for 9–12.

walled, 25.0–34.0 $\times$ 15.0–19.0  $\mu$ m, trigones small, concave, cuticle papillose; cells along leaf margin 15.0–20.0  $\mu$ m, thin-walled, trigones small, concave, cuticle virtually smooth. (Fig. 2: 9–12).

**Comment.** The specimen was designated as isotype of *Jungermannia borgenii* by Váňa (1974b). However, plants in the specimen are much smaller than those commonly described (e.g. in Váňa, 1974b), both in general habit and leaf cell size. Another difference is in distinctly papilliferous cuticle. I refrain to regard plants described above as a simple depauperate form of *Solenostoma borgenii* (Gott.) Steph., because no any features of etiolation were found (e.g., distant leaves) in the specimen. Also cell size in depauperate plants is commonly the same or only slightly smaller than in normally developed plants. I was unable to find any morphologically similar taxa known from Africa and adjacent areas. I have not studied the holotype of the taxon and I am not sure plants in holotype and isotype are identical. If the description given by Váňa (1974b) is based on holotype and is correct, the aforementioned specimen (G14433/00045605) probably represents another, previously not described taxon. Unfortunately, this problem demands to examine not only holotype specimen, but also more copious and fertile

material. The studied 'isotype' contains only few plants, and all of those are sterile.

7) *Jungermannia brasiliensis* Steph., Sp. Hepat. 2: 79. 1901. (non *Jungermannia brasiliensis* Raddi, Crittogame Brasiliane, 15. 1822., non *Jungermannia brasiliensis* Nees, Enumeratio Plantarum Cryptogamicarum Javæ, 11. 1830.)

**Holotypus:** Brasilia. Minas gera,s. Martius G14450/00067684.

**Accepted name:** *Solenostoma papulosum* (Steph.) Bakalin *comb. nov.* Basionym: *Jungermannia papulosa* Steph., Sp. Hepat. 2:73. 1901.

**Description.** Plants prostrate (?), only 6 plants are present in the type), pale brownish, 0.7–1.0 mm wide and 5–7 mm long. Rhizoids sparse, but dense in lower part of stem, obliquely spreading, colorless to grayish and brownish. Stem ca. 120  $\mu$ m in diameter, not branched, pale yellowish brownish, more deeply colored in ventral side. Leaves slightly concave to concave-canaliculate, laterally spreading (such as plants looks dorsiventrally flattened), obliquely inserted, dorsally barely decurrent, ventrally sub- to transversely inserted, not decurrent, ovate, ca. 220 $\times$ 120  $\mu$ m. Midleaf cells oblong, 27.5–

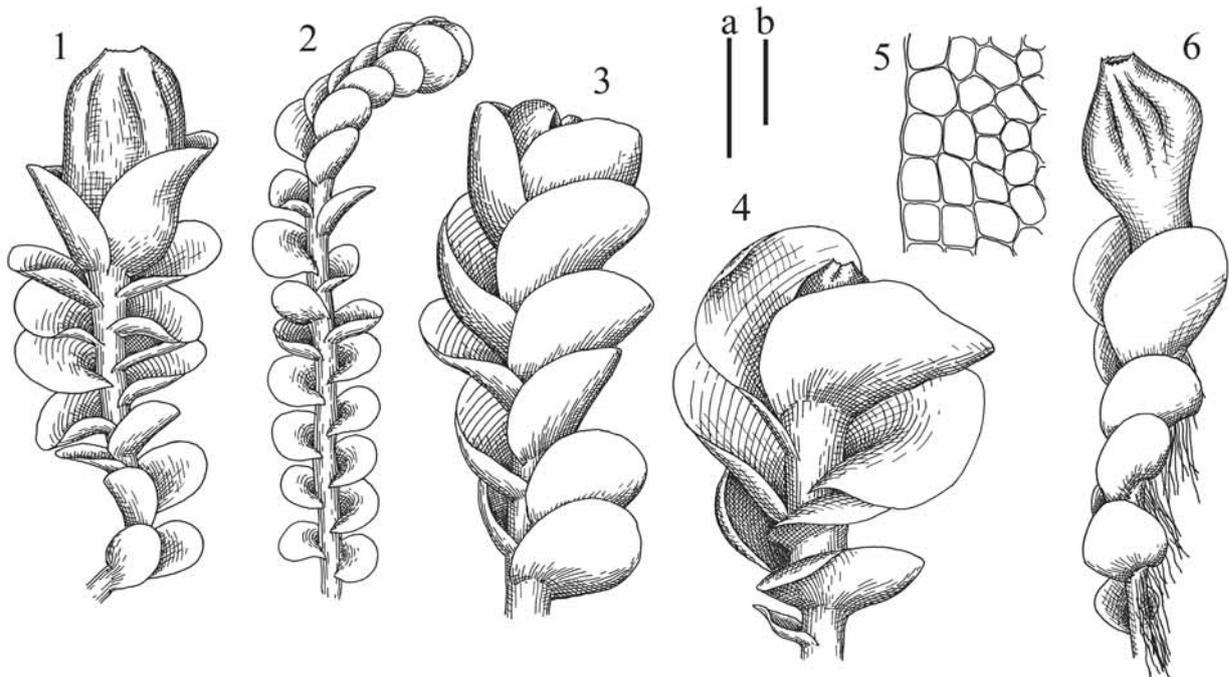


Fig. 3. *Jungermannia brasiliensis* Steph., holotype (G14450/00067684): 1 – perianthous plant; 2 – plant habit; *Jungermannia cambewarrana* Steph., holotype (G14297/00128127): 3, 4 – perianthous plants; *Jungermannia caespiticia* Lindenb., isotype (G00115178): 5 – cells along leaf margin; 6 – perianthous plant. Scales: a – 1 mm, for 3, 4, 6; b – 100  $\mu$ m, for 5; a – 500  $\mu$ m, for 1, 2.

50.0 $\times$ 19.0–34.0  $\mu$ m, thin-walled, trigones small to moderate in size, concave; cells along leaf margin 19–31  $\mu$ m, with moderately thickened walls, and thickened external wall, trigones moderate in size; cuticle smooth with the exception of leaf base, where papillose-striolate. Dioicous? Perianth 3-plicate in upper part, ellipsoidal, gradually narrowed to obscurely beaked mouth. (Fig. 3: 1, 2).

**Comment.** Váňa (1974a) regarded this name as synonymous with two other names: *Jungermannia papulosa* Steph. (Sp. Hepat. 2: 73. 1901) also described from “Brasilia. Minas geraës” based on collection by Lindmann (No. 23 p.p.), and with *Jungermannia amoena* Lindenb et Gott. Synopsis Hepat. 674. 1847. (= *Solenostoma amoenum* (Lindenb. & Gottsche) R.M. Schust. ex Váňa, Hentschel & J. Heinrichs) based on collection by Liebmann from Mexico. The latter name has priority. However, the plants in holotype of *J. brasiliensis* Steph. differ in many features from *Solenostoma amoenum* in the treatment by Váňa (1974a), including pale color of plants, smaller size of shoots (although they are not depauperate), smaller leaf cells which are also oblong in midleaf, but not isodiametric, etc. I regard *J. brasiliensis* Steph. as synonymous with *J. papulosa* that should be named in current taxonomy as *Solenostoma papulosum* (Steph.) Bakalin (see below).

**8) *Jungermannia caespiticia* Lindenb., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 14 (Suppl.): 67. 1829.**

**Isotypus:** Germany. “Ad Bergedorf in silvaticis”. Anonymous. G00115178. (marked as “Original von Lindenberd” by Stephani)

**Accepted name** *Endogemma caespiticia* (Lindenb.) Konstant., Vilnet & A. V. Troitsky, Folia Cryptogamica Estonica 48: 132. 2011.

**Description of leaf cells.** Midleaf cells 50.0–62.5 $\times$ 31.0–37.5  $\mu$ m, very thin-walled, oblong to subisodiametric, hexagonal, trigones vestigial; cells along margin 37.5–50.0  $\mu$ m, trigones small to moderate in size, concave, external wall thickened, other walls also slightly thickened. (Fig. 3: 5, 6)

**Comment.** The plants in the specimen bear two features unusual for most common forms of *E. caespiticia*: slightly thickened walls in the cells along leaf margin and sometimes moderate in size trigones in leaf marginal cells.

**9) *Jungermannia cambewarrana* Steph., Sp. Hepat. 6: 84. 1917.**

**Holotypus:** Australia. New South Wales, Cambewarra Pass. V.1903. W.W. Watts. G14297/00128127.

**Accepted name:** *Solenostoma orbiculatum* (Colenso) R.M. Schust. “orbiculata”, Nova Hedwigia Beiheft 119: 380. 2002.

**Description.** Plants rather ascending, yellowish-greenish to brownish, in more or less dense patches, 1.5–2.0 mm wide and 4–7 mm long. Rhizoids dense, in unclear obliquely spreading fascicles or in mat under the stem, colorless to grayish. Stem 270–370  $\mu$ m in diameter, yellowish-brown, not branched (even as subfloral innovations). Leaves concave to concave-canaliculate, obliquely inserted, barely decurrent down (up 1/4 of stem width), ventrally arcuately inserted, not or barely decurrent, suborbicular to transversely

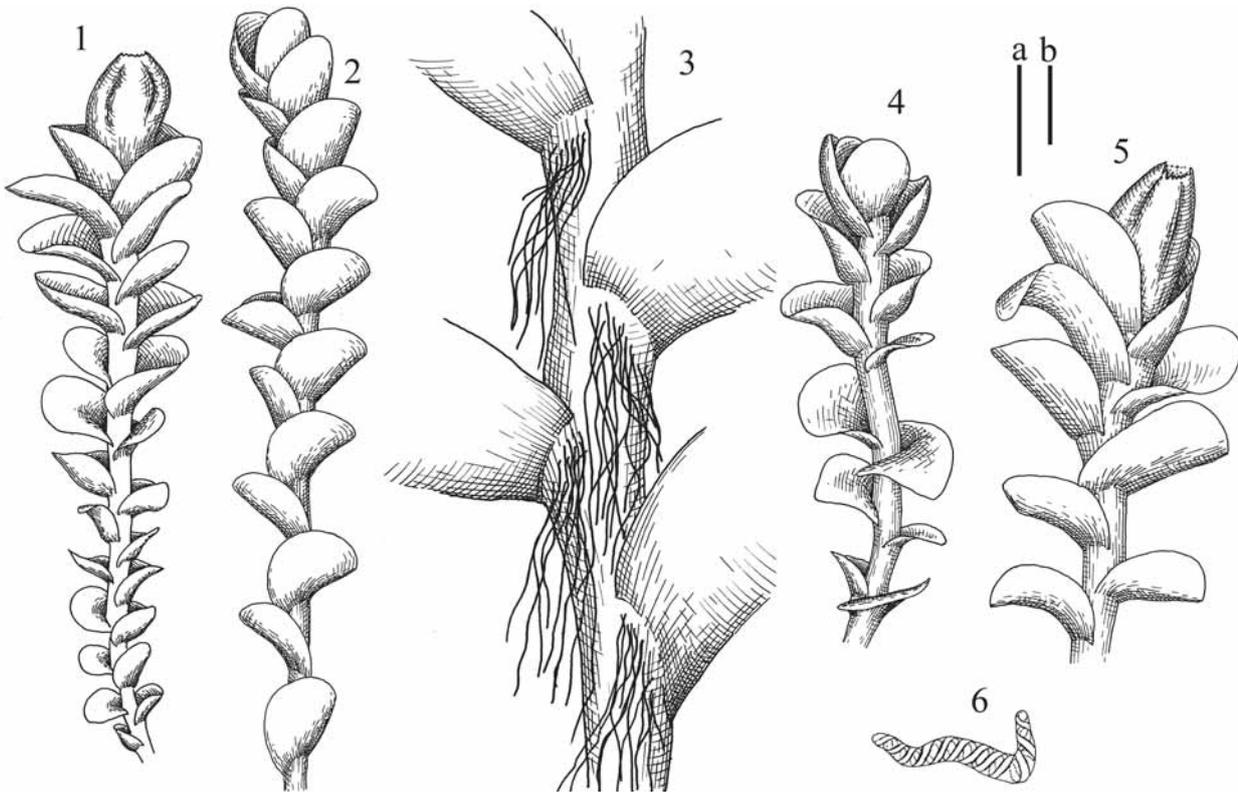


Fig. 4. *Jungermannia caucasica* Váňa, isotype (G00015179): 1 – perianthous plant; *Jungermannia decurrens* Steph., isotype (G00115348): 2 – plant habit; *Jungermannia mosenii* Steph., holotype (G14482/00112142): 3 – fragment of ventral view; 4 – plant habit; 5 – perianthous plant; 6 – elater. Scales: a – 1 mm, for 1, 2, 4, 5; b – 50  $\mu$ m, for 6; a – 500  $\mu$ m, for 3.

elliptic, 1100–1800 $\times$ 1500–2200  $\mu$ m, contiguous. Midleaf cells subsodiametric, 25–34 $\times$ 31–38  $\mu$ m, thin-walled, trigones moderate, slightly concave to convex, cuticle smooth; cells along leaf margin 28–40  $\mu$ m, thin-walled, external wall thickened, trigones moderate to large, convex, cuticle smooth. Dioicous? Perianth (only young perianth seen) hidden within bracts, not beaked, 4–5-plicate starting from the very base. (Fig. 3: 3, 4).

**Comment.** Váňa (1975a) regarded this name as synonymous with *Jungermannia orbiculata* (Col.) Grolle Journ. Jap. Bot. 41: 144. 1966. (= *Solenostoma orbiculatum* (Colenso) R.M. Schust.) described from New Zealand. Váňa (l.c.) also regarded *J. cambewarrana* as the taxon described basically for geographic reasons and well agreeing in complex features with *J. orbiculata*, being only different from typical phase of the latter in quite rarer rhizoids. In my estimate the plants in the type of *J. cambewarrana* are also slightly smaller than typical *Solenostoma orbiculatum*, but not deserving splitting from the latter.

**10) *Jungermannia caucasica*** Váňa, Preslia 42: 46. 1970.

**Isotypus:** Georgia. Adjara, prope lacum in decl. montis Mtirala. 20.VII.1961. A.L. Abramova et I.I. Abramov (LE1805) G00015179.

**Accepted name:** *Solenostoma causicum* (Váňa) Konstant., Arctoa 1: 123. 1992. (Fig. 4: 1)

**Description.** Plants bright green to greenish-yellowish, rather creeping, rarely ascending. Rhizoids colorless to brownish, erect to obliquely spreading. Leaves subtransversely inserted, concave to cupped, in bigger plants concave-canaliculate, widely ovate to widely obliquely ovate when flattened, ca. 0.62 $\times$ 0.85 mm in sterile plants up to 1.25 $\times$ 1.5 mm in fertile shoots. Midleaf cells 27.5–32.5 $\times$ 25–30  $\mu$ m, thin-walled, with triangle to concave moderate trigones; along margin 15–20  $\mu$ m, thin-walled, trigones concave to convex (adjacent to external wall), external wall slightly thickened. Dioicous. Androecia 3–4 pairs of bracts (different generation divided by 7–10 pairs of sterile leaves), 2-androus, stalk biseriate, ca. 75 $\times$ 25  $\mu$ m, body nearly spherical to shortly elliptic 160–170  $\mu$ m in diameter; bracts similar to sterile leaves and not to strongly inflated in the base. Perianth 4–5-plicate in its upper 1/4 of the length, suddenly contracted into not beaked mouth, exerted for 3/4 of its length, mouth crenulate, middle perianth cells subsodiametric, 22.5–27.5 $\times$ 20–23  $\mu$ m, thin-walled, with oil-bodies finely granulate, 4–6 per cell, 4.5–6 $\times$ 5–9  $\mu$ m, irregularly elliptic, cells in basal part of the perianth shortly rectangular, 42–72 $\times$ 27.5–37.5  $\mu$ m, thin-walled, with concave trigones, bistratose in lower half; female bracts erect spreading (not sheathing).

**11) *Jungermannia coniflora*** Schiffn. Reise der Gassel in den Jahren 1874–76. 4 (Lebermoose): 10. 1889.

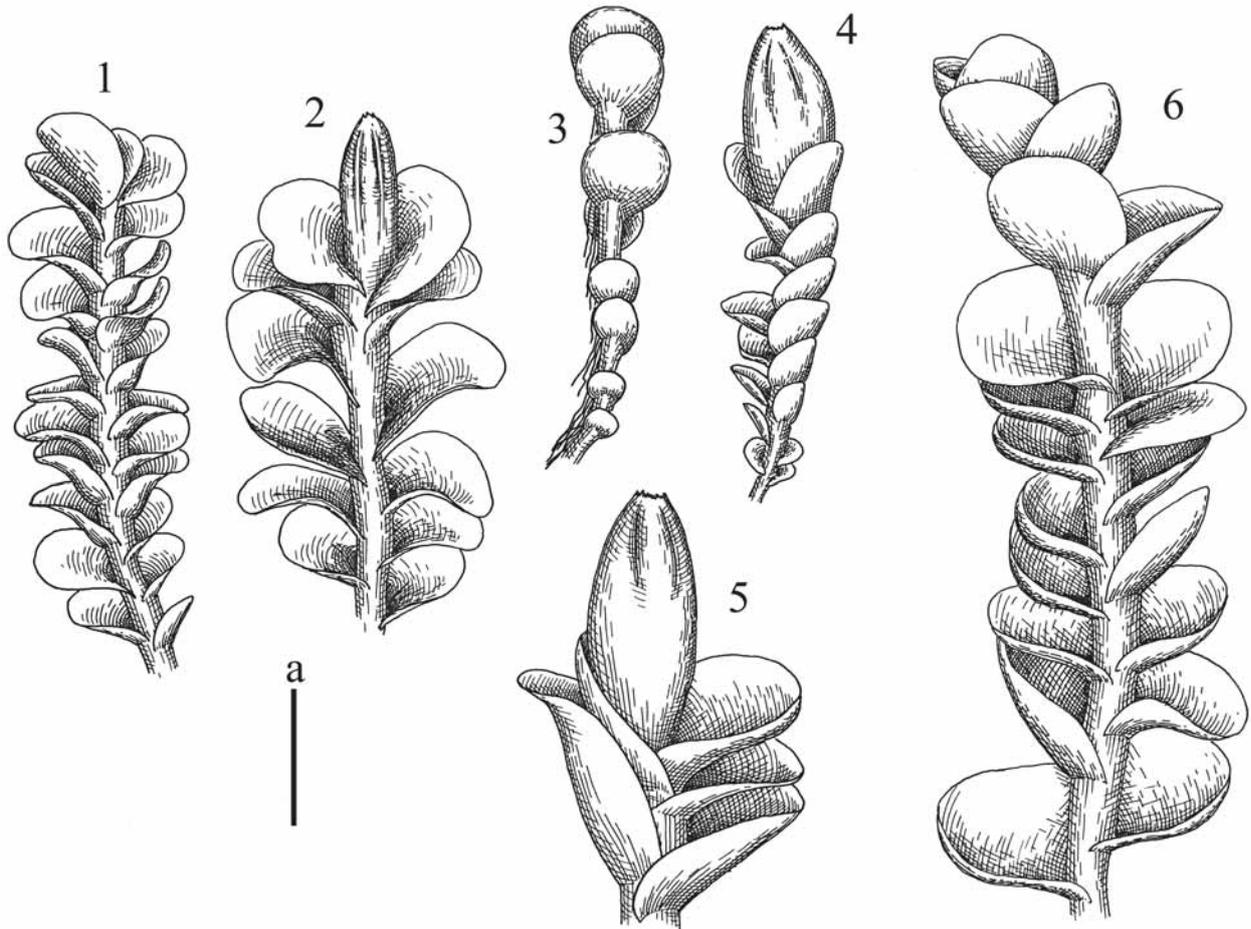


Fig. 5. *Jungermannia dussiana* Steph., holotype (G14457/00112189): 1 – plant habit; 2 – perianthous plant; *Jungermannia duthiana* Steph., holotype (G12915/00064473): 3 – plant habit, lateral view; 4–5 perianthous plants; *Jungermannia exsertifolia* Steph., holotype (G14574/00112197): 6 – plant habit. Scale: a – 1 mm, for 1–5.

**Isotypus:** Kerguelen Island, Successful Harbor. XII.1874 Naumann G14494/00115333

**Accepted name:** *Solenostoma coniflorum* (Schiffn.) Steph. Sp. Hepat. 2: 59. 1901.

**Description.** Plants brownish to brown and yellowish-brown, seems erect to ascending, 1.0–1.5 mm wide and 7–15 mm long. Rhizoids brownish, obliquely spreading in unclear fascicles or separated. Stem brown, 190–250  $\mu\text{m}$  in diameter, slightly flexuous, freely branched as subfloral ventral innovations (becoming into normal branches). Leaves subtransversely inserted, shortly (for 1/4–1/3 of stem width) decurrent dorsally and arcuately inserted and shortly (for 1/5–1/4 of stem width) decurrent ventrally, suborbicular, 700–750 $\times$ 700–820  $\mu\text{m}$ , obliquely spreading, concave-caniculate. Midleaf cells thin-walled, 18.5–25.0 $\times$ 16.0–22.5  $\mu\text{m}$ , trigones moderate in size, convex, walls yellowish to brownish; cells along leaf margin 18–25  $\mu\text{m}$ , thin-walled, trigones moderate in size, convex, external wall very slightly thickened. Dioicous. Perianth clavate to clavate-cylindrical, 3(4)-plicate in upper 2/3 of its length, gradually narrowed to not beaked mouth, rarely mouth beaked, exerted for 1/2–2/3 of its length; perigynium absent or very low. (Fig. 20: 9, 10).

**12) *Jungermannia danicola* Gottsche ex Underw.,** Descriptive catalogue of the North American Hepaticae, North of Mexico. Bull. Illinois State Laboratory of Natural History 2: 107. 1883.

**Isotypus:** U.S.A. California, Mt. Dana. Bolander (No. 24) G 14436/00115337

**Accepted name:** *Solenostoma sphaerocarpum* (Hook.) Steph., Sp. Hepat. 2: 61. 1901. = *Jungermannia danicola* Gottsche ex Underw. **syn. nov.** Descriptive catalogue of the North American Hepaticae, North of Mexico. Bull. Illinois State Laboratory of Natural History 2: 107. 1883.

**Comment.** The name was regarded as synonymous with *Jungermannia scalariformis* Nees (Naturgeschichte der Europäischen Lebermoose 2: 448. 1836.) by Vána in 1970 (in litt.) and was synonymized later (Vána, 1974c) with *Jungermannia confertissima* Nees (= *Solenostoma confertissimum* (Nees) Schljakov). Contrary to him, W.S. Hong (in litt.) regarded it as synonymous with *Jungermannia sphaerocarpa* Hook. (British Jungermanniae pl. 74. 1815.). Our data suggest the correctness of the latter point of view due to 1) absence of red coloration of shoots, 2) no rhizogenous cells in leaf lamina, 3) no distinct fascicle of rhizoids decurrent along the stem.

**13) *Jungermannia decurrens*** Steph., Sp. Hepat. 6: 85. 1917.

**Holotypus:** Korea [Stephani (1917) incorrectly wrote “Japonia” probably due to the fact it was collected by U. Faurie, the noticeable collector mostly gathered plants in Japan]. Quelpaert (=Jeju Island) 1906 U. Faurie (No. 106) G00115348.

**Accepted name:** *Solenostoma faurianum* (Beauverd) Bakalin, Hepat. Fl. Phytogeogr. Kamchatka, 366. 2009.

**Description.** Plants erect to ascending, yellowish-brownish to reddish brown in exposed(?) shoots, 2.5–3.2 mm wide and 25–40 mm long. Rhizoids virtually absent to very few, purplish. Stem 320–400 µm in diameter, not branched. Leaves subtransversely inserted, dorsally decurrent for ca. 1–3 stem width and ventrally decurrent for 1–2 stem width, flattened to slightly concave and slightly concave-canalicate, commonly reddish near their bases and along leaf rims, rarely undulate at margin, obliquely spreading to slightly appressed to the stem, 1.5–1.7×2.0–2.2 mm. Midleaf cells thin-walled, 18.0–37.5×18.0–27.5 µm, with moderate in size, convex trigones, walls colorless, purplish to brownish; cells along leaf margin 15–19 µm, thin-walled, with moderate in size, convex trigones, external wall thickened; leaf cuticle smooth throughout, with exception of lower 1/4–1/3 of its length, where become distinctly papillose–striolate. Dioicous. Androecia spicate, intercalary, with 5–6 pairs of bracts, bracts cupped, with narrow recurved margin. Perianth loosely 4-pleticte in upper half, gradually narrowed to beaked (sometimes unclearly) mouth, upper part of the perianth brightly purple colored, perianth hidden within bracts or exerted for 1/5 of its length (probably perianths are not mature in the specimen). (Fig. 4: 2).

**Comment.** The name (*Jungermannia decurrens* Steph.) has two earlier homonyms: *Jungermannia decurrens* Desv. (Observations sur les Plantes des Environs d’Angers 20. 1818.) and *Jungermannia decurrens* Reinw., Blume & Nees (Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12: 206 [Hepat. Jav.]. 1825.). Due to this fact it was renamed as *Jungermannia fauriana* Beauverd. ex Steph. (Sp. Hepat. 6: 571. 1924.) and later was transferred to *Solenostoma* by Bakalin (2009).

**14) *Jungermannia dussiana*** Steph. in Urban, Symb. Antil. 3: 276. 1902.

**Holotypus:** Martinique. VIII.1901. Duss (No. 569) G14457/00112189.

**Accepted name:** *Plectocolea comata* (Nees) S. Hatt., Bull. Tokyo Sci. Mus. 11: 38. 1944. (= *Jungermannia dussiana* Steph. in Urban Symb. Antil. 3: 276. 1902. *syn. nov.*)

**Description.** Plants prostrate to ascending, brownish to brownish-yellow, with purplish tint in ventral leaf base and pink to purplish tint in upper part of leaves near the apex, 1.5–2.7 mm wide, 5–12 mm long (male plants smaller). Rhizoids numerous, colorless to brownish and purplish, rigid, decurrent down the stem in unclear fas-

cicles or obliquely spreading. Stem not or sparsely laterally (looks as depauperate ventral branches) branched, 200–250 µm in diameter. Leaves canalicate to concave-canalicate, in larger leaves with convex middle part and incurved margins; obliquely inserted, dorsally decurrent for 1/4–1/2 of stem width, ventrally arcuately inserted, shortly (less than 1/4 of stem width) decurrent, when flattened obliquely ovate to obliquely lingulate, ca. 600×450–600 µm. Midleaf cells thin-walled, oblong, 50–87×32–50 µm, trigones moderate to large, mostly convex, cuticle papillose; cells along leaf margin 25–31 µm, thin- to slightly thick-walled, external wall noticeable thickened, cuticle verrucose (to coarsely verrucose). Dioicous. Androecia intercalary, with 6 and more pairs of bracts, male bracts canalicate, strongly inflated in lower 1/3–1/2 of the length. Perianth pluriplicate, with 5–6 main plicae, gradually narrowed to the mouth, conical, exerted for 1/5–1/3 of its length; perigynium ca. 1/4 of perianth length. (Fig. 5: 1, 2).

**Comment.** This name was synonymized with *Jungermannia callithrix* Lindenb. et Gott.<sup>1</sup> by Vána (1974a) as a modification not different from common forms of *J. callithrix*. In my opinion, this is not quite correct. The plants in the type of *J. dussiana* differ from common forms of *Plectocolea callithrix* in more distant leaves which are always longer than wide (versus contiguous to subimbricate and enclosed one to another in *P. callithrix*, and mostly as long as wide). Additionally dorsal part of the leaf is commonly convex, and antical leaf margin narrowly recurved (that gives ‘plagiochiloid’ appearance); androecia are not terminal (versus terminal in *P. callithrix*). The listed features suggest *Plectocolea comata* (Nees) S. Hatt., rather than *P. callithrix*. Perhaps this is a separate taxon related to *P. comata* (different from typical forms of the latter in leaf apices coloration, not so strongly verrucose cuticle, geographical distribution, etc.), but due to limited material in the type specimen any conclusion would be premature.

**15) *Jungermannia duthiana*** Steph., Sp. Hepat. 2: 71. 1901.

**Holotypus:** Kashmir. Alt. 10000–11000 feet a. s. l. 22.V.1892. J.F. Duthie G 12915/00064473.

**Accepted name:** *Solenostoma duthianum* (Steph.) C. Gao, Bryoflora of Xizang 495. 1985.

**Description.** Plants erect to ascending, yellowish-brownish, without red pigmentation. Rhizoids rather colorless to grayish, forming fascicles (sometimes unclear) decurrent down the stem, originated both from the stem and from leaf cells. Stem 150–170 µm in diameter, not branched (rarely as ventral innovations). Leaves subtransversely to slightly obliquely inserted, decurrent dorsally for (1/4)1/2–2/2 of stem width, and ventrally up 1/2–4/2 of stem width, concave to con-

<sup>1</sup> – *Plectocolea callithrix* (Lindenb. et Gott.) Bakalin *comb. nov.* Basionym: *Jungermannia callithrix* Lindenb. & Gott. in Gottsche, Lindenberg et Nees Syn. Hepat. 673. 1847.

cave-canaliculate, obliquely spreading to almost imbricate and sheathing the stem, suborbicular to transversely elliptic, 600–900×700–900 µm. Midleaf cells isodiametric to shortly oblong, 26–36×21–28 µm, thin-walled, trigones moderate in size, concave, cuticle smooth; cells along leaf margin 25–33 µm, thin-walled, with external wall thickened, trigones moderate, concave to convex. Paroicous. Androecia with 3–4 pairs of bracts below female bracts. Perianth 3(4)-plicate in its almost whole extent, slightly rhizogenous in lower 2/3, bistratose in lower half or even upward; gradually narrowed to the hardly beaked mouth; clavate to cylindrical-clavate, exerted for 3/4–4/5 of its length; perigynium up to 1/4 of perianth. Spores papillose, brown, 21–24 µm in diameter. Elaters ca. 150×8.8 µm, bispiral, with long (ca. 25 µm) homogenous ends. (Fig. 5: 3–5).

**Comment.** This name was synonymized with *S. confertissimum* (Nees) Schljakov by Váňa (1972b), but differs from the latter in bistratose perianth, absence of red or purple pigmentation, and also, probably, in habitat (the type specimen was collected on decaying wood – the habitat unsuitable for true *S. confertissimum*). Thus, in my opinion *S. duthianum* deserves the species rank.

**16) *Jungermannia exsertifolia* Steph., Sp. Hepat. 6: 86. 1917.**

**Holotypus:** Japan. Sendai 19.V.1907 U. Jishiba (No. 153) G14574/00112197.

**Accepted name:** *Jungermannia exsertifolia* Steph., Sp. Hepat. 6: 86. 1917.

**Description.** Plants erect to ascending, in loose patches, greenish-brown, 2–2.5 mm wide, 10–15 mm long. Rhizoids few, colorless to brownish, separated or rarely in unclear mat. Stem 120–160 µm wide, not or rarely intercalary branched. Leaves ovate, 900–1200×750–1100 µm, obliquely inserted, obliquely spreading laterally, dorsally subtransversely inserted (rarely obliquely), ventrally insertion line loosely arcuate, not or barely decurrent in the both sides. Midleaf cells thin-walled, oblong, 25.0–39.0×21.0–25.0 µm, trigones small, concave, walls rusty brownish, cuticle distinctly striolate-papillose. Dioicous. Perianth terminal, clavate, loosely to distinctly plicate in upper 1/3–1/4, ca. 2.5×1.0 mm, exerted for 3/4 of the perianth length; perigynium virtually absent. (Fig. 5: 6)

**17) *Jungermannia flavorevoluta* Váňa, J. Hattori Bot. Lab. 36: 63. 1972[1973].**

**Isotypus:** India. Sikkim. 9000 ped. J.D. Hooker G11168/00115180.

**Accepted name:** *Solenostoma flavorevolutum* (Váňa) Váňa & D.G. Long, Nova Hedwigia 89: 501. 2009.

**Description.** Plants erect in dense (if possible to suggest) patches, yellowish-brownish, without red pigmentation, 1.5–2.25 mm wide and 10–18 mm long. Stem 150–200 µm in diameter, but looks wider due to thick and dense rhizoids fascicle closely attached to the stem,

brownish, sparsely laterally branched (also as subfloral innovations). Rhizoids very numerous, originated from leaf lamina and decurrent down the stem in thick fascicle of 200 µm in diameter or even wider, brownish. Leaves obliquely spreading, with narrowly revolute margin, concave-canaliculate, transversely to subtransversely inserted, decurrent dorsally for 1/2–2/2 of stem width, ventrally decurrent for 2/3–4/3 of stem width, contiguous to (more frequently) imbricate and enclosed one to another, obliquely transversely elliptic when flattened in the slide, 875–950×1250–1375 µm. Midleaf cells 15.0–22.5×12.5–16.5 µm, thin-walled, with moderate to large, convex trigones, cuticle smooth; cells along leaf margin commonly with discolored walls, 8.7–15.0 µm, unequally thickened, trigones large, convex, sometimes confluent, external wall thickened, cuticle smooth. Dioicous? Perianth fusiform, pluriplicate, ca. 2750×1100 µm, densely rhizogenous, not only outside, but inside too, exerted for 1/6–1/4 of its length; perigynium ca. 1/5 of perianth length; female bracts similar to large leaves, closely sheathing perianth, not or loosely spreading in upper 1/4. (Fig. 27: 8–17).

**Comment.** The specimen was named in the herbarium as *Solenostoma clavellatum* Mitt. ex Steph. (Sp. Hepat. 2: 53. 1901.) and was regarded as lectotype of *S. clavellatum* by R. Grolle (1965). Later Váňa (1972b) showed the lectotypification by Grolle was incorrect and selected another lectotype of *Solenostoma clavellatum* from BM. He treated the specimen from G (G11168/00115180) as the isotype of newly described by him *Jungermannia flavorevoluta*.

**18) *Nardia fusiformis* Steph., Bull. Herb. Boissier [Hepaticae Japonicae] 5: 99. 1897. (= *Jungermannia fusiformis* (Steph.) Steph., Sp. Hepat. 2: 77. 1901.)**

**Holotypus:** Japan. Yezo, Otaru. 28.XII.1885. U. Faurie (No. 88) G00112194.

**Accepted name:** *Solenostoma fusiforme* (Steph.) R. M. Schust., Hepat. Anth. North Amer. 2: 944. 1969.

**Description.** Plants pallid, more or less pellucid, yellowish-brownish, prostrate, rarely ascending in perianthous plants, forming loose mats, 0.3–1.0 mm wide and 5–10 mm long, laterally flattened. Stem 75–250 µm in diameter, slightly wider near perianth, not branched, yellowish-brownish. Rhizoids sparse to nearly absent or dense and numerous, originated throughout ventral side of stem, but commonly concentrated near ventral leaf bases, grayish to pale brownish. Leaves lax, soft, commonly undulate at margin, obliquely to very obliquely (rarely in perianthous plants subtransversely) inserted, barely or up to 1/3 of stem width decurrent dorsally and subtransversely to loosely arcuately inserted ventrally, where not or barely decurrent, distant, to (rarer, in perianthous plants only) contiguous, obliquely spreading and subhorizontally oriented, in perianthous plants sometimes appressed to the stem and emarginate near apex, large leaves crispate along margin, in general outline leaves

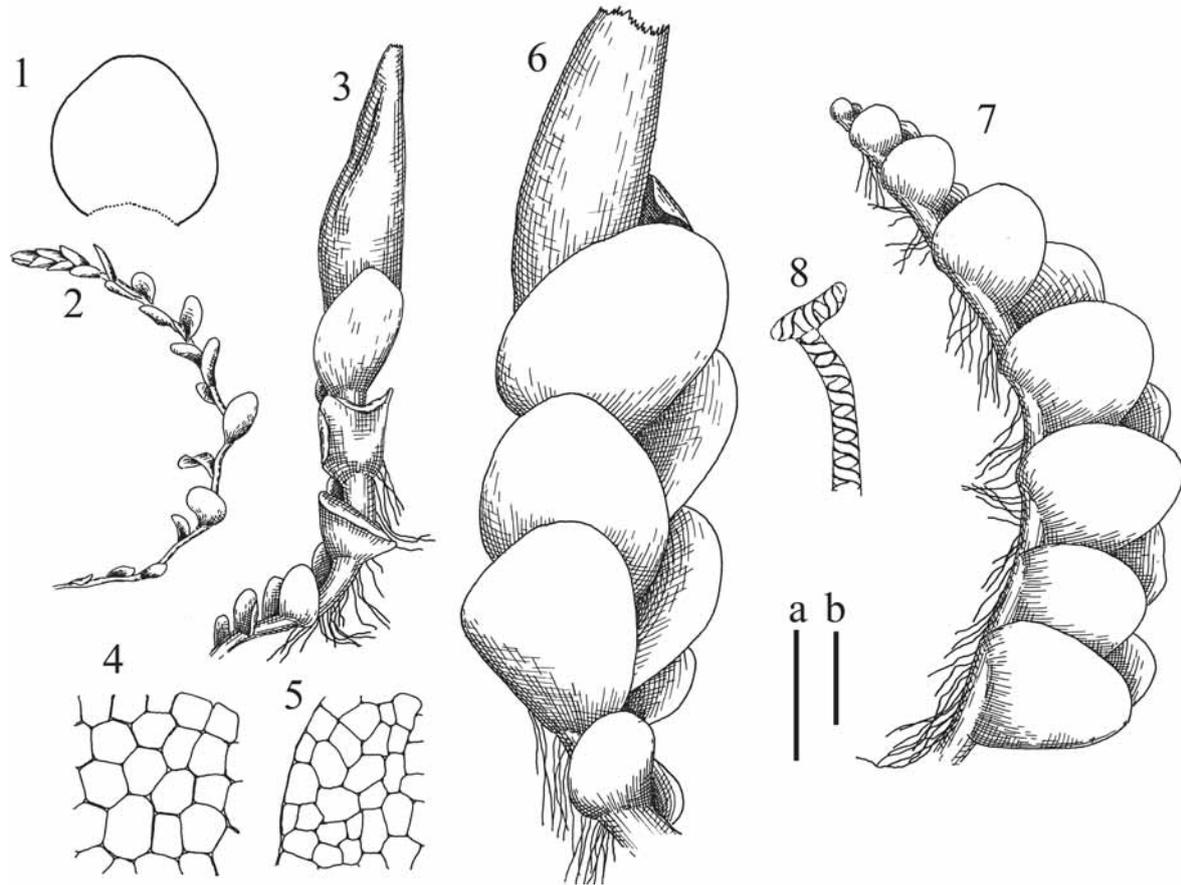


Fig. 6. *Nardia fusiformis* Steph., holotype (G00112194): 1 – leaf; 2 – sterile depauperate plant; 3 – perianthous plant; 4 – midleaf cells; 5 – cells along leaf margin; *Jungermannia gollanii* Steph., lectotype (G10921/00112200): 6 – perianthous plant; 7 – sterile plant, lateral view; 8 – fragment of elater. Scales: a – 1 mm, for 2, 3, 6, 7; b – 100  $\mu$ m, for 4, 5; a – 500  $\mu$ m, for 1; b – 50  $\mu$ m, for 8.

ovate to suborbicular, 450–800 $\times$ 350–925  $\mu$ m. Midleaf cells subsodiametric, mostly penta- to hexagonal, 31.0–42.0 $\times$ 29.0–42.0  $\mu$ m, thin-walled, trigones small, mostly concave, cuticle smooth; cells along leaf margin 25.0–37.5  $\mu$ m, thin-walled, trigones small, concave, cuticle smooth. Dioicous? Perianth fusiform, not or shallowly 3-plicate, gradually narrowed to not beaked mouth, rarely loosely turbinate near mouth, exerted for 2/3–3/4 of its length, composed by elongate, thin-walled cells; perigynium ca. 1/4–1/5 of perianth length, with 1 pair of bracts, loosely rhizogenous ventrally; female bracts similar to large leaves, undulate and shallowly crispate at margin. (Fig. 6: 1–5).

**19) *Jungermannia gollanii* Steph., Sp. Hepat. 6: 86. 1917.**

Lectotypus (designated by Amakawa, 1966): India. Dehra Dun, Mohand Pass, Siwalik Range, on wet rocks, 1600 ped. G10921/00112200.

Accepted name: *Plectocolea gollanii* (Steph.) Bakalin *comb. nov.* Basionym: *Jungermannia gollanii* Steph., Sp. Hepat. 6: 86. 1917.

Description. Plants pale greenish-brownish, prostrate to ascending, forming loose mats, mostly laterally compressed, 2.0–2.75 mm wide and 10–15 mm long. Rhiz-

oids rather numerous, erect to (rarer) obliquely spreading, colorless to brownish, attached plants to the substratum. Stem brownish, not branched (even as subfloral innovations), 200–250  $\mu$ m in diameter. Leaves very obliquely inserted, flattened to very loosely concave or slightly convex, dorsally not or barely decurrent, ventrally arcuately inserted (sometimes with auriculate leaf base), ovate to obliquely ovate, 1750–2500 $\times$ 1500–2000  $\mu$ m. Midleaf cells subsodiametric to oblong, 50–75 $\times$ 31–44  $\mu$ m, thin-walled, trigones vestigial to very small, cuticle virtually smooth; cells in leaf margin commonly elongate along margin, 50–69  $\mu$ m, thin-walled, trigones small, concave. Dioicous? Perianth almost cylindrical, not or loosely placate, ca. 3.0 $\times$ 1.0 mm, only slightly narrowed to the mouth, exerted for 1/2–2/3 of its length; mouth crenulate due to protrudent ob-pyriform cells with slightly thickened walls; cells in the perianth middle 112–200 $\times$ 37–50  $\mu$ m, thin-walled, with vestigial trigones, bistratose in lower 1/3 and cell cuticle striolate at that area; perigynium virtually absent; female bracts similar to leaves, but commonly larger and slightly emarginate at apex. Elaters sometimes branched, bispiral. (Fig. 6: 6–8).

Comment. Contrary to Amakawa (1966) and Váňa (1972a), who placed this species to subg. *Luridae* Spruce

ex S.W. Arnell (= *Jungermannia* subg. *Jungermannia* L., auct. non Amakawa 1966, etc.; = *Jungermannia* s. str.) I refer it to *Plectocolea* due to the following features: 1) mostly unistratose perianth, 2) perianth composed by elongate cells, 3) leaf cells are large (up to 75  $\mu\text{m}$  long, which is unsuitable for taxa of *Jungermannia* s. str.). The main reason why this species was put in *Jungermannia* by aforementioned authors is the absence of perigynium, but I do not consider this feature to be very valuable in this case, because several species of *Plectocolea* have perigynium very low to desired. One of possibly related species, *Plectocolea glauca* (Amak.) Bakalin *comb. nov.* (Basionym: *Jungermannia glauca* Amakawa J. Hattori Bot. Lab. 29: 256, 1966), also has no perigynium.

**20) *Jungermannia grossitexta* Steph., Sp. Hepat. 6: 87. 1917.**

**Holotypus:** Japan. 1907. U. Jishiba. G 14484'112193.

**Accepted name:** *Plectocolea grossitexta* (Steph.) S. Hatt., Bull. Tokyo Sci. Museum 11: 38. 1944.

**Description.** Plants prostrate to ascending, pale greenish-brownish, with brown-purple colored perianth tips and purplish tint near apices of female bracts, 1.75–3.0 mm wide and 10–15 mm long, dorsiventrally flattened, more or less soft. Rhizoids rather numerous, erect to obliquely spreading in unclear fascicles, colorless to brownish purplish (only those originated from perigynium or area near to it). Stem 175–325  $\mu\text{m}$  in diameter (wider near perigynium), not branched, slightly to moderately flexuous. Leaves undulate at margin, lax, contiguous to (rarer) distant, very obliquely inserted, dorsally decurrent for 2/3–5/3 of stem width, ventrally subtransversely to arcuately inserted, not or shortly decurrent, loosely concave to loosely canaliculate, obliquely laterally spreading, loosely sheathing the stem near base; 1130–1250×875–1500 (1:0.7–1.3), obliquely ovate to obliquely reniform, retuse at apex. Midleaf cells strongly collapsed (so it is difficult to see features), subsodiametric, ca. 25–50  $\mu\text{m}$  in diameter, thin-walled, trigones small, concave, cuticle smooth; cells along leaf margin 33–44  $\mu\text{m}$ , thin-walled, trigones small, concave, cuticle smooth. Dioicous? Perianth conical, ca. 2×1 mm, pluriplicate, with 5–6 main plicae, distinctly turbinate at the mouth, exerted for 1/2–2/3 of its length, composed by very elongate cells; perigynium ca. 1/2–2/3 of perianth length, rhizogenous ventrally; female bracts sheathing the perigynium and erect spreading above, undulate at margin. (Fig. 7: 1).

**Comment.** The taxon was treated as distinct species by Amakawa (1960), but his interpretation has certainly nothing to do with holotype specimen, as it was showed by Vána (1972a) and belongs to another species (*Jungermannia shimizuana* Vána, J. Hattori Bot. Lab. 35: 315. 1972 = *Solenostoma shimizuanum* (Vána) Vána, Hentschel & J. Heinrichs, Cryptogamie Bryologie 31(2): 138. 2010.). In the same paper Vána (1972a) synonymized *Jungermannia grossitexta* (= *Plectocolea gros-*

*sitexta* (Steph.) S. Hatt.) with *J. torticalyx* Steph. (= *Plectocolea torticalyx* (Steph.) S. Hatt.). Unfortunately he did not provide the reasons for this synonymization. In my opinion, *Plectocolea grossitexta* is a rather distinct species, although allied to *P. torticalyx*. Contrary to the latter, *Plectocolea grossitexta* is characterized by prostrate to ascending growth form (versus mostly erect), colorless to brownish rhizoids (versus almost uniformly purple), pale pigmentation (versus mostly deep green to brownish green) with common presence of pinkish or purplish tints (versus purplish pigmentation virtually absent), perianth exerted for 2/5–2/3 of its length (versus perianth exerted not more than 1/3 of its length), perigynium shorter than perianth (versus perigynium 1.0–2.0 times longer than perianth) and leaves commonly longer than wide, obliquely inserted and oriented (versus leaves uniformly wider than long, subtransversely or rarely obliquely inserted and rather subtransversely oriented).

**21) *Jungermannia hirticalyx* Steph., Sp. Hepat. 6: 87. 1917.**

**Holotypus:** Nova Caledonia. Franc (No. 106 p.p. by Theriot) G14462/00112202.

**Accepted name:** *Plectocolea montana* (Steph.) Bakalin *comb. nov.* Basionym: *Nardia montana* Steph., Hedwigia 28: 164. 1889.

**Description.** Plants prostrate, dorsiventrally flattened, greenish, pale greenish, greenish-brownish, in loose mats (0.75)1.0–1.5(1.75) mm wide and 5–10 mm long. Rhizoids numerous, colorless to purplish, obliquely to erect spreading, rarely decurrent down the stem, but not forming the fascicle. Stem 125–200  $\mu\text{m}$  in diameter, not branched. Leaves contiguous, very obliquely inserted, dorsally shortly (up 1/2 of stem width) decurrent, ventrally arcuately to subtransversely inserted, not or barely decurrent, rarely, in perianthous large plants decurrent up to 1/2 of stem width, lax, commonly undulate at the margin, slightly canaliculate to concave-caliculate, ovate to reniform, 500–750×400–800  $\mu\text{m}$ , obliquely spreading. Midleaf cells subsodiametric to oblong, 25.0–44.0×25.0–34.0  $\mu\text{m}$ , thin-walled, trigones moderate, nearly triangle to slightly concave or convex, cuticle distinctly papillose; leaf cells along margin 22.0–31.5  $\mu\text{m}$ , with noticeable equally thickened walls, trigones rather small, concave, cuticle distinctly verrucose. Dioicous. Androecia intercalary, with 6–7 pairs of bracts, bracts strongly inflated in lower half and recurved away of the stem along margin (in upper 1/3 of leaf). Perianth rather conical, pluriplicate (with 3–4 main plicae), cells in perianth middle noticeable elongate; perigynium virtually absent or up to 1/4 of perianth length; female bracts reniform, undulate, retuse at apex, sheathing perianth in lower half. (Fig. 7: 2–5).

**Comment.** See explanations under *Jungermannia wattiana* Steph. and *Solenostoma australe* Steph.

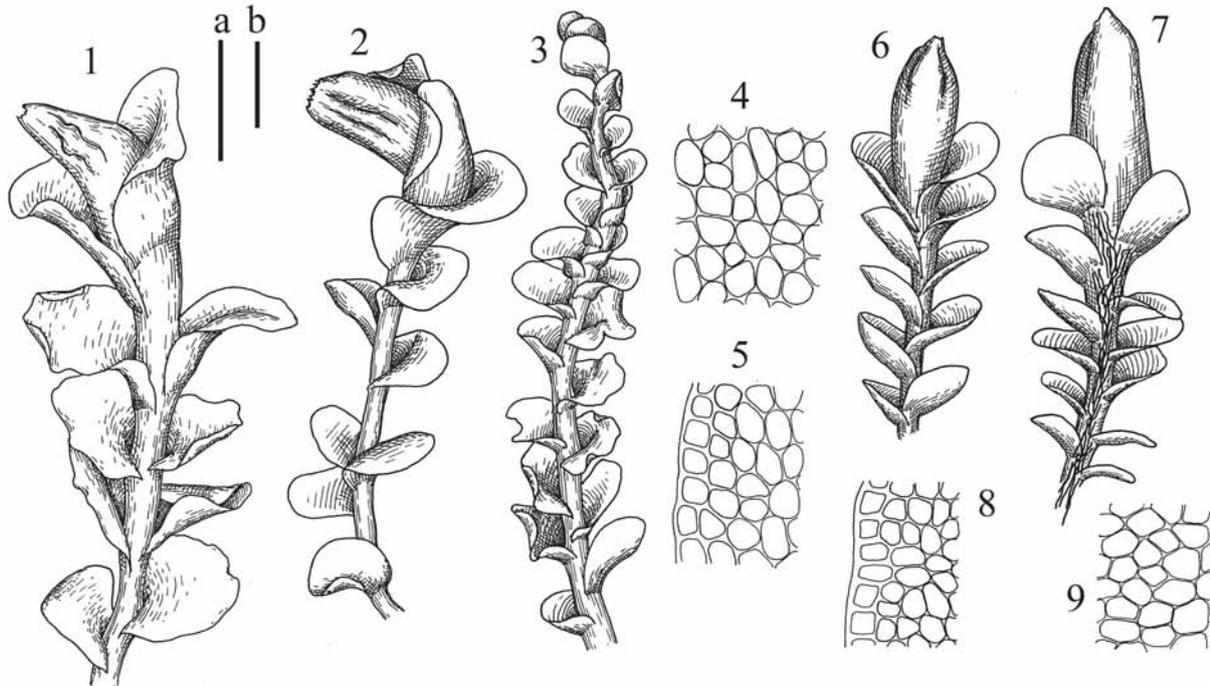


Fig. 7. *Jungermannia grossitexta* Steph., holotype, (G14484'112193): 1 – perianthous plant; *Jungermannia hirticalyx* Steph., holotype (G14462/00112202): 2 – perianthous plant; 3 – male plant; 4 – midleaf cells; 5 – cells along leaf margin; *Jungermannia hyalina* Lyell. var. *heteromorpha* Gott. et Rabenh., isotype (G00115357): 6 – perianthous plant; 7 – perianthous plant – ventral view; 8 – cells along leaf margin, 9 – midleaf cells. Scales: a – 1 mm, for 1–3, 6, 7; b – 100  $\mu$ m, for 4, 5, 8, 9.

**22) *Jungermannia hyalina* Lyell. var. *heteromorpha* Gott. et Rabenh., Hepaticae Europaeae, No. 628. 1877.**

**Isotypus:** Germany. Salem. 14.X.1875. Jack G00115357.

**Accepted name:** *Solenostoma gracillimum* var. *heteromorpha* (Gott. et Rabenh.) Bakalin comb. nov. Basionym: *Jungermannia hyalina* Lyell. var. *heteromorpha* Gott. et Rabenh., Hepaticae Europaeae, No. 628. 1877.

**Comment.** Váňa (1974c) regarded this name as mod. *pachyderma-colorata* of *Jungermannia gracillima* Sm. (= *Solenostoma gracillimum* (Sm.) R.M. Schust.), characterized by larger and slightly undulate leaves, leaf cells with somewhat thickened walls, not obviously enlarged leaf rim cells and almost fusiform perianth with beaked mouth. In the studied specimen, I found plants with following characters: (some of them reported by Váňa, l.c.): 1 – leaf border with unequally thickened cell walls, 2 – presence of moderate trigones in leaf cells, 3 – rather erect growth form, 4 – no red pigmentation (plants are yellowish-greenish), 5 – perigynium ca. 1/4 of perianth length, 6 – comparatively large, fusiform and only loosely plicate perianth. The features #1 and 2 suggest *Solenostoma gracillimum* f. *crenulatum* (Mitt.) R.M. Schust., while #3–6 – not typical for any forms. I prefer to regard var. *heteromorpha* as a separate variety of *S. gracillimum*. (Fig. 7: 6–9).

**23) *Jungermannia inundata* Hook. f. & Taylor, London J. Bot. 3: 559. 1844.**

**Isotypus:** New Zealand. Hooker. G 14447/00115362.

**Accepted name:** *Solenostoma inundatum* (Hook. f. & Taylor) Mitt. ex Steph., Bull. Herb. Boissier, sér. 2, 1: 490. 1901.

**Description.** Plant green-brown to olive-brown, rather ascending (if tentatively suggest so), 0.23–0.5 mm wide and 3–5 mm long. Rhizoids sparse, obliquely spreading, colorless to grayish. Leaves contiguous, obliquely inserted, not or shortly decurrent dorsally and subtransversely inserted ventrally, concave, 175–325×275–500  $\mu$ m. Midleaf cells strongly collapsed (that is very difficult to see), ca 17.5–24.0  $\mu$ m in diameter. Dioicous? Perianth clavate, 4-plicate at the upper 1/3, bistratose in lower half, gradually narrowed to not beaked mouth; perigynium virtually absent. (Fig. 8: 1, 2).

**Comment.** Only a few plants are present in the specimen.

**24) *Jungermannia macrocarpa* Steph., Sp. Hepat. 6: 87. 1917. (= *Aplozia macrocarpa* Schiffn. in litt., 1902).**

**Holotypus:** India. Darjeeling (Sikkim), “sous la galee blanche” 2135 m a.s.l. 31.XII.1899. R. Decoly G10924/00115185.

**Accepted name:** *Solenostoma macrocarpum* (Steph.) Váňa & D.G. Long, Nova Hedwigia 89: 504. 2009.

**Description.** Plants rather erect (if possible to suggest so, material is in very bad condition), greenish-brownish to yellowish-brownish, from 2.5 mm wide in sterile plants to 4.5 mm wide in perianthous ones, 5–15 mm long. Stem 200–450  $\mu$ m in diameter (wider near the perianth), not branched, with the exception of lateral subfloral innovations. Rhizoids numer-

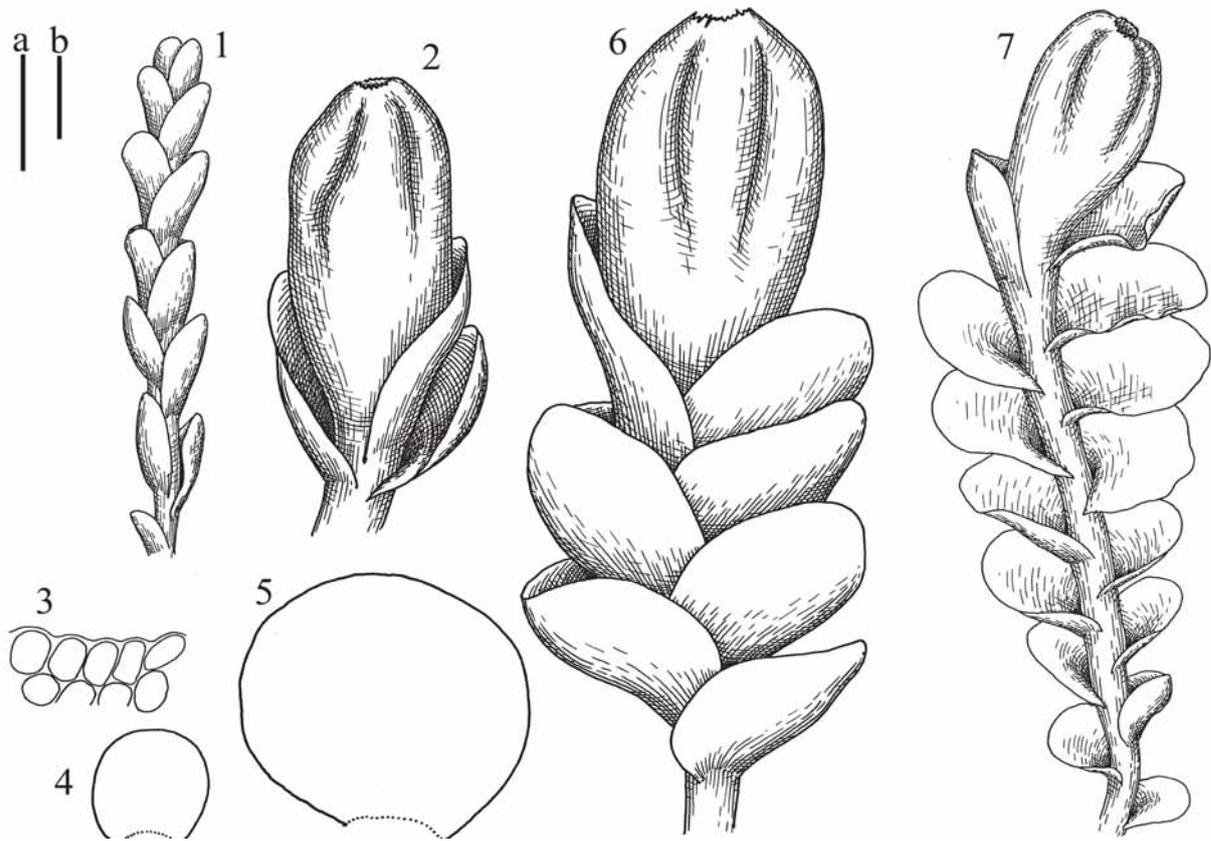


Fig. 8. *Jungermannia inundata* Hook. f. & Taylor, isotype (G14447/00115362): 1 – plant habit; 2 – upper part of perianthous plant; *Jungermannia macrocarpa* Steph., holotype (G10924/00115185): 3 – perianth mouth; 4, 5 – leaves; 6 – perianthous plant; *Jungermannia riparia* Tayl. var. *major* Gottsche et Rabenh., lectotype (G00114367): 7 – perianthous plant. Scales: a – 1 mm, for 4–6; b – 100  $\mu$ m, for 3; a – 500  $\mu$ m, for 1, 2; a – 590  $\mu$ m, for 7.

ous, grayish-brownish to brown, obliquely spreading (separated or in unclear fascicles), but commonly forming thick mat under stem and unite plants in the patches one to another. Leaves mostly strongly undulate at margin (with the exception of small sterile plants), loosely concave, dorsally decurrent for 1/2–3/4 of stem width, ventrally subtransversely to arcuately inserted, not decurrent, suborbicular to obliquely transversely elliptic, 1100–2750 $\times$ 1250–3250  $\mu$ m, contiguous to subimbricate (then enclosed one to another), large leaves sometimes bistratose in lower 1/4. Midleaf cells oblong, 50–75 $\times$ 25–37  $\mu$ m, thin-walled, trigones small, concave, cuticle smooth; cells along leaf margin 25–37  $\mu$ m, thin-walled, trigones moderate in size, convex, external wall thickened, cuticle virtually smooth. Dioicous? Perianth ca. 4.5 $\times$ 2.25 mm, 5–6-plicate (plicae sometimes undulate) in upper half, suddenly contracted to not beaked mouth, exerted for 1/2 of the length, cylindrical, perianth upper 1/3 unistratose, middle third bistratose and lower third 3–4-stratose, cells in the perianth middle oblong, 50.0–75.0 $\times$ 31.2–37.5  $\mu$ m, thin-walled, trigones small to moderate in size, concave, cells in upper part of the perianth isodiametric, trigones moderate in size, concave, perianth mouth

crenulate; perigynium absent or less than 1/6 of perianth length; female bracts similar to large leaves. Spores papillose, brown-rusty, 13.7–15.0  $\mu$ m in diameter (Fig. 8: 3–6).

**Comment.** My description strikingly differs from the description given by Amakawa (1967) in many traits, including plant size, color, perianth and leaves dimensions. At the other hand, original description by Stephani (1917) is well coinciding with my observations and supports the appropriateness of the epithet “macrocarpa” due to remarkably large perianth. The discrepancies with Amakawa description are therefore difficult to understand. Unfortunately Amakawa (1967) did not cite herbarium accession number for the collection he studied, although the label data provided by him are identical with my own.

**25) *Jungermannia marcescens* Mitt., J. Proc. Linn. Soc., Bot. 5: 91. 1861.**

**Isotypus:** Nepal (“In Himalayae orient.”), reg. temp. 11000 ped. J.D. Hooker (No. 1316) G 14835/00115162.

**Accepted name:** *Solenostoma marcescens* (Mitt.) Bakalin, Polish Bot. J. 58(1): 139. 2013.

**Comment.** a) The material is very poor, but in all ways is identical with previously studied and discussed in detail type collection from NY (Bakalin, 2013).

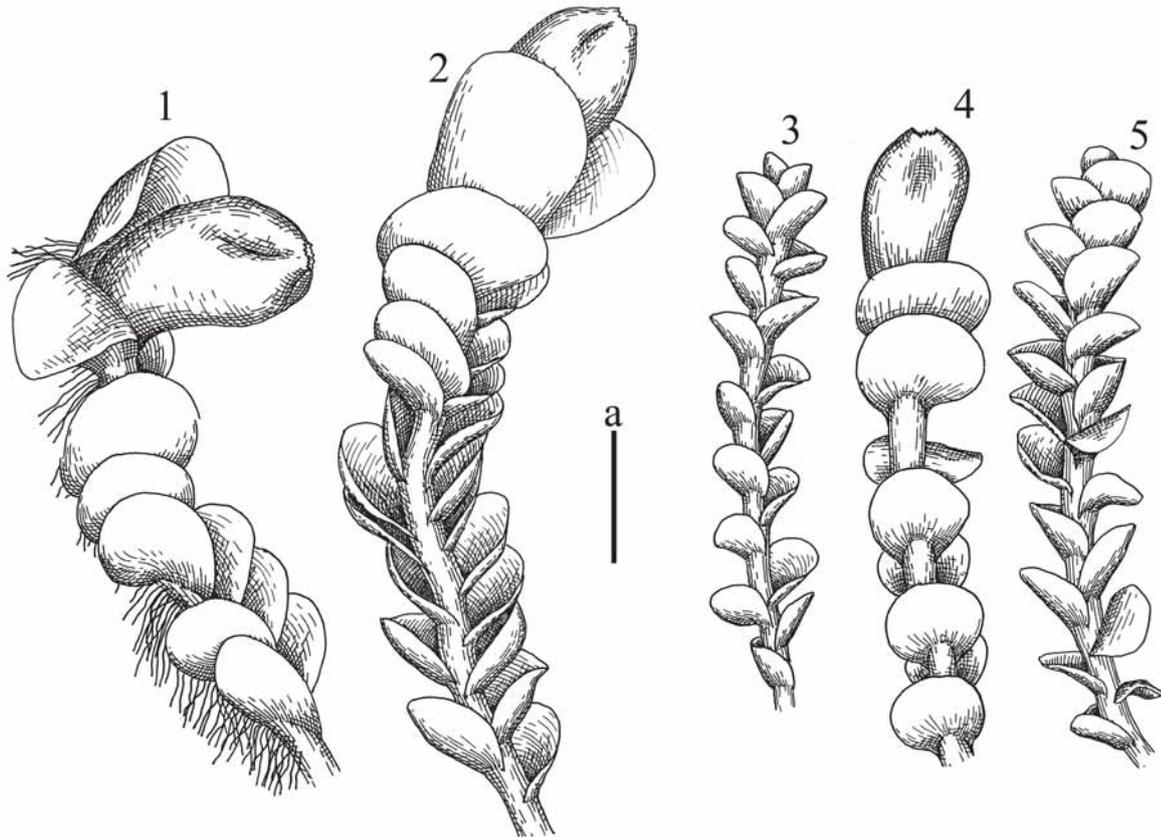


Fig. 9. *Jungermannia mieheana* Steph., holotype (G524/00112192): 1, 2 – perianthous plants; *Jungermannia mildbraedii* Steph., lectotype (G14300/00045331): 3, 5 – plant habit; 4 – perianthous plant. Scale: a – 1 mm, for 1–5.

b) Bakalin (2013) discussed in details differences between *S. marcescens* and *S. sanguinolentum* (Griff.) Steph. and suggested to treat the former as a species distinct from *S. sanguinolentum*. The main differences were found in: 1) inflorescence type (paroicous in *S. marcescens*, but dioicous in *S. sanguinolentum*, 2) bistratose versus unistratose perianth at its middle part, 3) perianth size (1.5 mm long versus 6 mm long), 4) yellowish to brownish versus light to deep pink coloration, 5) pachydermous versus leptodermous leaf cell structure. Shortly after appearance of this paper (l.c.), Váňa et al. (2013) suggested Bakalin's point of view is incorrect and two names should be regarded as synonyms, as the mentioned features are unstable. Indeed, if take each feature individually, the variability will be found in different groups (to affirm their considerations concerning inflorescence type, Váňa et al. (l.c.) involved an example of *Lophozioopsis propagulifera*, rather far distant genus from *Solenostoma*). Contrary, when I argued specific status for *S. marcescens*, I used a combination of features, not a single one. It is unclear for me how plants of supposedly the same species are able to develop only yellowish brownish pigmentation in pachydermous phenotypes, while more lax with leptodermous cells acquire a deep pink pigmentation. Also it seems strange why plants with the former combination of characters develop perianths up to 5 times longer than those of the latter. Therefore, I prefer to refrain from adopting Váňa et al. (2013) suggestion.

**26) *Jungermannia mieheana* Steph., Sp. Hepat. 6: 88. 1917.**

Holotypus: Java. Salak. 1909. Mieke G524/00112192.

Accepted name: *Solenostoma bauerii* (Schiffn.) Steph., Sp. Hepat. 2: 57. 1901.

Description. Plants prostrate, rarely ascending at the tips, pale greenish to brownish and pale yellowish-brownish, 1.5–2.0 mm wide, 10–15 mm long. Rhizoids numerous, colorless to grayish, erect spreading in unclear fascicles or forming mat in ventral side of stem, loosely attached plants to the substratum. Stem 300–400 µm in diameter, not branched, even as subfloral innovations. Leaves lax, contiguous to subimbricate, loosely concave, sometimes undulate at margin, barely or up to 1/2 of stem width decurrent dorsally, arcuate inserted ventrally, where not decurrent, obliquely spreading to loosely laterally appressed to the stem, transversely elliptic to reniform, larger leaves retuse at the apex, 1000–1500×1500–2100 µm. Midleaf cells 50.0–62.5×31.0–50.0 µm, thin-walled, with moderate in size, convex trigones, cuticle smooth; cells along leaf margin 31.2–50.0 µm, thin-walled, with slightly thickened external wall, trigones moderate in size, convex. Dioicous? Perianth 4(5)-plicate in upper 3/4 of its length, ellipsoidal, gradually narrowed to widely and obscurely beaked mouth, exerted for 1/2–2/3 of its length; perigynium absent. (Fig. 9: 1, 2).

Comment. Váňa (1974d) synonymized *Jungerman-*

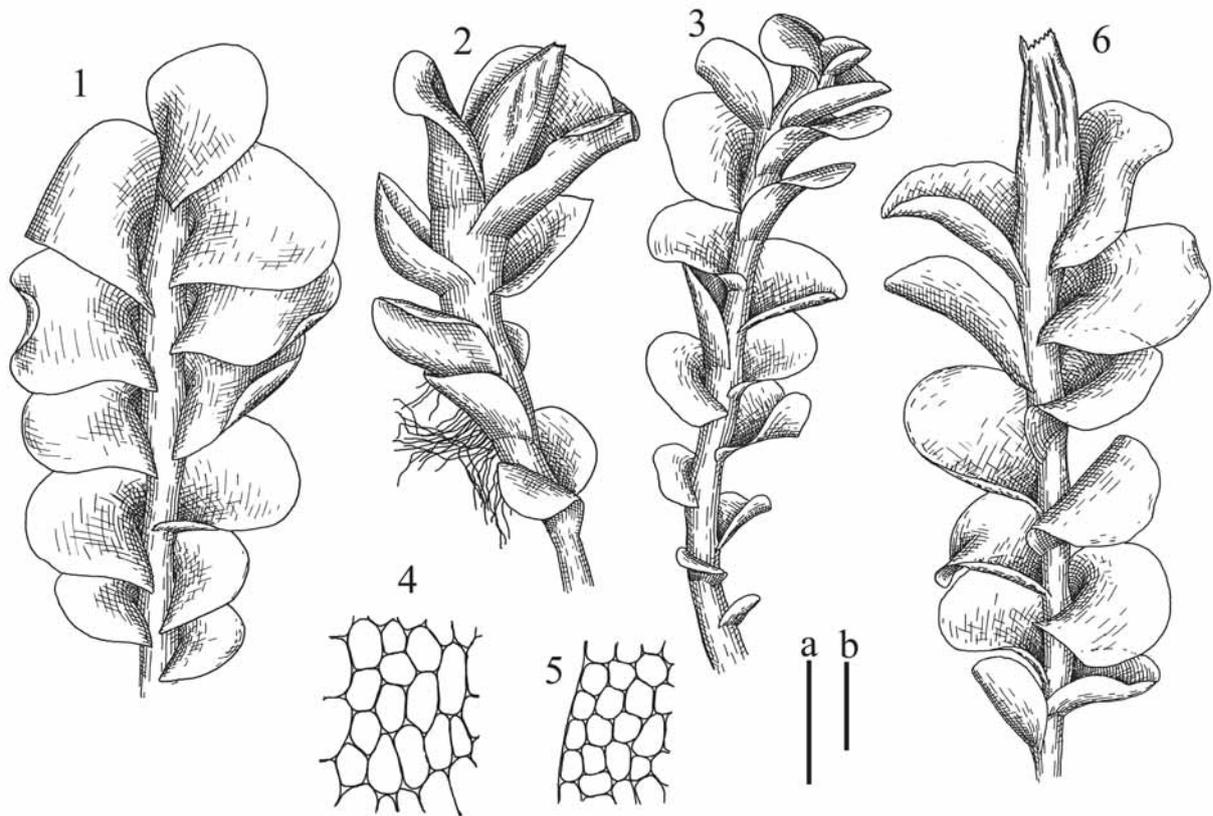


Fig. 10. *Jungermannia newellana* Steph., holotype (G14302/00112191): 1, 3 – plant habit; 2 – perianthous plant; 4 – midleaf cells; 5 – cells along leaf margin; *Jungermannia pallida* Steph., holotype (G16629/112139): 6 – perianthous plant. Scales: a – 1 mm, for 1–3, 6; b – 100  $\mu$ m, for 4, 5.

*nia mieheana* Steph. with *J. bauerii* Schiffn.) Amak.(= *Solenostoma bauerii*), with which I agree.

**27) *Jungermannia mildbraedii* Steph.**, Wiss. Ergebn. Deut. Zentr.-Afr. Exped., Bot. 2: 113. 1910[1911].

**Lectotypus** (designated by Vána, 1974b): Congo. Kissenge [Kisenyi]. Lava Spalten des Kraters. 3400 m a.s.l. Mildbraed(?) G14300/00045331.

**Accepted name:** *Solenostoma mildbraedii* (Steph.) R.M. Schust., Nova Hedwigia Beiheft 119: 387. 2002.

**Description.** Plants erect, in dense patches, yellowish brownish to brown near apex, 1.0–1.25 mm wide and 5–10 mm long. Rhizoids sparse, isolated, obliquely spreading or decurrent down the stem, but not forming fascicle, colorless to brownish. Stem 200–250  $\mu$ m in diameter, not branched, even as subfloral innovations. Leaves clearly dorsally secund, concave to concave-canaliculate (in sterile branches), transversely elliptic, distant, 500–800 $\times$ 750–1250  $\mu$ m, dorsally decurrent for 1/2–2/2 of stem width, subtransversely inserted, obliquely to erect spreading. Midleaf cells oblong, 27.5–43.0 $\times$ 25.0–31.5  $\mu$ m, thin-walled, trigones moderate in size, triangle to convex, cuticle smooth; cells along margin 12.5–18.5  $\mu$ m, thin- to slightly thick-walled, walls brownish, trigones moderate, concave to convex, rarely confluent in tangential wall. Paroicous. Androecia intercalary, below perianth, with 1–2 pairs of bracts that not differed in shape from sterile leaves. Perianth clavate, 3-plicate in upper

1/4–1/3 of the length, ca. 2.25 $\times$ 1.0 mm, suddenly contracted to not beaked mouth, more deeply colored in upper 1/4. (Fig. 9: 3–5).

**28) *Jungermannia mosenii* Steph.**, Sp. Hepat. 6: 89. 1917.

**Holotypus:** Brasilia. Prov. Minas Geraes, Caldas. 1.VI.1974. H. Mosen G14482/00112142.

**Accepted name:** *Plectocolea decolor* (Schiffn.) Bakalin *comb. nov.* Basionym *Jungermannia decolor* Schiffn., Die Forschungsreise S.M.S. ~Gazell~, IV. Teil. Botanik 10. 1889[1890].

**Description.** Plants olive green to greenish yellowish, erect in dense patches, 1.7–2.8 mm wide and 8–12 mm long. Rhizoids numerous, colorless to brown, originated near leaf ventral base (also from perigynium), decurrent down along the stem and forming more or less clear fascicle. Stem 280–380  $\mu$ m in diameter, not branched (even as subfloral innovations). Leaves obliquely to erect spreading, sometimes loosely sheathing the stem near base, concave to concave-canaliculate, 900–1000 $\times$ 1100–1500  $\mu$ m, widely obliquely ovate, sometimes slightly undulate at margin, ventrally arcuately inserted, dorsally shortly or up to 1/2 of stem width decurrent. Midleaf cells subisodiametric, 33.5–39.0 $\times$ 27.5–39.0  $\mu$ m, thin-walled, trigones moderate in size, concave to slightly convex, cuticle smooth; cells along leaf margin 15.0–27.5  $\mu$ m, more or less thin-walled, with slightly thick-

ened external wall, trigones moderate, concave. Dioicous? Perianth 4–5-plicate, conical, gradually narrowed to the mouth, exerted for 1/3–1/2 of its length (sometimes more); perianth cells similar to leaf cells; perigynium rhizogenous, ca. 1/2–2/3 of perianth length; female branches similar to leaves, but wider and sheathing the perianth at 2/3–3/4 of their length and obliquely spreading above. Spores spherical, finely papillose, 13.5–15.0 µm in diameter. Elaters bispiral, without homogenous ends. (Fig. 4: 4–6)

**Comment.** Váňa (1974b) synonymized *Jungermannia mosenii* Steph. with *J. decolor* Schifff. (= *Solenostoma decolor* (Schifff.) Bakalin). I did not see the type material of *J. decolor*, but based on Váňa (1974a) description, there is a difference in the size of perigynium, and only tentatively I agree with Váňa's conclusion; further study is needed.

**29) *Jungermannia newellana*** Steph., Sp. Hep. 6: 89. 1917.

**Holotypus:** Hawaii. 1911. Newell(?) G14302/00112191.

**Accepted name:** *Plectocolea newellana* (Steph.) Bakalin *comb. nov.* Basionym: *Jungermannia newellana* Steph., Sp. Hep. 6: 89. 1917.

**Description.** Plants ascending among other hepatics (mostly *Riccardia*), yellowish brownish, sometimes pallid, 1.75–3.5 mm wide and 10–15 mm long, rather rigid, sometimes dorsiventrally flattened. Stem 200–275 µm in diameter, sometimes slightly flexuous, not branched (even as subfloral innovations). Rhizoids numerous, deep purple to purple brown, originated in ventral side of stem, decurrent in thick, sometimes loose fascicle down the stem, in some plants erect spreading and not forming the fascicle, in lower part commonly obliquely to erect spreading and forming mat, rigid. Leaves obliquely inserted and obliquely spreading, mostly concave-canaliculate, but in dorsal half of the leaf sometimes slightly convex (giving 'plagiocylindroid' appearance), dorsally for 1/4–4/4 decurrent, ventrally mostly arcuately inserted, not decurrent, contiguous to subimbricate, sometimes undulate at margin (especially in large leaves), obliquely lingulate, 1100–1750×1000–1400 µm. Midleaf cells subisodiametric to oblong, 33.5–62.5×23.5–37.5 µm, trigones moderate in size, concave, cuticle virtually smooth; cells along leaf margin 25.0–37.5 µm, thin-walled, with slightly thickened external wall, trigones moderate to small, concave, cuticle smooth. Dioicous? Perianth conical, 4–pluriplicate, evidently, but not strongly turbinate at upper third, ca. 2000×900 µm, exerted for 1/2 or less of its length; perigynium ca. 1/2–2/3 of perianth length, with 1 pair of bracts; female bracts similar to leaves, but larger, undulate and shallowly crispate at margin, sheathing perianth in lower half and recurved away of the perianth in upper 1/3–1/2. (Fig. 10: 1–5).

**Comment.** *Jungermannia newellana*, along with *J. mauii* Aust. (= *Plectocolea mauii* (Aust.) Mill. Ark. Bot.

Ser. 2 (5/2): 513. 1963.) were synonymized under *J. micrantha* (Mitt.) Steph. (= *Plectocolea micrantha* Mitt.) by Váňa (1975b). Recently I studied the type of *J. micrantha* in NY (Bakalin 2013) and found it to be parodicous. Contrary, plants in the type of *J. newellana* seem to be dioicous. Despite careful search I did not find any antheridia or their remnants in leaves below female bracts. Plants in two types also strongly differ in size and colors. I have not studied the type of *P. mauii* and cannot conclude if it is identical with *P. newellana*, *P. micrantha* or represents the third species of its own.

**30) *Jungermannia obtusiflora*** Steph., Sp. Hepat. 2: 69. 1901. (= *Jungermannia obtusiflora* Gottsche, *in litt.*).

**Holotypus:** Guadeloupe. l'Herminier G14487/115155.

**Accepted name:** *Solenostoma linguifolium* (Gottsche) R.M. Schust., Nova Hedwigia Beiheft 119: 381. 2002.

**Description.** Plants prostrate, dorsiventrally flattened, more or less rigid (leaves even fragile when detaching them), brownish green to brownish, 3.0–3.5 mm wide and 10–15 mm long. Rhizoids brownish to brown, rarely with purplish tint, rigid, originated mostly near ventral leaf base, but not only there, decurrent down the stem, but not forming fascicle. Stem 320–380 µm in diameter, not branched, brown. Leaves contiguous, concave-canaliculate, laterally spreading, rigid, ovate to obliquely ovate, 1500–2000×1250–1500 µm, obliquely inserted, dorsally barely decurrent, ventrally transversely to arcuately inserted, not or barely decurrent. Midleaf cells oblong, 37.5–56.5×31.0–37.5 µm, thin-walled, trigones large, convex, cuticle smooth; cells along leaf margin 31.0–37.5 µm, thin-walled, external wall strongly thickened, trigones large, convex, cuticle virtually smooth. (Fig. 11: 1–7).

**Comment.** Váňa (1974a) treats *J. obtusiflora* as a modification of *J. linguifolia* with ascending stem.

**31) *Jungermannia pallida*** Steph., Sp. Hepat. 6: 90. 1917.

**Holotypus:** Japan. 1907. U. Jishiba (no. 79) G16629/112139.

**Accepted name:** *Plectocolea grossitexta* (Steph.) S. Hatt. Bull. Tokyo Sci. Mus. 11: 38. 1944.

**Description.** Plants pallid, prostrate, whitish to pale brownish, commonly tinged with purple near shoot apices (in exposed places), 1.5–3.0 mm wide and 7–10 mm long, dorsiventrally flattened, soft. Rhizoids numerous, colorless to grayish, loosely attached plant to the substratum, originated from the stem. Stem 175–300 µm in diameter, not branched. Leaves ovate to obliquely ovate, 1050–1500×950–1500 µm, lax, contiguous, laterally spreading, undulate at margin, loosely sheathing the stem near base, dorsally decurrent for 1/3–3/3 of stem width, ventrally arcuately inserted, not or shortly decurrent. Midleaf cells oblong, 37.5–62.5×18.5–31.5 µm, very thin-walled, trigones wanting to very small, triangle, cuticle smooth; cells along leaf margin 25.0–47.5 µm, thin-walled, with thickened external wall, trigones small, con-

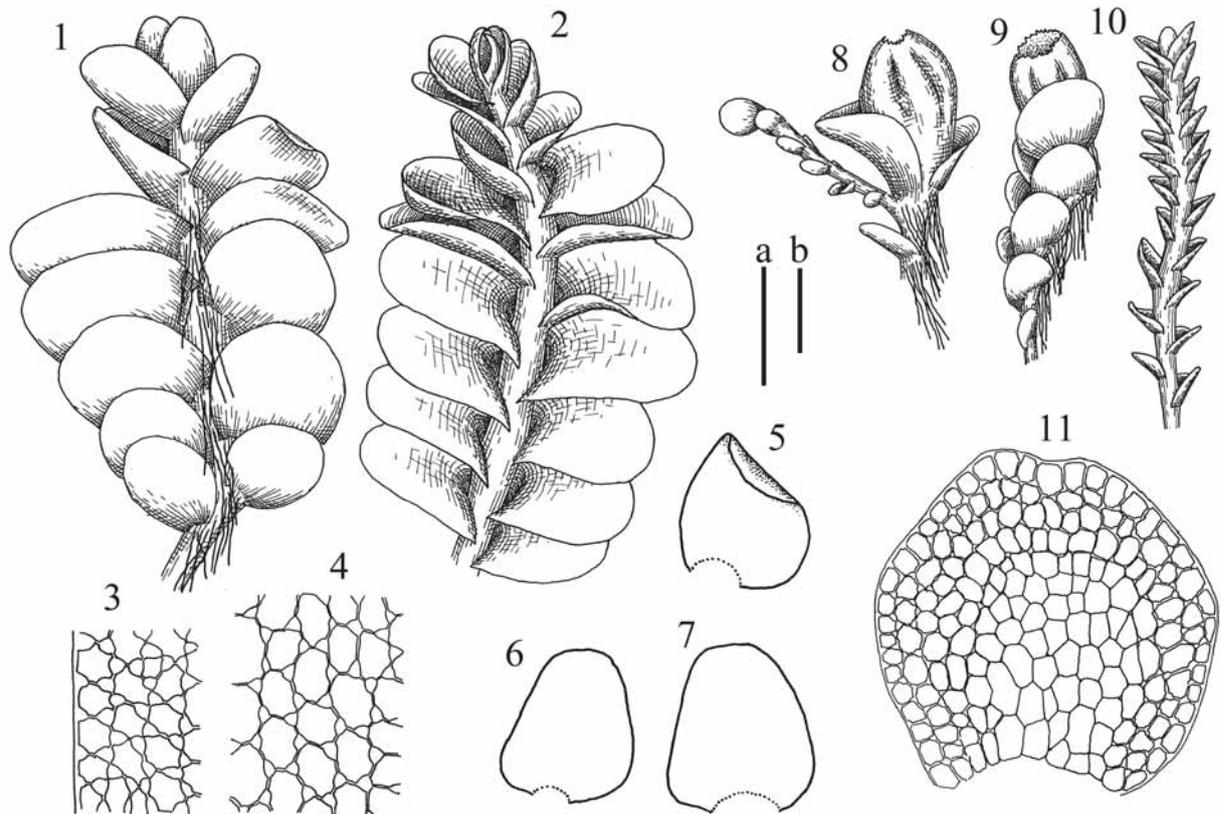


Fig. 11. *Jungermannia obtusiflora* Steph., holotype (G14487/115155): 1 – plant habit, ventral view; 2 – plant habit; 3 – cells along leaf margin; 4 – midleaf cells; 5–7 – leaves; *Jungermannia papulosa* Steph., holotype (G14471/00112138): 8, 9 – perianthous plants; 10 – plant habit; 11 – leaf. Scales: a – 1 mm, for 1, 2, 5–7; b – 100  $\mu$ m, for 3, 4, 11; a – 590  $\mu$ m, for 8–10.

cave, cuticle smooth. Dioicous? Perianth pluriplicate, but commonly with 3 main plicae, long-conical, 1750–550  $\mu$ m, gradually narrowed to the mouth, exerted for 2/3 of the length; perigynium ca. 1/3–1/2 of perianth length; female bracts similar to leaves, but larger and sometimes crispate along margin. (Fig. 10: 6).

**Comment.** This name was synonymized with *Jungermannia thermarum* Steph. by Amakawa (1960). Later Váňa (1974d) placed *Jungermannia pallida* (as syn. nov.) into synonym of *Jungermannia vulcanicola* (Schiffn.) Steph (= *Plectocolea vulcanicola* (Schiffn.) Bakalin). However one year later Váňa (1975c) transferred *J. pallida* into synonym of *J. torticalyx* Steph. (= *Plectocolea torticalyx* (Steph.) S. Hatt.), as the latter was found by him as a species with great variability. However, based on a combination of prostrate growth form, pallid color, colorless rhizoids, leaves commonly longer than wide, perianth exerted for 2/3 of its length, and not turbinate mouth I suggest *J. pallida* is synonymous with *Plectocolea grossitexta* (Steph.) S. Hatt., with the latter being priority name.

**32) *Jungermannia papulosa* Steph., Sp. Hepat. 2: 73. 1901.**

**Holotypus:** Brasilia. Minas Gerais. Lindman (No. 23 p.p.) G14471/00112138.

**Accepted name:** *Solenostoma papulosum* (Steph.) Bakalin, Arctoa 23: 95. 2014.

**Description.** Plants from “flagelliform” base with scale-like leaves to normally leaved shoots, pale brownish to yellowish brown, 0.2–0.4 (perianthous up to 0.7) mm wide and 3–5 mm long. Rhizoids colorless to grayish, erect spreading (not united into spreading fascicles). Stem 100–125  $\mu$ m in diameter, not branched, with exception of lateral subfloral innovations. Leaves subtransversely inserted, not decurrent in the both sides, although leaves near perianth (just below female bracts) ventrally arcuately inserted, 225–325 $\times$ 175–325  $\mu$ m, distant, concave, ovate to suborbicular. Midleaf cells subisodiametric to shortly elongate, 23.5–31.5 $\times$ 18.5–27.5  $\mu$ m, thin-walled, with moderate in size to small, mostly concave trigones, cuticle virtually smooth; cells along leaf margin 15.0–27.0  $\mu$ m, more or less thin-walled, trigones small to moderate in size, concave to convex, external wall thickened. Dioicous? Perianth 4-plicate in upper 2/3, gradually narrowed to not beaked mouth; perigynium virtually absent; female bracts similar to leaves, but larger. (Fig. 11: 8–11).

**Comment.** *Jungermannia papulosa* Steph. (= *Solenostoma papulosum* (Steph.) Bakalin) was synonymized with *Jungermannia amoena* Lindenb. & Gott. (*Solenostoma amoenum* (Lindenb. & Gott.) R.M. Schust. ex Váňa, Hentschel & J. Heinrichs) by Váňa (1974a). On the contrary, I consider *Solenostoma papulosum* as a ‘good’ species. For further explanations see comment under *Jungermannia brasiliensis* Steph.

**33)** *Jungermannia potamophila* Müll.Arg. ex Moug., Nestl. & Schimp., Stirpes Cryptogamae Vogeso-Rhenanae 15: 1418. 1860.

Isotypus: Switzerland. 1856. J. Muller. (No. 167) G14571/00115172.

Accepted name: *Jungermannia atrovirens* Dumort., Syll. Jungerm. Europ. 51. 1831.

Comment. The name was synonymized with *Jungermannia atrovirens* Dumort. by Vána (1973) (mod. *viridis-leptoderma-laxifolia*). I agree with this conclusion. Plants slightly differ from most common phenotypes of *J. atrovirens* in wider shoots and not so strongly laterally spreading leaves. (Fig. 12: 1, 2)

**34)** *Jungermannia purpurata* Mitt., J. Proc. Linn. Soc., Bot. 5: 91. 1860[1861].

Isotypus(?). “Simla. Dripping rocks. Griffith” G8180/115095.

Accepted name: *Solenostoma purpuratum* (Mitt.) Steph., Sp. Hepat. 2: 51. 1901.

Description. Plants seem to be ascending to erect, brownish-greenish to brownish-green, 1.75–2.5 mm wide and 10–15 mm long, without purple pigmentation. Stem 200–250 µm in diameter, not branched, straight, greenish brownish. Rhizoids numerous, originated in ventral side of stem, decurrent down the stem in wide (sometimes wider than stem) distinct fascicle, colorless to grayish. Leaves contiguous, obliquely to erect spreading, concave to concave-canaliculate (smaller ones), transversely to subtransversely inserted, shortly (ca. 1/4–1/2 of stem width) decurrent dorsally and arcuately inserted and decurrent for 1/2–2/2 of stem width ventrally, commonly undulate at margin, rarely (the biggest ones) crispate, widely obliquely ovate to widely obliquely triangular, 700–1400×750–1900 µm. Midleaf cells subsodiametric to shortly oblong, 25.0–37.5×18.7–25.0 µm, thin-walled, trigones moderate in size, cuticle virtually smooth; cells along leaf margin 15.0–19.0 µm, thin-walled, trigones moderate in size, convex, external wall thickened. Dioicous. Androecia intercalary (although sometimes branch become depauperate and die out after androecia), with 5–6 pairs of bracts, smaller than leaves, inflated in lower half and erect spreading in upper half. Perianth widely clavate, ca. 2000×1400 µm, not or very loosely 4-plicate in upper 1/4, suddenly contracted to obscurely beaked mouth, composed by subsodiametric cells, bistratose in lower 2/3; perigynium virtually absent or very low; female bracts in one pair, similar to leaves, but larger, concave. Spores finely papillose, 15.0–16.5 µm in diameter. Elaters bispiral, ca. 115×10 µm, with homogenous ends ca. 19–20 µm long. (Fig. 12: 10, 11).

Comments. a) Other isotypes, G00115096 and G00115094, are identical with the above described, but due to a possibility of their non-identity, description is given for one specimen.

b) W. Mitten (1861) provides locality data as “In montis khasianae Bengaliae orient. reg. trop. alt. 2000–

4000 ped. Griffith” (No. 1327), but on the label in G only “Simla. Dripping rocks. Griffith” is mentioned (G8180/115095). The same geography is mentioned in the lectotype label in NY (NY00967458!), plants in the lectotype from NY are similar in all ways to the present specimen, although shoots are slightly narrower.

**35)** *Jungermannia pyriflora* Steph., Sp. Hepat. 6: 90. 1917.

Holotypus: Japan. Shinano, Mt. Natruzawo. 28.VII.1908. U. Jishiba (No. 205) G530/00067158.

Accepted name: *Solenostoma pyriflorum* Steph., Sp. Hepat. 6: 83. 1917.

Description. Plants erect, in dense patches, more or less small, 1.25–1.5 mm wide and 3–5 mm long, yellowish brownish. Rhizoids colorless, sparse to numerous, erect to obliquely spreading in unclear fascicles, rarely forming unclear fascicle decurrent down the stem. Stem 250–300 µm in diameter, not branched (even as subfloral innovations). Leaves subtransversely inserted, dorsally barely decurrent, or decurrent up to 1/4 of stem width, ventrally transversely to arcuately inserted, not decurrent, 500–800×700–1175 µm, suborbicular to transversely elliptic, contiguous to subimbricate. Midleaf cells mostly isodiametric to shortly oblong, 25.0–37.5×25.0–29.0 µm, thin-walled, trigones moderate in size, convex, cuticle smooth; leaf margin cells 16.0–22.5 µm, thin-walled, trigones convex to concave, moderate to large in size, external wall thickened, cuticle smooth. Dioicous. Perianth 3–4-plicate in upper 1/3–1/2 of its length, 2–3-stratose in lower 2/3, exerted for 2/3–3/4 of its length, subclavate, ca. 1100×600 µm. Androecia intercalary, with (2)3–4 pairs of bracts, different generations divided by 1–2 pairs of sterile leaves, male bracts strongly inflated in lower half and erect spreading near bract margin. (Fig. 13: 1, 2).

Comment. Stephani (1917) used epithet “*pyriflorum*” twice within *Jungermannia* s.l. He described *Solenostoma pyriflorum* Steph. on page 83 and 7 pages below, on page 90, described also *Jungermannia pyriflora* Steph. Both names seem to be synonymous to each other, or, at least, very closely morphologically related. Small differences may be found in leaf cell size. I suggest to synonymize two names only provisionally, because further studies in this group in Japan and adjacent areas are needed.

*Solenostoma pyriflorum* Steph., Sp. Hepat. 6: 83. 1917. – *Jungermannia pyriflora* Steph. Sp. Hepat. 6: 90. 1917. *syn. nov. prov.*

**36)** *Jungermannia renauldii* Steph., Bull. Soc. Bot. Belgique 30: 201. 1892.

Holotypus: Reunion (Bourbon). Rodriguez (No. 276) G14303/00045333.

Accepted name: *Plectocolea renauldii* (Steph.) Bakalin *comb. nov.* Basionym: *Jungermannia renauldii* Steph., Bull. Soc. Bot. Belgique 30: 201. 1892.

Description. Plants prostrate to indistinctly ascending, greenish-brownish to brownish-yellowish, 1.5–2.0

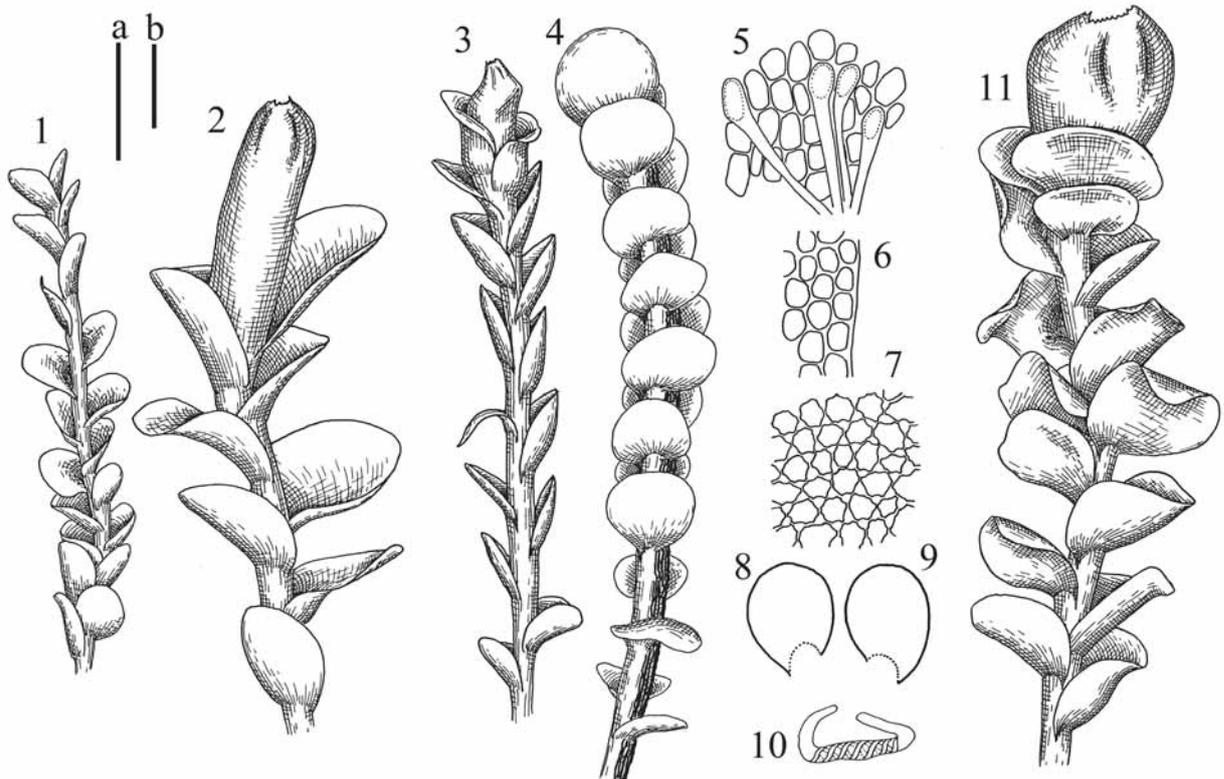


Fig. 12. *Jungermannia potamophila* Müll. Arg. ex Moug., Nestl. & Schimp., isotype (G14571/00115172): 1 – plant habit; 2 – perianthous plant; *Nardia prostrata* Steph., holotype (G516/00115364): 3 – perianthous plant; 4 – plant habit, lateral view; 5 – rhizogenous cells in the leaf; 6 – cells along leaf margin; 7 – midleaf cells, 8, 9 – leaves; *Jungermannia purpurata* Mitt., isotype (G8180/115095): 10 – elater; 11 – perianthous plant. Scales: a – 1 mm, for 1–4, 8, 9, 11; b – 100  $\mu$ m, for 5–7; b – 50  $\mu$ m, for 10.

mm wide and 5–10 mm long. Rhizoids colorless to grayish and brownish, erect to obliquely spreading, in indistinct fascicles, or decurrent down the stem, but not forming fascicles, originated mostly near ventral leaf base. Stem 175–300  $\mu$ m in diameter, not branched (with the exception of ventral subfloral innovations). Leaves obliquely inserted, concave-canaliculate, distant to contiguous, dorsally decurrent for (1/2)1–2 stem width, ventrally arcuately inserted, not or barely decurrent, obliquely ovate, more or less rigid, 870–1000 $\times$ 750–1050  $\mu$ m. Midleaf cells subisodiametric to oblong, 25.0–37.5 $\times$ 22.5–30.0  $\mu$ m, thin-walled, trigones moderate in size, convex, cuticle distinctly papillose; cells along leaf margin 25.0–37.5  $\mu$ m, subequally thickened, trigones moderate in size, concave, cuticle papillose-verrucose (rarely with large verrucae along margin). Dioicous. Perianth irregularly conical, 5-pluriplicate, gradually narrowed to the mouth, hidden within bracts or exerted for 1/3–1/2 of its length, perianth cells moderately differ from leaf cells; perigynium ca. 1/2–2/3 of perianth length, with 1(2) pairs of bracts; female bracts shallowly retuse at the apex, similar to leaves, but wider, long decurrent dorsally. (Fig. 13: 3–10).

**37) *Jungermannia riparia* Tayl. var. *major* Gottsche et Rabenh., Hepaticae Europeae, No. 276**

**Lectotypus** (designated by Váňa 1973): Germany. Bruggen. U. Geheeb G00114367.

**Accepted name:** *Jungermannia atrovirens* Dumort., Syll. Jungerm. Europ. 51. 1831.

**Comment.** Váňa (1973) synonymized it with *J. atrovirens* Dumort. s. str. mod. *viridis-leptoderma-laxifolia*, which I fully accept.

**38) *Jungermannia rupicola* Amakawa, J. Hattori Bot. Lab. 22: 23. 1960.**

**Isotypus:** Japan. Kyushu, Miyazaki Pref. 2.IV.1953. T. Amakawa (Hepaticae Japonicae Exsiccatae. Ser. 12. No. 572) G00115163.

**Accepted name:** *Plectocolea rupicola* (Amakawa) Bakalin, Arctoa 18: 26. 2009.

**Description.** Plants ascending to erect, in rather loose patches, brownish-purplish to brown-purple in upper parts of shoots, more or less rigid, 2.5–3.5 mm wide and 10–18 mm long. Stem not branched, 225–275  $\mu$ m in diameter, brownish. Rhizoids purple to colorless in the most cases forming clear fascicle decurrent down the stem, rarely (near branch base) erect spreading and separated (not in the fascicle). Leaves rigid, canaliculate to concave-canaliculate, obliquely (ca. 45–50° with axis) inserted, dorsally become very obliquely inserted, decurrent for 1/4–1/3 of stem width, ventrally arcuately inserted, not or barely decurrent, sometimes (in area of shoot adjacent to the perianth) undulate at margin, obliquely ovate, 1600–1750 $\times$ 1600–1750  $\mu$ m (1:1). Midleaf cells subisodiametric to oblong, (18.5)25.0–

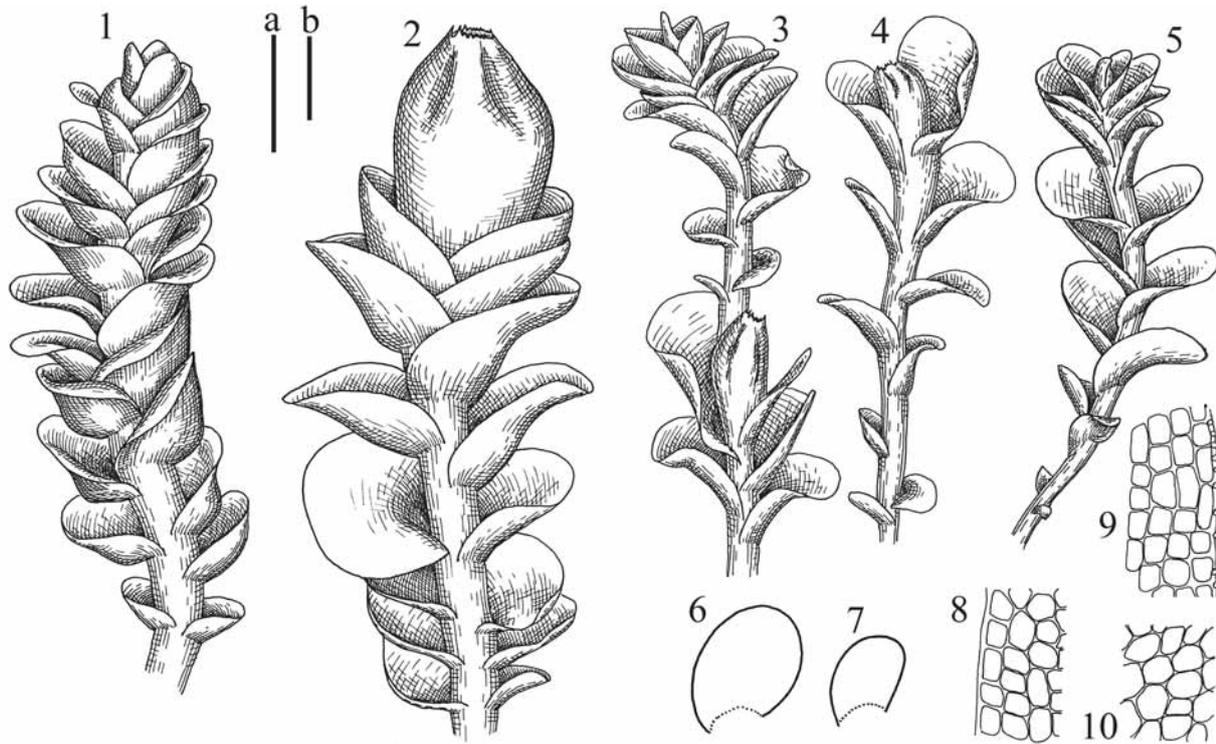


Fig. 13. *Jungermannia pyriflora* Steph., holotype (G530/00067158): 1 – male plant; 2 – perianthous plant; *Jungermannia renauldii* Steph., holotype (G14303/00045333): 3, 4 – perianthous plants; 5 – plant habit; 6, 7 – leaves; 8, 9 – cells along leaf margin; 10 – midleaf cells; Scales: a – 1 mm, for 3–7; b – 100 µm, for 8–10; a – 500 µm, for 1, 2.

37.5×22.5–31.5 µm, thin-walled, trigones moderate, convex, cuticle smooth; cells along leaf margin 18.5–23.0 µm, thin-walled, with moderate to large in size, convex trigones, external wall thickened, cuticle smooth; cuticle in basal part of the leaf striolate. Dioicous. Perianth pluriplicate (mostly with 5–6 main plicae), purple in color, loosely turbinate at the mouth, exerted for 1/2–2/5 of its length, conical, ca. 1.7×0.9 mm; perigynium ca. 1/3 of perianth length or smaller; female bracts closely sheathing the perianth in lower 1/2–2/3 of their length and erect spreading above. (Fig. 14: 1–4).

**Comment.** Váňa (1975c) synonymized *Jungermannia rupicola* (= *Plectocolea rupicola* (Amakawa) Bakalin) with *J. rosulans* (= *Plectocolea rosulans* (Steph.) S. Hatt.), however later Váňa & Long (2009) treated both species separately, as *Solenostoma rupicola* (Amakawa) Váňa et D.G. Long and *S. rosulans* (Steph.) Váňa et D.G. Long respectively without discussion on their status. In my opinion two taxa are different due to the following reasons: *P. rupicola* is characterized by common presence of purple to purplish coloration, erect growth form and subtransversely inserted and oriented leaves, whereas *P. rosulans* nearly totally lacks purplish or reddish pigmentation, and has obliquely inserted and very obliquely oriented leaves.

**39) *Jungermannia rufiflora* Col.**, Trans. Proc. New Zealand Institute 18: 237. 1886.

**Isotypus:** New Zealand. Waipawa Co. (No. 1361) G14441/00115161.

**Accepted name:** *Solenostoma rufiflorum* (Colenso) J. Engel, Novon 17: 312. 2007.

**Description.** Plants ascending to erect, in dense patches, brownish to yellowish-brownish, marked with red or purple at the tips (especially in upper half of perianth), 0.5–1.0 mm wide and 3–5 mm long. Rhizoids sparse to common, mostly erect spreading, sometimes in unclear fascicles, colorless to grayish. Stem 100–170 µm in diameter, not branched, brownish. Leaves concave, contiguous to imbricate, subtransversely inserted, dorsally shortly decurrent, ventrally arcuately inserted, not or barely or up to 1/2 of stem width decurrent, 650–1000×750–1050 µm, suborbicular to ovate-orbicular. Midleaf cells isodiametric to shortly oblong, 27.5–37.5×22.0–31.5 µm, thin-walled, with moderate in size, mostly convex trigones, cuticle smooth; cells along leaf margin 21.0–27.5 µm, thin-walled, with large, convex trigones, external wall noticeable thickened, cuticle smooth. Paroicous? (I did not see androecia, but 2–3 pairs of leaves below female bracts characteristically inflated near their bases) Perianth terminal, (4)5-plicate in upper 2/3, gradually narrowed to the not beaked mouth, exerted for 2/3 of its length; female bracts concave, sheathing the perianth in lower part. (Fig. 14: 5, 6).

**Comment.** The taxon was synonymized by Váňa (1975a) with *Jungermannia inundata* Hook. f. et Tayl. Engel & Glenn (2008) did not confirm this and provided arguments in favor of treating these taxa separately (on species level) and I fully agree with them.

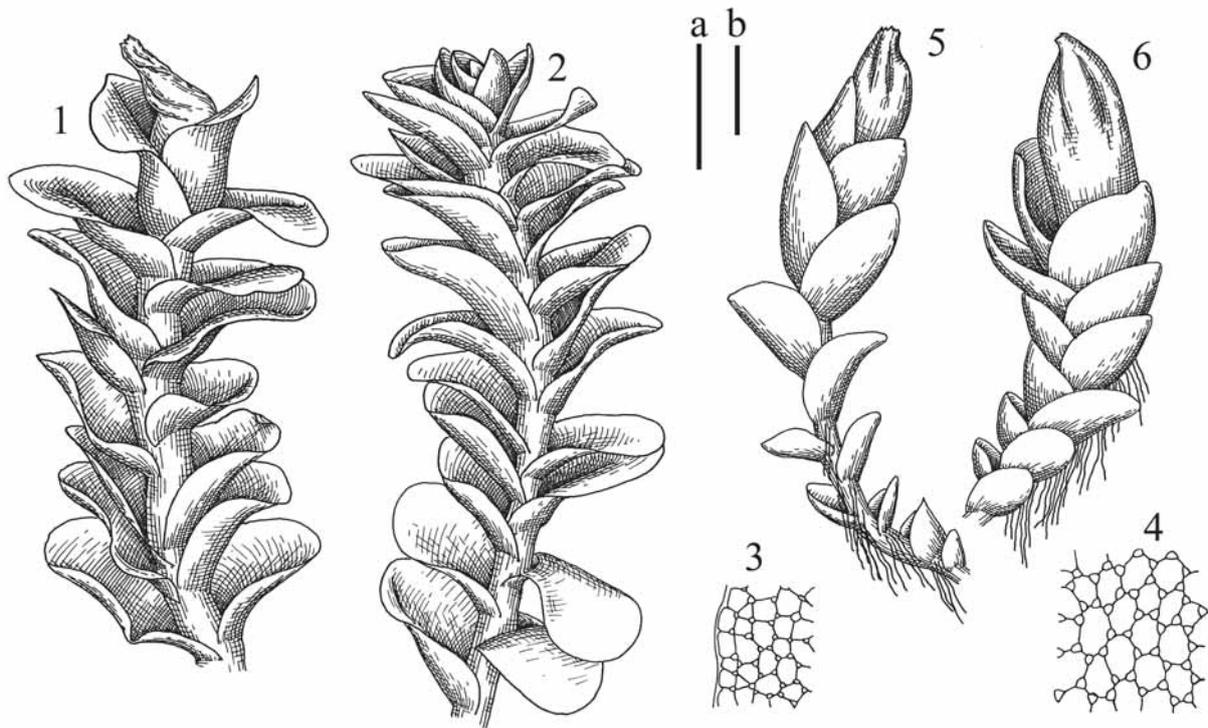


Fig. 14. *Jungermannia rupicola* Amakawa, isotype (G00115163): 1 – perianthous plant; 2 – plant habit; 3 – cells along leaf margin; 4 – midleaf cells; *Jungermannia rufiflora* Col., isotype (G14441/00115161): 5, 6 – perianthous plants. Scales: a – 1 mm, for 1, 2, 5, 6; b – 100  $\mu$ m, for 3, 4.

**40) *Jungermannia schauliana*** Steph., Sp. Hepat. 6: 90. 1917. (= *Aplozia schauliana* Schiffn. in litt.).

**Lectotypus** (selected by Amakawa, 1967): India. Sikkim. 2200 m a.s.l. 1.I.1900 Decoly et Schaul G674/00067151.

**Accepted name:** *Solenostoma schaulianum* (Steph.) Vána & D.G. Long, Nova Hedwigia 89: 508. 2009.

**Description.** Plants prostrate to obscurely ascending, greenish to greenish-brownish, loosely attached by rhizoids to the substratum, 3.0–3.5 mm wide and 7–12 mm long, forming loose patches, plants dorsiventrally flattened. Stem 200–275  $\mu$ m in diameter, straight to obviously flexuous, not branched, brownish. Rhizoids common, rigid, brownish, originated mostly near ventral leaf base (but not only there), obliquely spreading, separated or united into unclear fascicles, or sometimes obliquely spreading upward to the shoot apex. Leaves contiguous (partly overlapping one to another), very obliquely inserted and oriented, dorsally decurrent for 1/5–1/3 of stem width, ventrally subtransversely to arcuately inserted, not or barely decurrent, slightly concave to slightly canalliculate-concave, ovate to elliptic, 750–1600 $\times$ 700–1500  $\mu$ m. Midleaf cells subsodiametric to shortly oblong, 36.0–56.5 $\times$ 26.0–44.0  $\mu$ m, thin-walled, trigones moderate in size, convex, cuticle virtually smooth; cells along leaf margin 25.0–36.2  $\mu$ m, thin-walled, with thickened external wall, trigones moderate to large, convex, cuticle smooth. Dioicous? Perianth shortly fusiform to clavate, ca. 1400 $\times$ 750  $\mu$ m, 3-plicate (plicae not acute) in upper

half, gradually narrowed in upper 2/5 to not beaked mouth, composed by subsodiametric cells, bistratose in lower 1/3. Spores finely papillose, 12.5–14.0  $\mu$ m in diameter. Elaters bispiral, ca. 113 $\times$ 8  $\mu$ m, with homogeneous ends 19–25  $\mu$ m. (Fig. 15: 1–8).

**Comment.** Three specimens are present in G, one of them containing more material was selected as lectotype by Amakawa (1967). Other syntypes are the following: 1) G675/00067153, only a few plants are present, some of them more deeply brownish colored along leaf margin near shoot apices; 2) G23992/00067152 contains mostly *Scapania*, *Cephalozia*, *Solenostoma appressifolium* and only a few plants of *S. schaulianum*.

**41) *Jungermannia sexplicata*** Steph., Sp. Hepat. 6: 91. 1917.

**Holotypus:** Hawaii. 1500 ft. Newell (No. 165). G14305/00067150.

**Accepted name:** *Plectocolea sexplicata* (Steph.) Bakalin *comb. nov.* (*Plectocolea sexplicata* (Steph.) Mill. in litt.) Basionym: *Jungermannia sexplicata* Steph., Sp. Hepat. 6: 91. 1917.

**Description.** Plants creeping to loosely ascending, in loose patches, greenish-brownish to brownish-yellowish, loosely attached by rhizoids to the substratum, 1.0–1.25(1.4) mm wide, 4–8 mm long. Stem 150–200  $\mu$ m in diameter, slightly flexuous, not branched, with the exception of ventral subfloral innovations (becoming into normal branch and after 3–4 mm produce perianth again). Rhizoids numerous, originated from ventral side of stem,

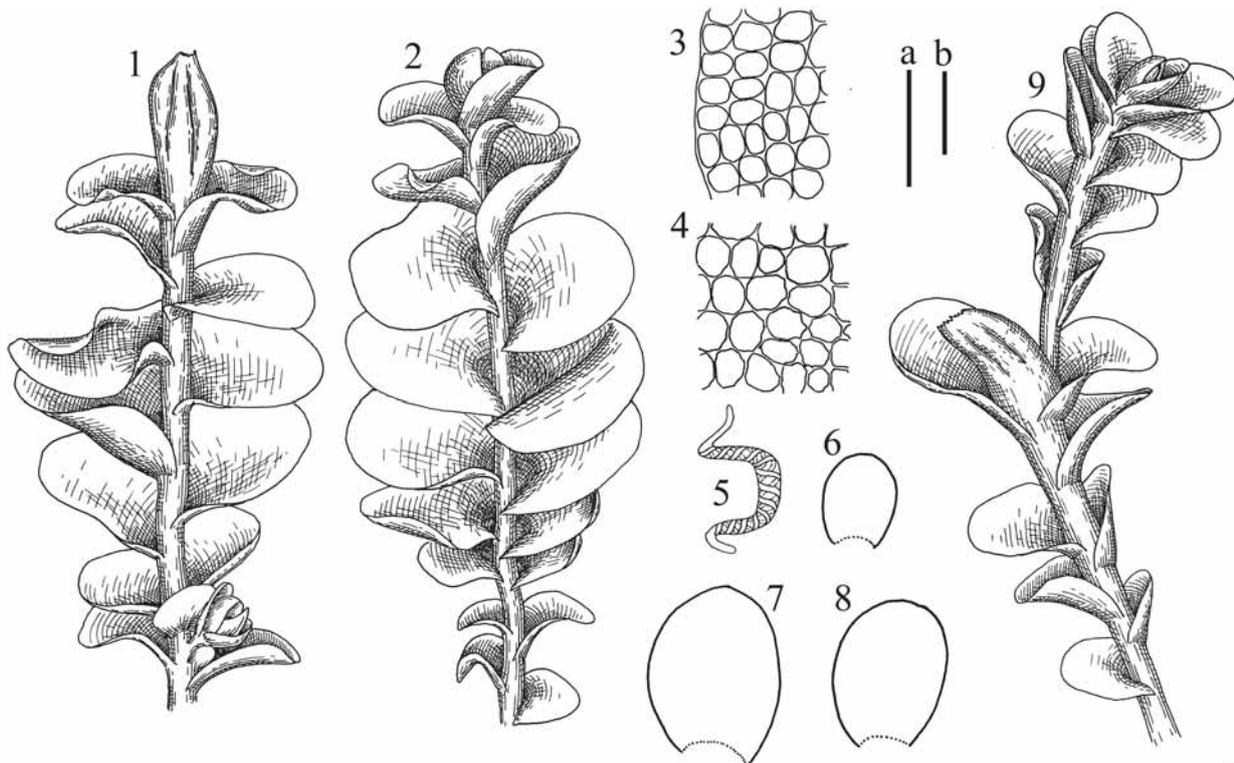


Fig. 15. *Jungermannia schauliana* Steph., lectotype (G674/00067151): 1 – perianthous plant; 2 – plant habit; 3 – cells along leaf margin; 4 – midleaf cells, 5 – elater; 6–8 – leaves; *Jungermannia sexplicata* Steph., holotype (G14305/00067150): 9 – perianthous plant. Scales: a – 1 mm, for 1, 2, 6–8; b – 100  $\mu$ m, for 3, 4; a – 590  $\mu$ m, for 9; b – 50  $\mu$ m, for 5.

colorless to brownish, obliquely spreading or decurrent down the stem, but not forming distinct fascicle. Leaves obliquely to very obliquely inserted, dorsally not or barely decurrent, ventrally subtransversely to arcuately inserted, not or barely decurrent, slightly concave to loosely concave-caniculate, obliquely to (rarely) erect spreading, obliquely ovate to obliquely lingulate, rarely emarginated at apex, 500–800 $\times$ 475–800  $\mu$ m. Midleaf cells subsisodiametric to shortly oblong, 37.5–56.5 $\times$ 31.0–50.0  $\mu$ m, thin-walled, trigones moderate, slightly concave or slightly convex, cuticle smooth; cells along leaf margin 22.5–50.0  $\mu$ m, thin-walled, external wall thickened, trigones moderate to large, rarely confluent in tangential wall; cuticle smooth. Gemmae rarely occur, unicellular, spherical, 20–30  $\mu$ m in diameter. Dioicous? Perianth conical to (rarely, probably with unfertilized archegonia only) fusiform, 3-plicate (sometimes with many additional plicae), ca. 900 $\times$ 450  $\mu$ m; perigynium vestigial or up to 1/4(1/3) of perianth length; female bracts similar to leaves, loosely sheathing perianth in lower 1/3–1/2 and obliquely spreading above. (Fig. 15: 9).

**Comment.** *Jungermannia sexplicata* Steph. (= *Plectocolea sexplicata* (Steph.) Bakalin) was synonymized with *J. micrantha* (Mitt.) Steph. (= *Plectocolea micrantha* Mitt.) by Váňa (1975b) as a probable shaded form characterized by green color, etiolate small plants with distant leaves and gemmae(!) production. I cannot agree with this statement. By appearance, even sterile plants easily differ from both *Plectocolea micrantha* Mitten and

*Plectocolea mauii* (Aust.) Mill. by creeping growth, pale color, low perigynium and absence of purplish coloration in the rhizoids. That appearance cannot be recognized as “eine Schattenform” (Váňa, 1975b: 361) due to well developed trigones in leaf lamina cells and thickened cell walls along leaf margin. Also taking into account the ability of *Plectocolea sexplicata* to produce gemmae (supposedly not present in well developed shoots of the same species, Váňa, 1975b), I think the position of *P. sexplicata* should be in the group *Plectocolea truncata* – *P. rubripunctata*, but not in the group *P. micrantha* – *P. mauii* characterized by purple to purplish rigid rhizoids, bright color and absence of gemmae.

**42) *Jungermannia sikkimensis* Steph., Sp. Hepat. 6: 92. 1917. (= *Nardia sikkimensis* Schiffn. in litt., 1902).**

*Neotypus nov.\**: India. West Bengal, Kurseong. 610 m alt. 22.XI.1899 Decoly et Schaul G548/00115079.

\* Stephani (1917) cites “Sikkim”, but data on the label of the only specimen in G is different, Kurseong in West Bengal. The same was stressed by Váňa & Long (2009). Váňa in litt. recognized this specimen as isotype, however, the species description is based on this specimen, but not on the specimen in V. Schiffner collection in FH, because Stephani prepared descriptions basing on material of his collection, but not on duplicates in other herbaria. Most probably, the cited specimen is the one upon which the Stephani description of *Jungermannia sikkimensis* has been done. The disagreement between

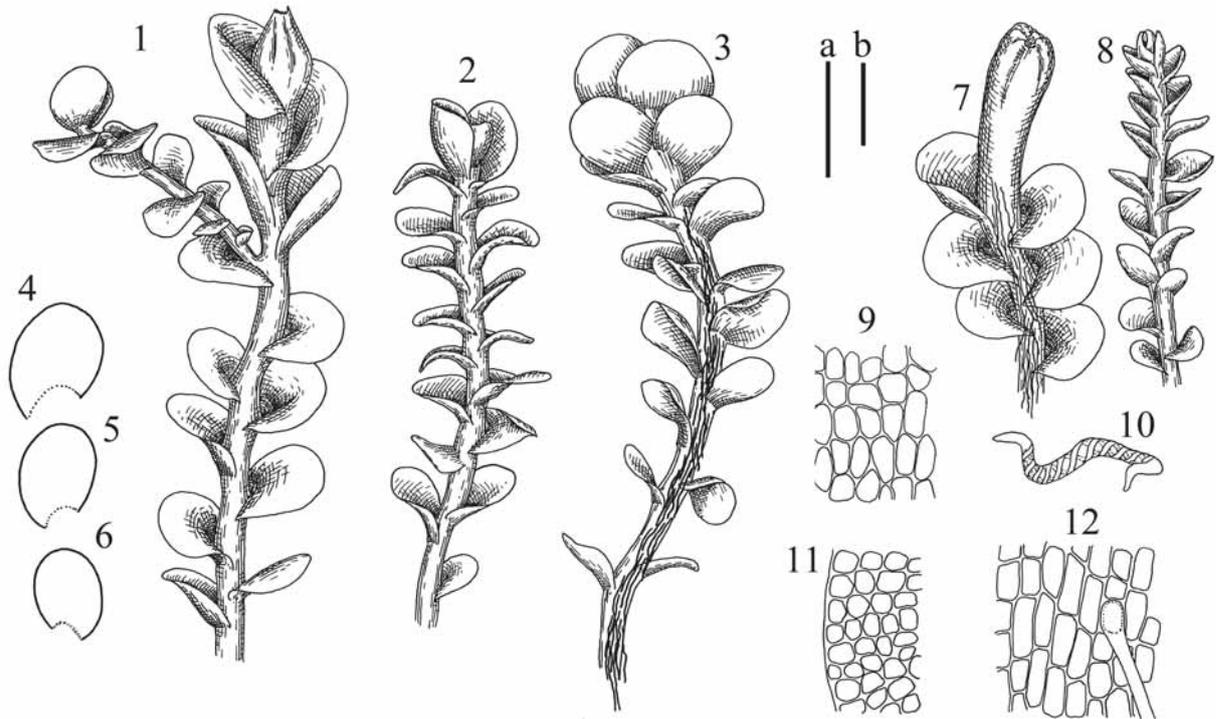


Fig. 16. *Jungermannia sikkimensis* Steph., neotype (G548/00115079): 1 – perianthous plant; 2 – plant habit; 3 – plant habit, ventral view; 4–6 – leaves; *Jungermannia simplicissima* Steph., holotype (G14488/00067149): 7 – upper part of perianthous plant; 8 – plant habit; 9 – midleaf cells; 10 – elater; 11 – cells along leaf margin; 12 – rhizogenous cells in the leaf. Scales: a – 1 mm, for 1–8; b – 100  $\mu$ m, for 9, 11, 12; b – 50  $\mu$ m, for 10.

the label and the protologue seems to be caused by error, which, however, I cannot explain. Therefore I propose this specimen to be the neotype, not the holotype or isotype.

*Accepted name:* *Plectocolea sikkimensis* (Steph.) Bakalin comb. nov. Basionym: *Jungermannia sikkimensis* Steph., Sp. Hepat. 6: 92. 1917.

*Description.* Plants ascending to erect, in loose patches, brownish-green, without red or purple pigmentation, 1.25–2.5 mm wide and 10–15 mm long. Stem 225–375  $\mu$ m in diameter, slightly flexuous, not branched, with the exception of subfloral lateral innovations (very common, 1–2 per perianth). Rhizoids numerous, originated mostly near ventral leaf base, but not only there, decurrent down along the stem and forming distinct fascicle, colorless to grayish. Leaves obliquely to (larger plants) erect spreading, contiguous to rather distant, concave to concave-canaliculate, commonly with recurved (mostly slightly) dorsal margin, subtransversely to transversely inserted, dorsally shortly or up to 1/2 of stem width decurrent, ventrally arcuately inserted, variously, but not longer than 1.0 stem width decurrent, obliquely ovate to orbicular, 700–960 $\times$ 750–1100  $\mu$ m. Midleaf cells 37.5–56.5 $\times$ 27.5–37.5  $\mu$ m, thin-walled, trigones moderate to large, cuticle loosely papillose; cells along leaf margin 20.0–27.5  $\mu$ m, mostly thin-walled, rarely unequally thickened, trigones large, sometimes confluent in tangential wall, external wall thickened, cuticle slightly verrucose. Dioicous? Perianth conical, pluripliate (mostly with 4–5 main plicae), ca. 1000 $\times$ 750  $\mu$ m, hidden within bracts

or exerted for 1/3–1/2 of its length; perigynium 2/2–3/2 of perianth length, strongly rhizogenous (sometimes even dorsally!); female bracts similar to leaves or rarely re-tuse at apex. (Fig. 16: 1–6).

*Comment.* Váňa et al. (2013) synonymized recently described *Plectocolea yunnanensis* Bakalin (Bakalin, 2013) with *P. sikkimensis*, stating that the former species is fully identical with *Solenostoma sikkimensis* (Schiffn. ex Steph.) Váňa et D.G. Long. *Plectocolea yunnanensis* however differs from *P. sikkimensis* in: 1) plant coloration (brownish-green versus pale greenish to greenish-yellowish, despite the fact that the type of *P. sikkimensis* is much older than *P. yunnanensis* and might be much paler colored due to age), 2) short perigynium (less than 1/2 of the perianth length versus higher than perianth length), 3) obliquely versus subtransversely to transversely inserted leaves, 4) obscurely thickened leaf cell walls versus uniformly thin (despite the fact trigones in the former are mostly small, but large in the latter). Differences in even part of these characters separate many species pairs in *Plectocolea*, e.g., *Plectocolea subelliptica* (Lindb ex Heeg.) A. Evans and *P. obovata* (Nees) Mitt., or other recognized by Váňa as discrete taxa, such pairs as *Jungermannia hokkaidensis* Váňa and *J. subtilissima* (Schiffn.) Grolle, *Solenostoma ovalifolium* (Amak.) Váňa and *S. obscurum* (A. Evans) R.M. Schust. and many others.

43) *Jungermannia simplicissima* Steph., Kungl. Svensk. Vetensk. Handl. 46(9): 17 1911.

Holotypus: Chili. Chiloe 1908. Halle et Skottsberg G14488/00067149.

Accepted name: ?*Solenostoma crassulum* (Nees et Mont.) Steph.

Description. Plants erect in dense patches to ascending, greenish-yellowish to brownish-greenish, sterile 0.75–1.0 mm wide, female up to 2.0 mm wide, 4–8 mm long. Rhizoids rare, absent in the most of sterile plants, rarely present, obliquely spreading or decurrent down the stem in unclear fascicle, in female plants rhizoids common, brownish, decurrent down the stem in distinct fascicle in dorsal side of stem. Stem 125–175 µm in diameter, not branched, with the exception of rare subfloral lateral innovations (1–2 per perianth), yellowish-brownish, straight. Leaves transversely to subtransversely inserted (obliquely in female plants), barely or up to 1/5 of stem width decurrent dorsally and arcuately inserted and up to 1/2 of stem width decurrent ventrally, concave to canaliculate-concave, obliquely to erect spreading, elliptic (smaller) to suborbicular (larger), 500–800×500–950 µm. Midleaf cells oblong, 25.0–45.0×12.5–25.0 µm, thin-walled, trigones moderate in size, slightly convex, cuticle papillose; cells along leaf margin 25.0–27.5 µm, thin-walled, with thickened external wall, trigones moderate, convex. Dioicous. Perianth fusiform to (rarely) clavate, loosely 3–4 plicate near mouth, gradually narrowed to not beaked mouth, ca. 2200×500 µm, composed by subsodiametric cells, bis-tratose and rhizogenous in lower 1/3; perigynium virtually absent; bracts similar to larger leaves. Spores rusty brown, finely papillose, ca. 12.5 µm in diameter. Elaters bispiral, ca. 125×7 µm, with long (ca. 18–23 µm) homogenous ends. (Fig. 16: 7–12).

Comments. a) Váňa (1974a) treated *Jungermannia simplicissima* as synonymous with *J. crassula* Nees et Mont (= *Solenostoma crassulum* (Nees et Mont.) Steph.), although noted that at the first sight it seems an independent species due to ascending stem, distant leaves and clavate to fusiform perianth, but further studies revealed transitional forms to the typical *S. crassula*. By now and very preliminary I agree with Váňa's (l.c.) statement, but this question needs further studies involving more material.

b) Female plants are characterized by noticeable interesting rhizoid distribution, a feature rarely occurring in some species of *Solenostoma*. The rhizoids are decurrent down not by ventral side of stem, but along the dorsal side, that is very unique in prostrate to ascending growth form of these plants (not erect where probably "no difference for rhizoids" between ventral and dorsal sides is observed).

44) *Jungermannia spongiosa* Steph., Sp. Hepat. 6: 92. 1917.

Lectotypus nov.: Japan. 1907. Jishiba. G16632/00120740.

Accepted name: *Plectocolea spongiosa* (Steph.) S. Hatt., Bull. Tokyo Sci. Mus. 11: 38. 1944.

Description. Plants prostrate to ascending, (1.5)2.0–3.5 µm wide, 10–20 mm long, in loose patches, pallid,

pale yellowish-brownish to whitish-brownish, more deeply (brownish to almost brown, rarely reddish-brownish) colored at leaf margins in upper part of shoot. Stem 250–375 (wider near perianth) µm in diameter, slightly flexuous, not branched, with the exception of ventral and lateral subfloral innovations (1–2 per perianth), becoming into normal branch. Rhizoids sparse, colorless to brownish, obliquely spreading (separated or in indistinct fascicles) or decurrent down the stem, but not forming distinct fascicle. Leaves contiguous, loosely concave-canaliculate, slightly undulate at the margin, or margin flat, obliquely spreading or loosely laterally appressed to the stem, suborbicular to widely ovate, 1500–2000×1600–2100 µm, obliquely inserted, dorsally barely (smaller) or up to 1/2 (larger) of stem width decurrent, ventrally arcuately inserted, not or barely decurrent. Midleaf cells oblong to subsodiametric, 62.5–94.0×37.5–50.0 µm, thin-walled, trigones moderate to small, convex, cuticle distinctly papillose; leaf cells along margin 31.1–50.0 µm, thin-walled, trigones moderate to small, convex to concave, external wall slightly thickened, cuticle papillose. Dioicous. Perianth hidden within bracts (bracts ca. 1.5–2.0 times longer than perianth), conical, pluri-plicate, not turbinate at the mouth, 1000×500 µm, composed by elongated cells; perigynium ca. 1/2 of perianth length; bracts undulate and sometimes loosely crispate at margin. (Fig. 17: 1–4).

Comments. a) There are two syntypes with the same label in G. The selected lectotype has better preserved plants and fits well the original description. The second syntype (G00120750) also belongs to the same species.

b) Amakawa (1960) treated this name as synonymous with *J. torticalyx* Steph. (= *Plectocolea torticalyx* (Steph.) S. Hatt.). I cannot agree with this. Both taxa differ in coloration (pale in *P. spongiosa* and deep in *P. torticalyx*), rhizoid coloration (mostly purple and rigid in *P. torticalyx* and soft and colorless to brownish in *P. spongiosa*) and perigynium height (more than perianth length in *P. torticalyx* and 1/2 of perianth length in *P. spongiosa*). Note that Amakawa (1960) indicated perigynium length for *J. torticalyx* as 1/2 of perianth length, but the drawn perigynium (fig. 16 in l.c.) exceeded the whole perianth length. The drawings well agreed with the type of *J. torticalyx* (see below).

c) In my opinion, *P. spongiosa* is most closely related to *P. grossitexta* (Steph.) S. Hatt., being different from the latter in larger leaves and leaf cells, as well as leaves wider than long. The relationships between both species need further consideration.

d) In the original description (Stephani, 1917), the perianth size is 7.5×2.5 mm, that is unimaginable, the real size is just 1.0×0.5 mm.

e) Another specimen of *Jungermannia spongiosa* (G16631/00120750) contains plants with olive brownish to blackish-greenish, and probably collected in water. Other parameters are similar to the lectotype.

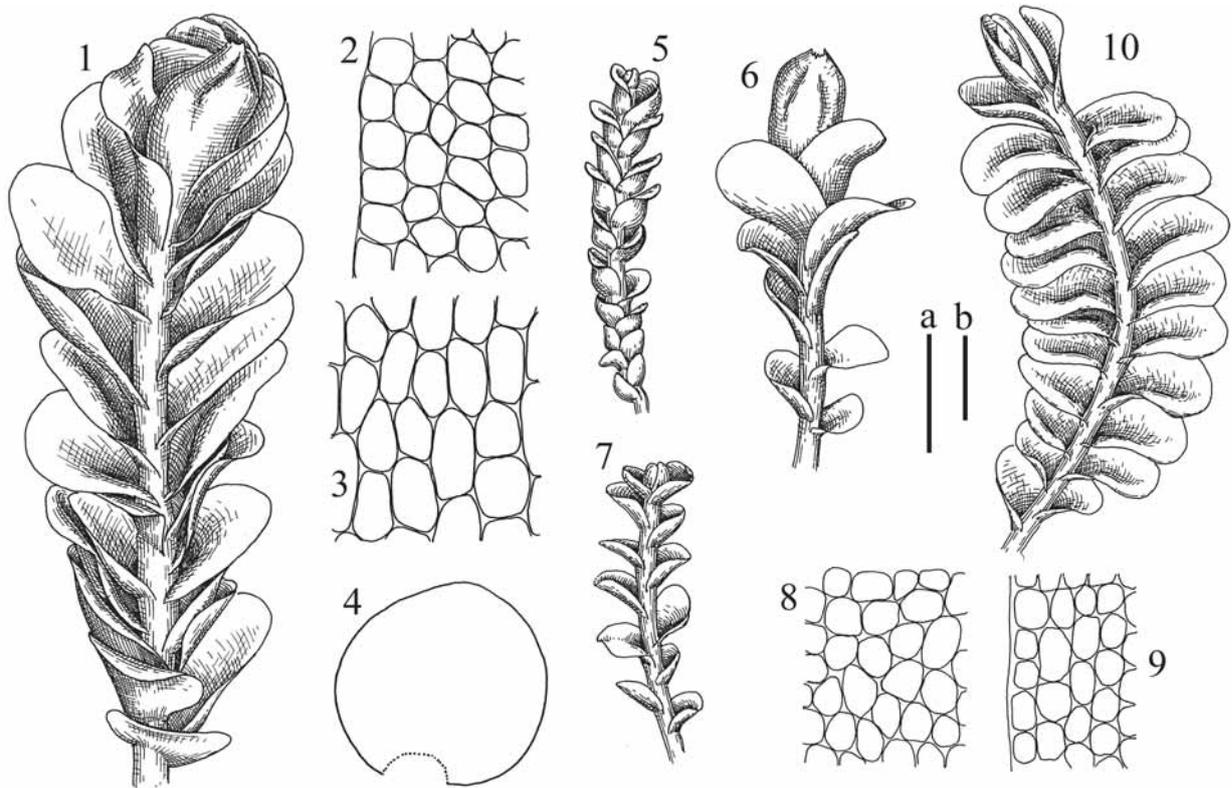


Fig. 17. *Jungermannia spongiosa* Steph., lectotype (G16632/00120740): 1 – perianthous plant; 2 – cells along leaf margin; 3 – midleaf cells, 4 – leaf; *Jungermannia subrubra* Steph., holotype (G677/115433): 5 – male plant; 6 – perianthous plant; 7 – plant habit; 8 – midleaf cells; 9 – cells along leaf margin; *Jungermannia stevensiana* Steph., holotype (G 644/00115332): 10 – plant habit. Scales: a – 1 mm, for 1, 4–7, 10; b – 100  $\mu$ m, for 2, 3, 8, 9.

**45) *Jungermannia stevensiana* Steph., Sp. Hepat. 6: 93. 1917.**

**Holotypus:** India. Sikkim (Darjeeling) 1895. Stevens (No. 24)G 644/00115332.

**Accepted name:** *Plectocolea comata* (Nees) S. Hatt., Bull. Tokyo Sci. Museum 11: 38. 1944.

**Comment.** This name was synonymized with *Jungermannia comata* Nees (= *Plectocolea comata* (Nees) S. Hatt.) by Vána (1972b), with whom I agree in full. (Fig. 17: 10)

**46) *Jungermannia subrubra* Steph., Sp. Hepat. 6: 93. 1917. (= *Nardia subrubra* Schiffn. *in litt.*).**

**Holotypus:** India. Sikkim. 2195 m a.s.l. 19.X.1899 Decoly et Schaul G677/115433 (In Sp. Hepat. 1917, W. Gollan mistakenly indicated as collector).

**Accepted name:** *Solenostoma subrubrum* (Stephani) Vána & D.G. Long, Nova Hedwigia 89: 508. 2009.

**Description.** Plants erect, greenish-brownish to pale brownish with purplish to violet tint near the perianth base and in its upper part (but not between these parts), 0.9–2.0  $\mu$ m wide, 5–10 mm long. Stem 100–225  $\mu$ m in diameter, brownish, not branched. Rhizoids numerous, brownish to pale purplish-brownish, decurrent down the stem and mostly forming clear fascicle, originated from ventral side of stem. Leaves obliquely to (rarer) erect spreading, concave-canaliculate, sometimes recurved away from the apex,

contiguous to subimbricate, subtransversely inserted, dorsally decurrent for 1/2–2/3 of stem width, ventrally subtransversely to arcuately inserted, not or up to 1/2 of stem width decurrent, loosely undulate along margin, rounded to ovate, 550–1250 $\times$ 600–1150  $\mu$ m. Midleaf cells subisodiametric to oblong, 32.5–56.5 $\times$ 32.5–40.0  $\mu$ m, thin-walled, trigones moderate in size, convex, cuticle smooth, cells along leaf margin 27.5–44.0  $\mu$ m, mostly thin-walled, with slightly thickened external wall, trigones moderate in size to large, sometimes confluent in tangential walls, cuticle smooth. Dioicous. Androecia intercalary (although sometimes branch depauperate and die out after them), with 3–4 pairs of bracts, bracts strongly inflate in lower 1/3 and recurved in upper 1/4. Perianth subclavate, (3)4-plicate in upper half, gradually to suddenly contracted to not beaked mouth, composed by subsisodiametric to shortly oblong cells; perigynium vestigial or up to 1/6 of perianth length; female bracts similar to leaves, concave-canaliculate, recurved from the perianth in upper 1/3 and sheathing perianth in lower third. (Fig. 17: 5–9).

**47) *Jungermannia tenerrima* Steph., Sp. Hepat. 6: 93. 1917.**

**Holotypus:** India. Missouri, Respana Valley. IX.1900 W. Gollan G645/00067148.

**Accepted name:** *Plectocolea gollanii* (Steph.) Bakalin, Arctoa 23: 101. 2014.

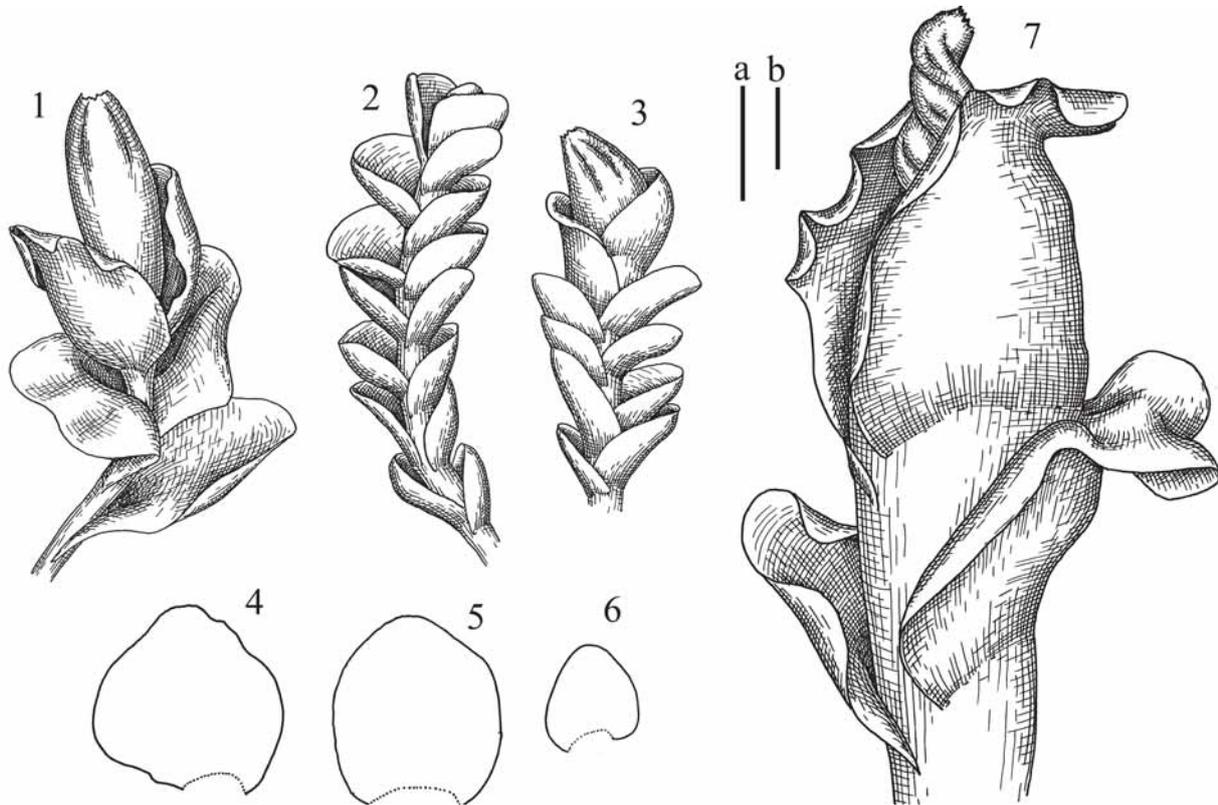


Fig. 18. *Jungermannia tenerrima* Steph., holotype (G645/00067148): 1 – perianthous plant; *Jungermannia thermarum* Steph., neotype (G00067147): 2 – plant habit, 3 – perianthous plant; *Jungermannia torticalyx* Steph., holotype (G16633/00067146): 4–6 leaves; 7 – upper part of perianthous plant. Scales: a – 1 mm, for 1–6; a – 500  $\mu$ m, for 7.

**Comment.** Váňa (1972a) synonymized *J. tenerrima* with *J. gollanii* Steph. (= *Plectocolea gollanii* (Steph.) Bakalin). I also do not see the differences from *P. gollanii*. Very characteristic is the perianth shape with wide mouth that is identical with *P. gollanii* and not present in other species of the genus (perianth middle cells 75.0–112.5 $\times$ 18.8–25.0  $\mu$ m, thin-walled, with vestigial to wanting trigones, bistratose in lower 1/3(1/2) of the length). Perianth features also confirm position of the species in *Plectocolea*, but not in *Jungermannia* s. str. (see discussion under *P. gollanii*). (Fig. 18: 1).

**48) *Jungermannia thermarum* Steph., Sp. Hepat. 2: 77. 1901.**

**Neotypus novus:** Japan. Hakkoda. Eaux thermals. U. Faurie (No. 12791) G00067147.

**Accepted name:** *Plectocolea vulcanicola* (Schiffn.) Bakalin comb. nov. Basionym: *Nardia vulcanicola* Schiffn., Denkschr. Akad. Wiss. Wien, Kl. Math.-Naturw. 67: 191. 1899.

**Description.** Plants blackish to brownish black, pellucid, rather erect to (rarer) ascending, in loose patches, 1.5–2.0 mm wide and 8–15 mm long, no red or purple pigmentation. Stem 250–300  $\mu$ m in diameter, blackish-brown, not branched. Rhizoids sparse, obliquely to erect spreading, rarely forming the mat at the ventral side of the stem, colorless to grayish. Leaves obliquely inserted (35–45° with axis), concave to canaliculate-concave, dorsally shortly or

up to 1/4 of stem width decurrent, ventrally arcuately inserted, not or shortly (less than 1/5 of stem width) decurrent, transversely elliptic to suborbicular, ca. 1000 $\times$ 1400  $\mu$ m. Midleaf cells oblong, 50.0–87.5 $\times$ 25.0–47.5  $\mu$ m, thin-walled, walls brownish, trigones small, concave, cuticle smooth; leaf cells along margin 31.5–75.0  $\mu$ m, thin-walled, with external wall obscurely thickened, trigones small to moderate in size, convex to concave, cuticle virtually smooth. Dioicous. Perianth pluriplicate, with 5 main plicae, conical, ca. 1000 $\times$ 700  $\mu$ m, not turbinate at mouth, commonly with 1–2 subfloral innovations, composed by strongly elongated cells. Perigynium well-developed, 1/2–2/2 of perianth length; female bracts in 2 pairs on perigynium, similar to leaves, but wider, concave. (Fig. 18: 2, 3).

**Comments.** a) Original description (Stephani, 1901) cites *locus classicus* as “Sikayu (Faurie)”, that probably means Sikayu Hot Spring in Akita Prefecture. That specimens could not be located in G, but only one from Hakkoda (Aomori Prefecture of Japan), also collected by U. Faurie was found. Since the specimen fits well into original description of *Jungermannia thermarum*, I suggest to designate it as neotype. It is worth noting that Amakawa (1960) cites *locus classicus* also as Hakkoda Mt. in Aomori Prefecture, despite the discrepancy with original description of collecting place in Stephani (1901).

b) Váňa (1974d) argued the synonymy of *J. thermarum* with *J. vulcanicola* (Schiffn.) Steph., with which I agree.

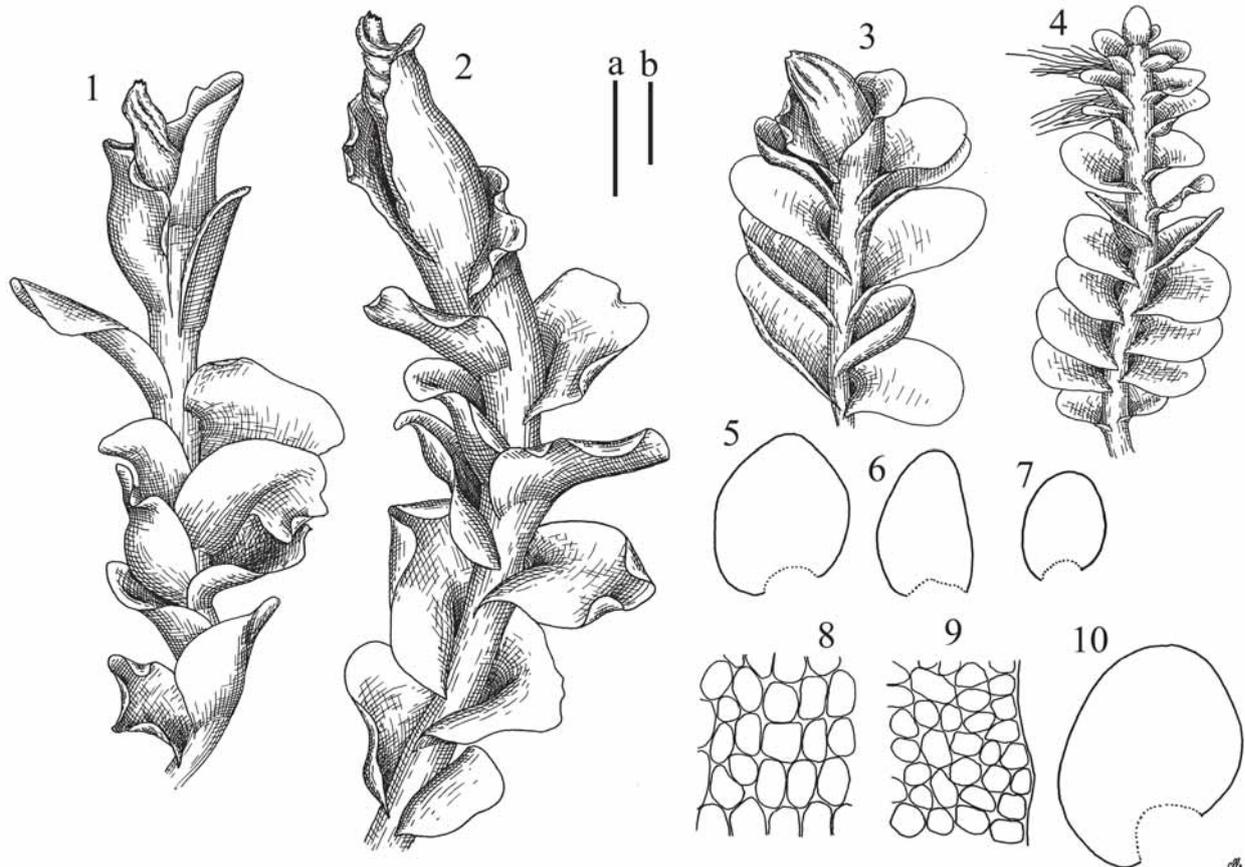


Fig. 19. *Jungermannia torticalyx* Steph., holotype (G16633/00067146): 1, 2 – perianthous plants; *Jungermannia vaginans* Steph., holotype (G16634/00067145): 3 – perianthous plant; 4 – plant habit; 5–7 – leaves; *Nardia obliquifolia* Schiffn., isotype (G14667/00115154): 8 – midleaf cells; 9 – cells along leaf margin; 10 – leaf. Scales: a – 1 mm, for 1–7; b – 125  $\mu$ m, for 8, 9; a – 1250  $\mu$ m, for 10.

c) The name “*Plectocolea vulcanicola* Schiffn.” was used many times in the Russian literature (Konstantinova et al., 1992; Konstantinova et al., 2009, etc.), but it seems that has never been validated (Schiffner never published or mentioned this name in herbarium labelling); the necessity of validation is explained by the new combination above.

**49)** *Jungermannia torticalyx* Steph., Sp. Hepat. 6: 94. 1917.

**Holotypus:** Japan. Hirafu. 1907. U. Faurie (No. 1923) G16633/00067146.

**Accepted name:** *Plectocolea torticalyx* (Steph.) S. Hatt., Bull. Tokyo Sci. Museum 11: 38. 1944.

**Description.** Plants large, erect, to ascending in loose patches, 2.0–4.0 mm wide and 8–20 mm long, greenish-brownish to brown in upper leaves margin and perianth tip, rigid. Stem brownish, 250–450  $\mu$ m in diameter (wider near perianth), loosely flexuous or straight, not branched. Rhizoids sparse to common, obliquely to erect spreading, not forming the fascicle, but sometimes united into mat, rigid, mostly purple, but some isolated colorless (mixed with purple ones). Leaves contiguous, obliquely to erect spreading, concave, commonly undulate at mar-

gin, dorsally decurrent for 1/4–1/2 of stem width, ventrally arcuately inserted, not or barely decurrent, widely ovate to widely triangular, 1000–1750 $\times$ 1000–2000  $\mu$ m (1:0.9–1.0), concave to concave-canalicate. Midleaf cells shortly oblong, 37.5–62.5 $\times$ 22.5–37.5  $\mu$ m, thin-walled, walls brownish to brownish-yellowish, trigones moderate, mostly concave, but sometimes slightly convex, cuticle smooth; cells along leaf margin 25.0–31.0  $\mu$ m, thin-walled, walls brownish yellowish or sometimes discolored, trigones moderate, convex, external wall thickened, cuticle virtually smooth. Dioicous. Perianth conical, pluri-plicate (plicae more deeply, commonly brown, colored), mostly with 4–6 main plicae, distinctly turbinate at the mouth, 1250 $\times$ 1000  $\mu$ m; perigynium well developed, 3/2–4/2 of perianth length, with 2 pairs of bracts; female bracts similar to leaves, but wider, sheathing perianth and recurved in upper 1/3, strongly undulate and shallowly crispate along margin. (Fig. 18: 4–7; 19: 1, 2)

**50)** *Jungermannia vaginans* Steph., Sp. Hepat. 6: 95. 1917.

**Holotypus:** Japan. Sendai. 27.X.1907. E. Uematsu G16634/00067145.

**Accepted name:** *Plectocolea infusca* Mitt., Trans. Linn. Soc. London, Bot. 3: 196. 1981. var. *infusca*

**Description.** Plants prostrate to ascending, closely to loosely attached plants to the substratum by rhizoids, greenish-brownish to brownish-green, 1.75–3.0 mm wide (male smaller, female larger), 5–7 mm long. Rhizoids numerous, brownish to purplish, erect to obliquely spreading in indistinct fascicles, or decurrent down the stem, but not forming distinct fascicle. Stem 225–275 µm in diameter, sometimes slightly flexuous, not branched (even as subfloral innovations). Leaves contiguous, obliquely inserted, decurrent ca. 1/2–3/2 of stem width dorsally and arcuately inserted ventrally, where not or shortly (up to 1/4 of stem width) decurrent, concave-canalicate, at middle part sometimes (larger ones) convex, obliquely ovate to obliquely ovate and obliquely lingulate, 1000–1400×850–1450 µm (1:0.8–1.1). Midleaf cells oblong, 35.0–62.5×25.0–37.5 µm, thin-walled, trigones moderate, convex, cuticle papillose; leaf cells along margin 21.0–35.0 µm, thin-walled, trigones moderate, convex, external walls thickened, cuticle virtually smooth. Dioicous. Perianth conical, pluriplicate, loosely turbinate at the mouth, composed by shortly elongated cells, 1250×750 µm, exerted for 1/3–1/2 of its length; perigynium ca. 1/3 of perianth length; female bracts similar to leaves, sheathing perianth near the base and obliquely spreading above. Androecia intercalary (although sometimes branch become depauperate or die out after androecia), with 2–3 pairs of bracts, bracts similar to leaves, but strongly inflated at lower half and with recurved margin. (Fig. 19: 3–7)

**Comment.** The plants in holotype are fully identical with *P. infusca*. The synonymization of two names was made before by Váňa (1975c), with whom I agree.

**51) *Jungermannia watsiana* Steph., Sp. Hepat. 6: 99. 1917.**

**Lectotypus** (selected by Váňa, 1975a): Australia. N–S. Wales. 24.VI.1901 R. Watts (No. 303) G14307/00067143.

**Accepted name:** *Plectocolea montana* (Steph.) Bakalin, Arctoa 23: 102. 2014.

**Description.** Plants prostrate, pallid, pellucid, pale brownish green to brownish, loosely attached to the substratum, 1.25–2.0 (up 2.5 near perianth) mm wide and 5–8 mm long, dorsiventrally flattened. Rhizoids sparse, erect spreading, colorless to purplish and purplish-brownish, originated from the stem. Stem brownish, sometimes slightly flexuous, 125–225 µm in diameter, not branched (even as subfloral innovations). Leaves contiguous to distant, very obliquely inserted, dorsally decurrent for 1/2–2/2 of stem width, ventrally transversely to arcuately inserted, not or barely decurrent, flattened to slightly convex (concave near the perianth), soft, undulate at margin, obliquely ovate, 750–1400×750–1300 µm. Midleaf cells subsodiametric to shortly oblong, 35.0–62.5×31.2–40.0 µm, thin-walled, trigones small, concave,

cuticle distinctly papillose; cells along leaf margin 25.0–34.0 µm, more or less thin-walled, with obscurely thickened external wall, trigones small, concave; cuticle obscurely verrucose-papillose. Dioicous? Perianth conical, loosely 3–pluriplicate, gradually narrowed to the mouth, composed by oblong cells, ca. 625×375 µm, exerted for 1/2–2/3 of its length; perigynium 1/2–2/3 of the perianth length, with 1 pair of bracts; female bracts similar to large leaves, but wider, loosely sheathing perianth near base and recurved in upper 1/3 of dorsal side, ventrally obliquely spreading. (Fig. 20: 1, 2)

**Comments.** a) Váňa (1975a) stated that among sympatric species the most closely related one is *Jungermannia hirticalyx* Steph. (= *Plectocolea hirticalyx* (Steph.) Bakalin), but the latter is larger in size, often ascending in growth form, with mostly larger and wider leaves, and larger leaf cells (l.c., 295: “Sie unterscheidet sich durch grossere, oft aufsteigende Pflanzen mit grosseren, meistens auch breiteren Blättern, grosserem Blattzellnetz u.a.m.”). In fact, plants in the type specimens (cf. *Jungermannia hirticalyx* above) are only slightly different and plant size, leaf size as well as cell size are slightly larger in *Jungermannia watsiana* (!) type (35.0–62.5×31.2–40.0 µm), but not in *J. hirticalyx* type (where 25.0–44.0×25.0–34.0 µm). This observation differs drastically from Váňa’s (1975a) assertions. Superficially both taxa are very similar as well and I do not see any reasons to keep both taxa separately. Two more taxa synonymized with *Jungermannia watsiana* Steph. (Váňa, 1975a) before are *Nardia montana* Steph. and *Solenostoma australe* Steph. I agree in full with the latter synonymizing and thus need to note:

*Plectocolea montana* (Steph.) Bakalin, Arctoa 23: 102. 2014 = *Jungermannia watsiana* Steph. Sp. Hepat. 6: 99. 1917. *syn. nov.*

b) The plants in another examined specimen (not type, “Australia New South Wales. 11.VI.1901 R. Watts (No. 303)”, G14311/00112016) named as *Jungermannia watsiana* by Stephani are similar to lectotypus, but more deeply colored (brownish), not so pallid and have dense rhizoids, which are commonly purple, erect spreading and forming mat under stem.

**52) *Nardia dusenii* Steph., Hedwigia 30: 209. 1891.**

**Holotypus:** Congo (Bomana). On rocks and stones. 2.XII.1890 P. Dusen (No. 48) G14453/00115344.

**Accepted name:** *Plectocolea dusenii* (Steph.) Bakalin *comb. nov.* Basionym: *Nardia dusenii* Steph., Hedwigia 30: 209. 1891.

**Description.** Plants prostrate, slightly pellucid, forming loose mats, soft, 1.25–2.15 mm wide and 8–15 mm long, greenish-brownish, dorsiventrally flattened. Stem 175–250 µm in diameter, not branched, with the exception of subfloral innovations. Rhizoids brown to purplish-brown and purplish-brownish, rather common, originated mostly near ventral leaf base, but not only there, decurrent down the stem and forming loose fascicle, or sep-

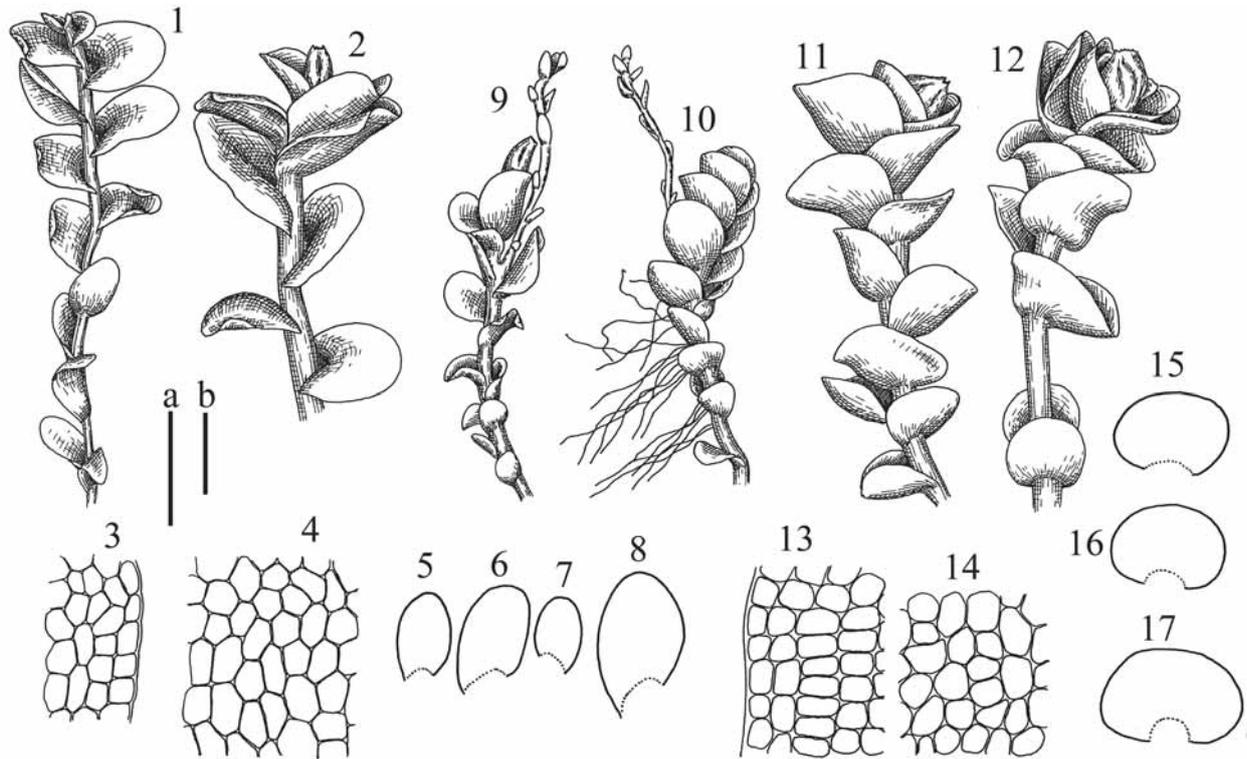


Fig. 20. *Jungermannia watsiana* Steph., lectotype (G14307/00067143): 1 – plant habit; 2 – perianthous plant; *Nardia dusenii* Steph., holotype (G14453/00115344): 3 – cells along leaf margin; 4 – midleaf cells; 5–8 – leaves; *Jungermannia coniflora* Schiffn., isotype (G14494/00115333): 9 – perianthous plant; 10 – plant habit; *Nardia levieri* Steph., holotype (G11673/00067154): 11, 12 – perianthous plants; 13 – cells along leaf margin; 14 – midleaf cells; 15–17 – leaves. Scales: a – 1 mm, for 1, 2, 5–12, 15–17; b – 100  $\mu$ m, for 3, 4, 13, 14.

arated and obliquely spreading. Leaves very obliquely inserted, laterally spreading, dorsally barely or up to 1/3 of stem width decurrent, ventrally subtransversely to loosely arcuately inserted, not or barely decurrent, flattened to slightly convex, distant to contiguous, obliquely ovate, 600–1000 $\times$ 450–800  $\mu$ m. Midleaf cells shortly oblong, 31.0–56.0 $\times$ 22.5–32.5  $\mu$ m, thin-walled, trigones vestigial to very small, concave, cuticle distinctly papillose; cells along leaf margin 25.0–37.5  $\mu$ m, thin-walled, trigones very small, concave, cuticle distinctly papillose, leaf margin crenulate due to protrudent cells. Dioicous. Androecia seems to be intercalary, but not more than one generation was observed, with 10 and more pairs of bracts, 2–3-androus, male bracts similar to leaves, but inflated in lower 1/3, concave-canalicate, commonly with recurved dorsal leaf margin. Perianth conical to narrowly trapezoidal in projection, ca. 1900 $\times$ 750  $\mu$ m, shallowly pluriplicate, not turbinate, gradually narrowed to the narrow or wide (up to 600  $\mu$ m) mouth, exerted for 2/5–3/5 of its length, composed by elongate, pellucid, thin-walled cells; perigynium ca. 1/5–1/3 of perianth length, with 1 pair of bracts, rhizogenous ventrally; female bracts similar to leaves, undulate at margin, sheathing perianth in lower 1/2 and obliquely spreading above, commonly with dorsal margin recurved away of the perianth. (Fig. 20: 3–8; 21: 1–3).

**Comment.** The species is closely morphologically related to *Plectocolea comata* (Nees) S Hatt., but differs mainly in rhizoid coloration and leaf cell features.

**53) *Nardia levieri* Steph., Bot. Zentralblatt 13(50): 70. 1892.**

**Holotypus:** Svanetia occidentalis, ad rivulos alpinos jugi Utbiri. 2400 m a.s.l. 19.VIII.1890 Levier (No. 60) G11673/00067154.

**Accepted name:** *Solenostoma levieri* (Steph.) Steph., Sp. Hepat. 2: 50. 1901.

**Description.** Plants yellowish-brownish, erect in rather dense patches, 1.25–2.0  $\mu$ m wide and 8–12 mm long, lax, soft. Stem 225–300  $\mu$ m in diameter, not branched, even as subfloral innovations, yellowish brownish. Rhizoids nearly colorless to brownish, originated both from ventral side of stem and from lower half of the leaf lamina, decurved down along the stem and forming fascicle (sometimes unclear). Leaves loosely concave to concave-canalicate, soft, sometimes undulate at margin, subtransversely inserted, shortly or up to 1/2 of stem width decurrent dorsally and arcuately inserted and barely or up to 3/4 of stem width decurrent ventrally, distant to contiguous, rarer subimbricate (in perianthous plants only), mostly erect spreading, transversely elliptic, 700–900 $\times$ 1200–1450  $\mu$ m. Midleaf cells subsisodiametric to shortly oblong, 31.0–

44.0×31.0–40.0 µm, thin-walled, trigones moderate in size, triangle to concave; cells along leaf margin 20.0–37.0 µm, thin-walled, with thickened external wall, trigones moderate in size, mostly concave, rarely slightly convex, cuticle smooth. Paroicous. Androecia with 2–3 pairs of bracts situated just below female bracts, similar to large leaves, loosely inflated in lower 1/3. Perianth 4–5-plicate in upper 1/3–1/2 of its length, gradually or (more frequently) suddenly contracted to the not or obscurely beaked mouth, exerted for 1/3–1/2 of its length, obovate, 1000–1100×900–1000 µm; perigynium virtually absent or up to 1/5 of perianth length; female bracts similar to leaves, in one pair, loosely sheathing perianth and not or slightly obliquely spreading in upper 1/3–1/4. (Fig. 20: 11–17).

**Comment.** At the time of description Stephani (1892a) believed *Nardia levieri* Steph. (= *Solenostoma levieri* (Steph.) Steph.) is closely morphologically allied to *Jungermannia lanigera* Mitt. (= *Solenostoma lanigerum* (Mitt.) Váňa et D.G. Long) due to rhizogenous leaf cells. Later *Nardia levieri* was synonymized by Váňa (1974c) as “häufigste Modifikation” (l.c.: 376) under *Jungermannia confertissima* Nees (= *Solenostoma confertissimum* (Nees) Schljakov). I think that although *Solenostoma levieri* and *S. confertissimum* are related, they differ. The main differentiating features are absence of red or purplish coloration in *S. levieri* and shortly exerted perianth. The differences of *S. levieri* from *S. confertissimum* are of the same value as the differences of *Lophozia wenzelii* (Nees) Steph. var. *wenzelii* from var. *massularioides* Bakalin. The question whether *S. levieri* should be regarded as a variety within *S. confertissimum*, needs further investigation.

**54) *Nardia obliquifolia* Schiffn., Denkschr. Akad. Wiss. Wien, KI. Math.-Naturw. 67: 191. 1899.**

**Isotypus:** Sumatra occidentalis. In monte Singalang, in silvis primaevis ad decli. orient. Regio nubium. 2000 m a.s.l. 24.VII.1894 Schiffner (481) G14667/00115154.

**Accepted name:** *Plectocolea obliquifolia* (Schiffn.) Bakalin *comb. nov.* Basionym: *Nardia obliquifolia* Schiffn., Denkschr. Akad. Wiss. Wien, KI. Math.-Naturw. 67: 191. 1899.

**Description.** Plants erect, in dense patches, 1.6–2.75 mm wide and 12–20 mm long, yellowish-brownish, rigid. Stem 250–325 µm in diameter, not branched, yellowish-brownish. Rhizoids numerous, purple to brownish-purple, originated mostly near ventral leaf base, but not only there, decurrent down in distinct fascicle, that is little bit smaller than stem. Leaves obliquely spreading, concave-canaliculate, transversely to subtransversely inserted, dorsally decurrent for 1/2–2/2 of stem width, ventrally arcuately inserted, decurrent for 1/2 of stem width, distant to contiguous, in larger shoots enclosed one to another; in shape rounded to transversely elliptic in smaller shoots and widely obliquely ovate to obliquely elliptic in larger ones, 750–1650×1000–1750 µm, large leaves

sometimes crispate at margin. Midleaf cells oblong, 37.5–64.0×21.0–37.5 µm, thin-walled, trigones moderate in size, concave to convex, cuticle distinctly striolate-papillose; cells along leaf margin 25.0–31.0 µm, thin-walled, with thickened external wall, cuticle distinctly papillose, trigones moderate in size, mostly convex. Dioicous? Androecia looks intercalary (but no sequence of generations was observed) in 3–5 pairs of bracts, 2–3-androus, male bracts similar to leaves, but wider, evidently inflated in lower half, purplish in inflated area and nearby. (Fig. 19: 8–10; 21: 4–9).

**Comment.** Another isotype of *Nardia obliquifolia* Schiffn. (G00115153) is identical to the above described in all features.

**55) *Nardia prostrata* Steph., Bull. Herb. Boissier 5: 101. 1897. (= *Jungermannia prostrata* (Steph.) Steph. Bull. Herb. Boissier, sér. 2, 1: 504. 1901, replaced by *Jungermannia inouensis* Beauverd in Steph. Sp. Hepat. 6: 569. 1924., non *Jungermannia prostrata* Sw. Nova Genera et Species Plantarum seu Prodrum 143. 1788.).**

**Holotypus:** Japan. Yezo, Hakodate 1.V.1886 U. Faurie (No. 222) G516/00115364.

**Accepted name:** *Plectocolea prostrata* (Steph.) S. Hatt., Bull. Tokyo Sci. Mus. 11: 38. 1944.

**Description.** Plants erect, yellowish-brownish, in dense patches, 1.0–1.25 mm wide (rarely up to 1.5 mm wide near perianth), 10–15 mm long. Stem 250–300 µm in diameter, slightly wider near the perianth, not branched, even as subfloral innovations, yellowish-brownish (darker colored than leaves). Rhizoids numerous, originated from stem near ventral leaf base and 1–3 lowest rows of cells in the leaf, deep purple. Leaves distant to (in younger parts and near perianth) contiguous, obliquely spreading to loosely laterally appressed to the stem, slightly concave to nearly flattened or convex (in lower part of branch), in the latter case commonly with leaf apex recurved to stem base, subtransversely (rarely obliquely) inserted, dorsally decurrent for 1/2–3/2 of stem width, ventrally shortly or up to 1/2 of stem width decurrent, widely obliquely ovate, 700–800×850–1000 µm. Midleaf cells 22.5–31.0×22.5–25.0 µm, subisodiametric, walls unequally thickened (sometimes also thin), trigones moderate in size to large, convex, cuticle smooth; cells along leaf margin 27.5–31.0 µm, unequally thickened, trigones large, sometimes confluent, external wall noticeable thickened, cuticle at the edge distinctly verrucose or not so. Dioicous? Perianth conical, slightly laterally compressed, ca. 650–1000×1000–1100 µm, with 4 main plicae, composed by elongate and pellucid cells; perigynium 4/5–7/5 of perianth length, rhizogenous, with 2 pairs of bracts; female bracts similar to leaves, but undulate at margin, also sometimes emarginated at apex. (Fig. 12: 3–9).

**Comment.** This name was synonymized with *J. virgata* (Mitt.) Steph. (= *Plectocolea virgata* Mitt.) by Amakawa (1960). However, according to my observations, *Nardia prostrata* is different from *Plectocolea vir-*

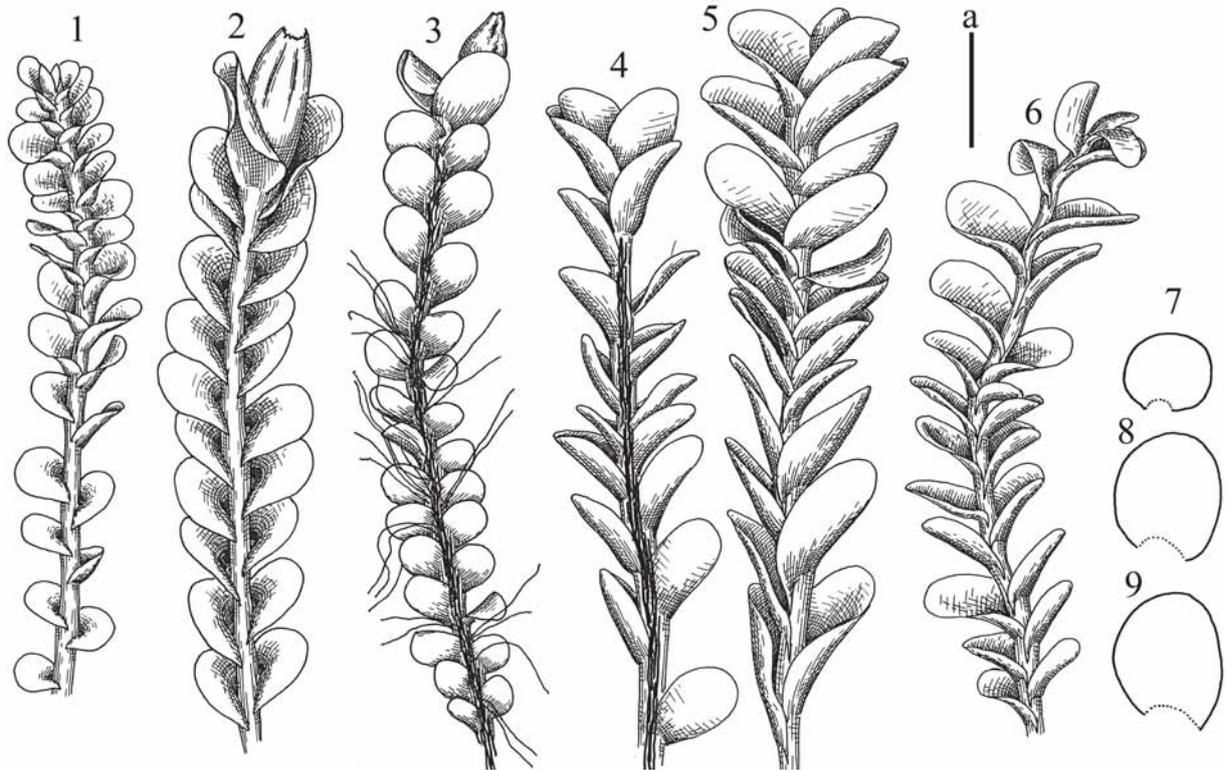


Fig. 21. *Nardia dusenii* Steph. Hedwigia 30: 209. 1891., holotype (G14453/00115344): 1 – plant habit; 2 – perianthous plant; 3 – perianthous plant, ventral view; *Nardia obliquifolia* Schiffn., isotype (G14667/00115154): 4 – plant habit, ventral view; 5, 6 – plant habit; 7–9 – leaves. Scale: a – 1,25 mm, for 1–9.

*gata* in leaf cell size (much larger in *N. prostrata*), size of trigones (large and convex in *N. prostrata* versus small and mostly concave in *P. virgata*). Due to features in the description based on the type material, *P. erecta* may be synonymized with *N. prostrata*, another species of “*virgata*” group, but now I refrain from this conclusion because of rhizoids in *N. prostrata* which originate from the limited area near ventral leaf base and from some lower cells in the basal part of the leaf. This feature should set *N. prostrata* aside of the pair *P. virgata* – *P. erecta*, and then *N. prostrata* may be treated as a separate species from them.

**56)** *Nardia rosulans* Steph., Bull. Herb. Boissier 5: 101. 1897.

**Holotypus:** Japan. Tosa. 1895 T. Inoue G16630/00067156.

**Accepted name:** *Plectocolea rosulans* (Steph.) S. Hatt., Bull. Tokyo Sci. Mus. 11: 38. 1944.

**Description.** Plants prostrate to rather ascending, dorsiventrally flattened, 2.5–2.8 mm wide, 15–20 mm long, in loose patches, green to brownish and yellowish-greenish. Rhizoids common, purple to purplish and purplish-brown, decurrent down the stem and forming distinct narrow fascicle, originated commonly near ventral leaf base. Stem 250–300  $\mu\text{m}$  in diameter, brownish, not branched. Leaves obliquely inserted, dorsally shortly (up 1/4 of stem width) decurrent, ventrally subtransversely to arcuately inserted, not or barely decurrent, leaves some-

times (larger ones) undulate at margin, distant to contiguous, obliquely laterally spreading, concave-caniculate, obliquely ovate, 1100–1500 $\times$ 900–1400  $\mu\text{m}$ . Midleaf cells subisodiametric to oblong, 27.5–50.0 $\times$ 25.0–35.0  $\mu\text{m}$ , thin-walled, cuticle smooth, trigones moderate in size, convex; cells along margin 12.5–26.5  $\mu\text{m}$ , thin-walled, with moderate in size to large convex trigones, external wall thickened, cuticle smooth. (Fig. 22: 1, 2).

**57)** *Nardia stolonifera* Steph., Hedwigia 31: 128. 1892.

**Lectotypus** (selected by Vána, 1974b): Transvaal. In jugo Mahali Mt., ad terra. Mac Lea (229) G14473/00112143.

**Accepted name:** *Solenostoma stoloniferum* (Steph.) S.W. Arnell, Hepaticae of South Africa, 316. 1963.

**Description.** Plants prostrate to ascending, pallid, pale greenish-brownish to whitish-brownish, more or less pelucid, forming rather dense mats, 0.4–0.6 mm wide (perianthous up to 1.6 mm wide) and 3–5 mm long, sometimes margins of upper leaves more dark colored. Stem 125–175  $\mu\text{m}$  in diameter, whitish to pale brownish, not branched, but commonly with ventral stolon-like rhizogenous scale-leaved branches that not become to normal branch. Rhizoids sparse to numerous, colorless to purplish, rarely purple, obliquely spreading. Leaves contiguous, concave to concave-caniculate, obliquely spreading, large leaves undulate at margin, obliquely inserted, shortly (up to 1/2 of stem width) decurrent dorsally, sub-

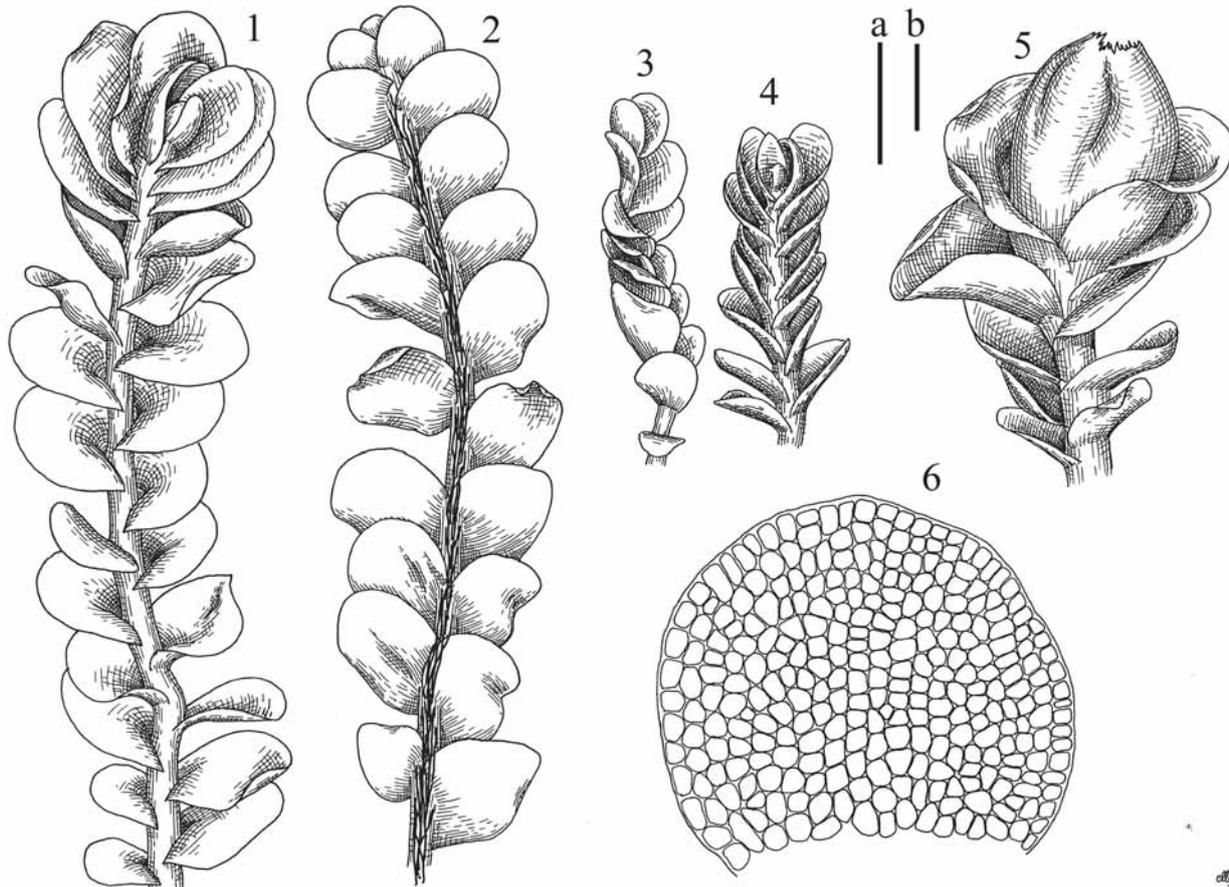


Fig. 22. *Nardia rosulans* Steph., holotype (G16630/00067156): 1 – plant habit; 2 – plant habit, ventral view; *Nardia stolonifera* Steph., lectotype (G14473/00112143): 3, 4 – plant habit; 5 – upper part of perianthous plant; 6 – leaf. Scales: a – 1, 25 mm, for 1, 2; b – 100  $\mu\text{m}$ , for 6; a – 500  $\mu\text{m}$ , for 3–5.

transversely to loosely arcuately inserted ventrally, where not or barely decurrent, suborbicular to transversely elliptic,  $300\text{--}400 \times 375\text{--}500 \mu\text{m}$ . Midleaf cells  $13.5\text{--}27.5 \times 15.0\text{--}22.5 \mu\text{m}$ , thin-walled, trigones moderate in size to small, concave, cuticle smooth; cells along leaf margin  $12.5\text{--}29.0 \mu\text{m}$ , thin- to obscurely and unequally thick-walled, trigones moderate in size, concave, external wall thin, cuticle smooth. Dioicous. Perianth comparatively large (in comparison with sterile plants), ca.  $1.5 \times 0.9 \text{ mm}$ , ellipsoidal to obovate, loosely 3-plicate in upper half, gradually narrowed to not beaked mouth, exerted for  $1/2\text{--}3/5$  of the length, composed by subsidiometric cells; perigynium ca.  $1/4\text{--}1/5$  of perianth length, with one pair of bracts; female bracts undulate at margin, sometimes loosely crispate, sheathing perianth in lower half and obliquely spreading above, ca.  $1000 \times 1150 \mu\text{m}$ . (Fig. 22: 3–6).

**Comments.** a) *Nardia stolonifera* Steph. (= *Solenostoma stoloniferum* (Steph.) S.W. Arnell) was synonymized with *Jungermannia borgenii* Gott. (= *Solenostoma borgenii* (Gott.) Steph.) by Váňa (1974b). However, the type of *Nardia stolonifera* differs considerably both from the description of *Jungermannia borgenii* provided by Váňa (l.c.) and from the original description of *Nar-*

*dia stolonifera* (Stephani, 1892b). Size of plants is much smaller, with shoots being only  $600 \mu\text{m}$  wide (but become much wider near perianth where attain  $1600 \mu\text{m}$ ) and leaf cells are smaller ( $13.5\text{--}27.5 \times 15.0\text{--}22.5 \mu\text{m}$ , versus  $30\text{--}35 \mu\text{m}$  in *Solenostoma borgenii*). *Solenostoma stoloniferum* was described one year earlier than *Jungermannia borgenii*, thus the correct name for this taxon should be the former one, regardless of whatever the taxa are synonymous or not.

b) The plants in the second specimen (syntype) found in G collection (G00112144) are rather similar with lectotype, but differ in presence of light rusty pigmentation of shoots.

**58) *Nardia verrucosa* Steph., Hedwigia 31: 172. 1892.**

**Holotypus:** Camerun. Prope Elundu pagus in rupicis basalticis adesis. 17.X.1980. Dusen (126B) G14478/00115343.

**Accepted name:** *Plectocolea dusenii* (Steph.) Bakalin comb. nov. Basionym: *Nardia dusenii* Steph., Hedwigia 30: 209. 1891.

**Description.** Plants prostrate, dorsiventrally flattened,  $1.25\text{--}2.25 \text{ mm}$  wide and  $10\text{--}20 \mu\text{m}$  long, yellowish-brown, without red or purple pigmentation, forming loose

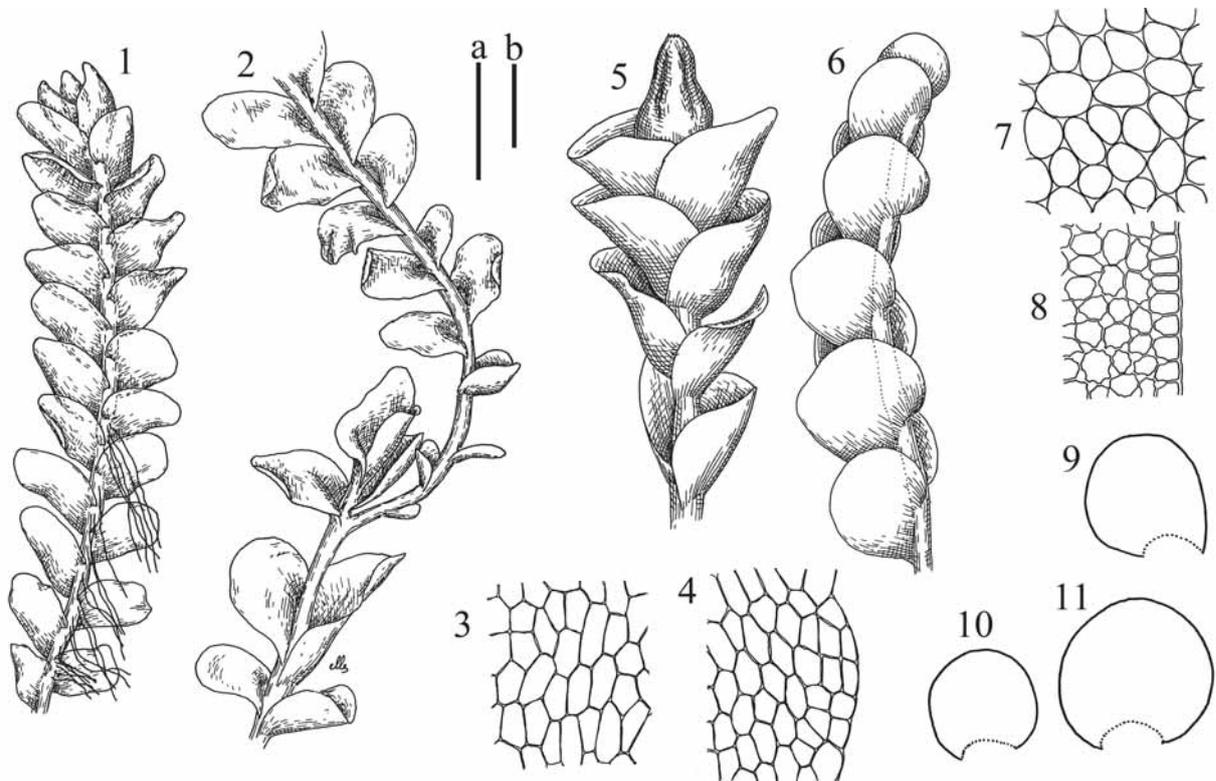


Fig. 23. *Nardia verrucosa* Steph., holotype (G14478/00115343): 1 – plant habit, ventral view; 2 – plant habit; 3 – midleaf cells; 4 – cells along leaf margin; *Nardia vulcanicola* Schiffn., holotype (G00121010): 5 – perianthous plant; 6 – plant habit – lateral view; 7 – midleaf cells; 8 – cells along leaf margin; 9–11 – leaves. Scales: a – 1 mm, for 1, 2, 5, 6, 9–11; b – 100  $\mu$ m, for 3, 4, 7, 8.

patches, soft. Stem 125–150  $\mu$ m in diameter, sparsely laterally branched, as well as lateral subfloral innovations (1 per perianth). Rhizoids brownish-purplish, originated from ventral side of stem (mostly concentrated near ventral leaf base), separated, obliquely spreading or decurrent down the stem, but not forming clear fascicle. Leaves horizontally spreading, very obliquely inserted, not or shortly decurrent dorsally, subtransversely to loosely arcuately inserted ventrally, where not or barely decurrent, flattened to slightly convex, contiguous or (rarely) distant, obliquely lingulate, 900–1100 $\times$ 500–600  $\mu$ m. Midleaf cells mostly oblong, 37.5–71.0 $\times$ 25.0–31.5  $\mu$ m, very thin-walled, trigones vestigial, concave, cuticle distinctly papillose- verrucose; cells along leaf margin 26.0–38.5  $\mu$ m, thin-walled, external wall very slightly thickened, trigones small, concave, cuticle distinctly papillose verrucose. Dioicous. Only unfertilized archegonia (with mature subfloral innovations before them) were found. (Fig. 23: 1–4).

**Comment.** Vána (1974b) regards *Nardia verrucosa* as fully identical with *Jungermannia dusenii* (Steph.) Steph. (= *Plectocolea dusenii* (Steph.) Bakalin) with the exception of clearly verrucose cuticle. In the present study I found cuticle clearly verrucose in the type of *Nardia dusenii* Steph., too. The only difference I found is rhizoid coloration, which is deeper in *Plectocolea dusenii*.

**59) *Nardia vulcanicola* Schiffn., Denkschr. Akad. Wiss. Wien, KI. Math.-Naturw. 67: 191. 1899.**

**Holotypus:** Java. Prov. Praenger, ad lacum vulcanum “Telega Bodas”. Regio Nubium. 1660 m a.s.l. 15.II.1894 (482) G00121010.

**Accepted name:** *Plectocolea vulcanicola* (Schiffn.) Bakalin, Arctoa 23: 117. 2014.

**Description.** Plants pellucid, rather erect in dense patches, pale yellowish-brownish, pallid, 1.25–2.25 mm wide and 12–20 mm long, rather soft. Stem 150–300  $\mu$ m in diameter, not branched (even as subfloral innovations), yellowish-brownish to brownish. Rhizoids sparse, grayish to brownish, originated mostly near ventral leaf bases, but not only there, erect to obliquely spreading. Leaves obliquely to very obliquely inserted, dorsally decurrent for 1/3–2/3 of stem width, ventrally transversely to arcuately inserted, shortly (up to 1/3 of stem width) decurrent, contiguous to subimbricate, loosely laterally appressed to the stem or obliquely spreading, more or less flattened to slightly concave or concave-canaliculate near perianth (3–5 pairs below perianth), obliquely lingulate to reniform, commonly emarginated at apex, 1000–1300 $\times$ 1000–1550  $\mu$ m, leaf margin commonly more deeply colored (looks as rim). Midleaf cells subsodiametric to shortly oblong, 37.5–70.0 $\times$ 37.5–62.5  $\mu$ m, thin-walled, trigones moderate in size, slightly concave to slightly convex, cuticle smooth; cells along leaf margin 18.7–25.0  $\mu$ m, walls thin to moderately unequally thickened, trigones moderate in size, triangle to slightly concave or convex, external wall thickened. Dioicous? Perianth conical, pluriplicate (mostly with 4

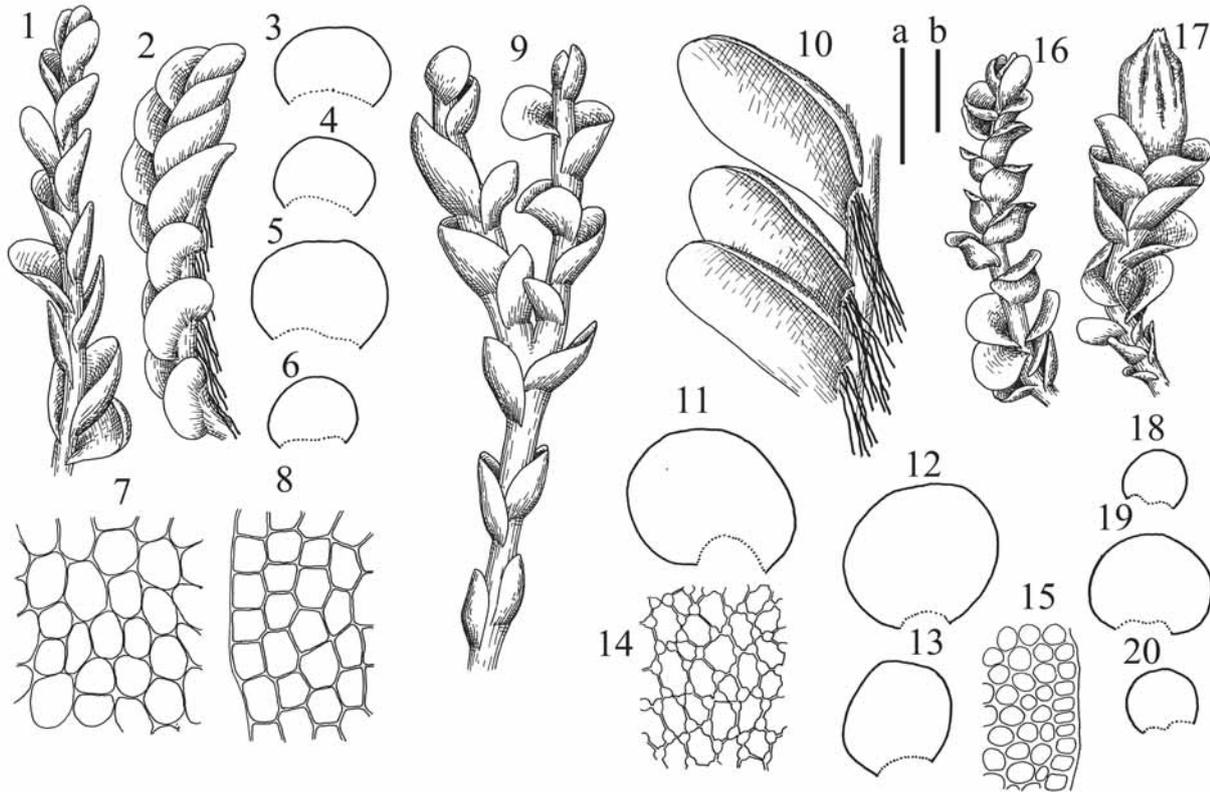


Fig. 24. *Nardia vulcanicola* Schiffn. var. *tenuiretis* Schiffn., syntype (G00120998): 1, 2 – plant habit; 3–6 – leaves; 7 – midleaf cells, 8 – cells along leaf margin; *Nardia vulcanicola* var. *tenuiretis* f. *cavifolia* Schiffn., holotype (G00120999): 9 – plant habit; *Solenostoma radiculosum* Mitt., isotype (G531/265243): 10 – ventral view of the plant, fragment; 11–13 – leaves; 14 – midleaf cells, 15 – cells along leaf margin; *Solenostoma rostratum* Steph., holotype (G11666/00112195): 16 – male plant; 17 – perianthous plant; 18–20 – leaves. Scales: a – 1 mm, for 1–6, 9, 11–13; b – 100  $\mu$ m, for 7, 8, 14, 15; a – 800  $\mu$ m, for 16–20; a – 500  $\mu$ m, for 10.

main plicae), gradually narrowed to the mouth, not turbinate in upper part, ca. 2000 $\times$ 750  $\mu$ m, composed by elongated pellucid cells; perigynium ca. 1/4 of perianth length, with 1 pair of bracts; bracts similar to large leaves but wider, undulate at margin and commonly slightly crispate. (Fig. 23: 5–11).

**60)** *Nardia vulcanicola* Schiffn. var. *tenuiretis* Schiffn., Denkschr. Akad. Wiss. Wien, KI. Math.–Naturw. 67: 191. 1899.

Syntypus: Prov. Praenger, ad lacum vulcanum “Telega Bodas”. Regio Nubium. 1660 m a.s.l. 15.II.1894 (483) G00120998.

Accepted name: *Plectocolea vulcanicola* (Schiffn.) Bakalin var. *tenuiretis* (Schiffn.) Bakalin comb. nov. Basionym: *Nardia vulcanicola* Schiffn. var. *tenuiretis* Schiffn., Denkschr. Akad. Wiss. Wien, KI. Math.–Naturw. 67: 191. 1899.

Description. Plants prostrate, pale yellowish-brownish, forming loose mats, 0.6–1.25 mm wide and 10–15 mm long, more or less soft. Stem 200–250  $\mu$ m, not branched, pale yellowish-brownish. Rhizoids numerous, colorless to grayish, erect spreading, forming loose mat in ventral side of stem, originated mostly near ventral leaf base, but not only there. Leaves very to moderately obliquely inserted, ventrally decurrent for 1/4–3/4 of stem

width, dorsally subtransversely to arcuately inserted, not or barely decurrent, reniform to transversely elliptic, truncate to shallowly emarginate at apex, 550–850 $\times$ 950–1400  $\mu$ m, contiguous, rarely distant, mostly slightly laterally appressed to the stem or obliquely spreading, slightly concave to almost flat. Midleaf cells subquadrate to rectangular and oblong, 37.5–62.5 $\times$ 25.0–45.0  $\mu$ m, thin-walled, trigones small to very small, concave, cuticle smooth; cells along leaf margin 25.0–42.0  $\mu$ m, thin-walled, with moderate in size, triangle to slightly concave or convex trigones, external wall noticeable thickened, cuticle smooth. (Fig. 24: 1–8).

Comment. Plants represent a lax form of *Plectocolea vulcanicola* with leaf margin cells larger than in the type variety.

**61)** *Nardia vulcanicola* var. *tenuiretis* f. *cavifolia* Schiffn., Denkschr. Akad. Wiss. Wien, KI. Math.–Naturw. 67: 192. 1899.

Holotypus: In monte ignivomo Papandian, ad fontes calidos in cratere. 14.II.1894. V. Schiffner (495) G00120999.

Accepted name: ?*Plectocolea vulcanicola* (Schiffn.) Bakalin var. *tenuiretis* (Schiffn.) Bakalin f. *cavifolia* (Schiffn.) Bakalin comb. nov. Basionym: *Nardia vulcanicola* Schiffn. var. *tenuiretis* Schiffn. f. *cavifolia* Schiffn.,

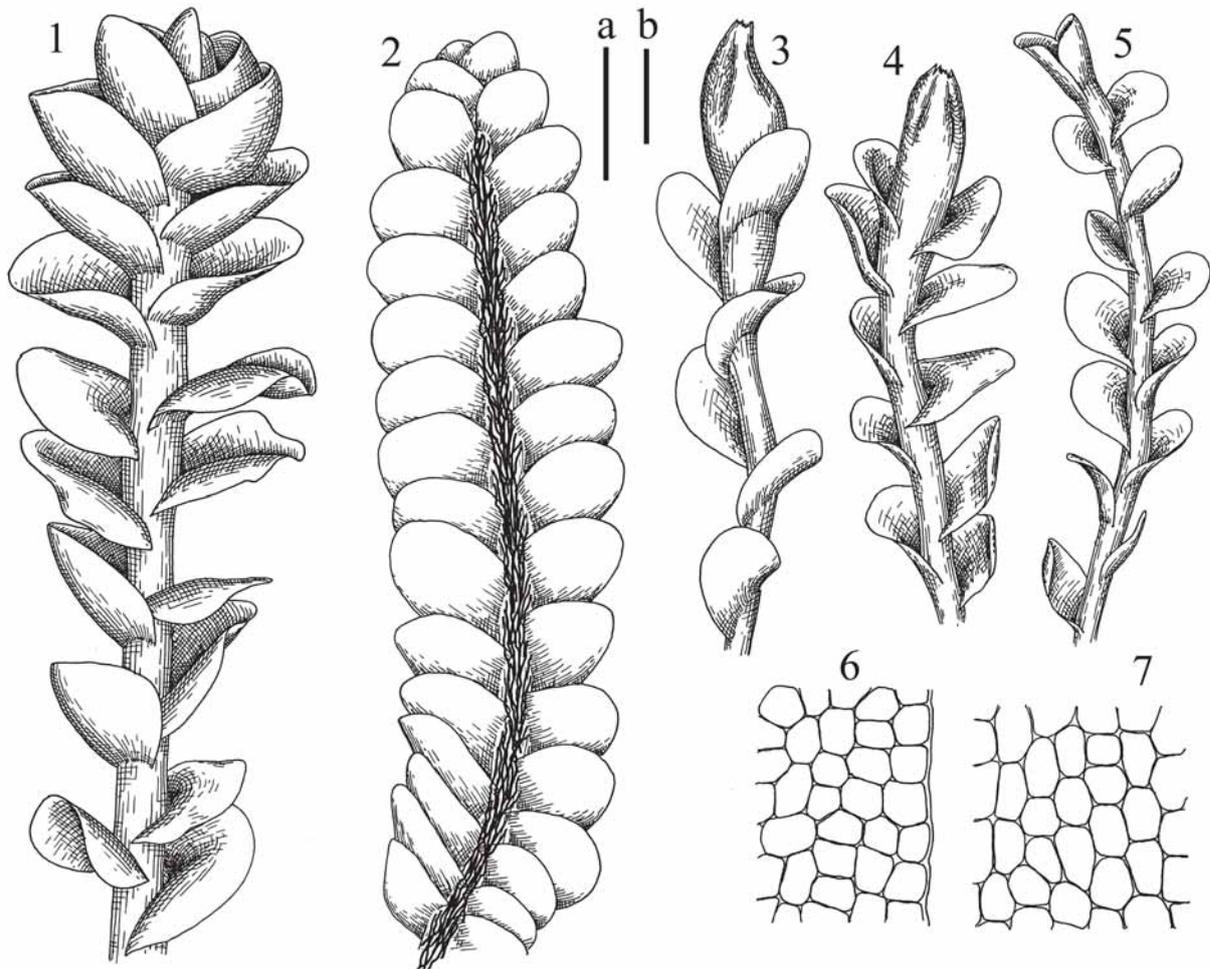


Fig. 25. *Solenostoma radiculosum* Mitt., isotype (G531/265243): 1 – plant habit; 2 – plant habit, ventral view; *Solenostoma aomorense* Steph., holotype (G00112198): 3, 4 – perianthous plants, 5 – plant habit; 6 – cells along leaf margin; 7 – midleaf cells. Scales: a – 1 mm, for 1–5; b – 100  $\mu$ m, for 6, 7.

Denkschr. Akad. Wiss. Wien, KI. Math.-Naturw. 67: 192. 1899.

**Comment.** By habit the plants are similar to *Solenostoma fusiforme* (Steph.) R. M. Schust. due to concave leaves sheathing the stem. Unfortunately, no perianths were found to check this suggestion (Fig. 24: 9).

**62) *Solenostoma aomorense* Steph., Sp. Hepat. 6: 79. 1917.**

**Holotypus:** Japan. Aomori. 1902. U. Faurie (1260) G/00112198.

**Accepted name:** *Solenostoma fusiforme* (Steph.) R. M. Schust., Hepat. Anth. North Amer. 2: 944. 1969.

**Description.** Plants pallid, yellowish-greenish to greenish-brownish, prostrate to loosely ascending, forming loose mat, 0.7–2.0 mm wide, 5–10 mm long, purplish pigmentation present, but limited to perigynium and adjacent areas. Stem 175–250  $\mu$ m in diameter, yellowish-brownish, not branched. Rhizoids colorless to grayish and brownish, originated from ventral side of stem, perigynium and lower 1/4 of perianth, obliquely spreading, to sometimes forming loose mat in ventral side of stem or decurrent down, but not forming the fas-

cicle. Leaves obliquely inserted, rather distant, obliquely spreading, loosely concave, dorsally not or barely decurrent, ventrally subtransversely to arcuately inserted, not or barely decurrent, nearly suborbicular to reniform, 550–875 $\times$ 700–1150  $\mu$ m. Midleaf cells subsodiametric to oblong, 27.5–52.5 $\times$ 26.0–42.5  $\mu$ m, thin-walled, trigones small, concave, cuticle virtually smooth. Dioicous? Perianth fusiform, slightly 3-plicate in upper 1/3–1/2 of its length, gradually narrowed to the not beaked mouth, 1600–2100 $\times$ 750–800  $\mu$ m, exerted for 4/5 of its length, bistratose in lower 1/4, composed by rectangular to elongate cells, at middle part 56.0–90.0 $\times$ 33.5–44.0  $\mu$ m, thin-walled, with small, concave trigones; perigynium ca. 1/4 of perianth length, with 1 pair of bracts, commonly purple or pale violet colored; female bracts similar to large leaves, rarely emarginated at the apex, loosely sheathing the perianth in lower 1/3 and obliquely spreading above. (Fig. 25: 3–7).

**Comment.** Amakawa (1960) synonymized *Solenostoma aomorense* Steph. with *Jungermannia fusiformis* (Steph.) Steph. (= *Solenostoma fusiforme* (Steph.) R.M. Schust.). Due to the presence of purplish pigmentation

and the presence of short perigynium it is rather identical with the type of *Solenostoma koreanum* Steph., regarded here as a modification of *S. fusiforme* as well, but treated as separate species in Amakawa (l.c.).

**63) *Solenostoma appalachianum*** R.M. Schust. ex Bakalin *sp. nov.*

**Holotypus:** U.S.A. North Carolina, Jackson Co. 1.IX.1953 R.M. Schuster (No. 29379) G 25914/00067159.

**Accepted name:** *Solenostoma appalachianum* R.M. Schust. ex Bakalin.

**Description.** Plants yellowish-green to yellowish-light green, ascending in loose patches, with markedly purple pigmented perianth tip, 1.5–2.25 mm wide and 3–5 mm long, no purplish pigmentation in other areas. Stem 200–300 µm in diameter, not branched, pale greenish to pale yellowish-greenish, not or slightly flexuous. Rhizoids colorless to brownish, sparse to numerous, erect to obliquely spreading or decurrent down the stem, but not forming the fascicle. Leaves subtransversely (ca. 70–80° with axis) inserted, concave to concave-canaliculate, mostly erect spreading, dorsally decurrent for 1/3–1/2 of stem width, ventrally transversely to obscurely arcuately inserted, not or shortly (up to 1/3 of stem width) decurrent, 750–900×900–1150 µm, suborbicular to transversely elliptic, contiguous to subimbricate and enclosed one to another. Midleaf cells subsodiametric to shortly oblong, 25.0–37.5×18.5–27.5 µm, thin-walled, trigones moderate, triangle to slightly convex, cuticle virtually smooth; cells along leaf margin 15.0–22.5 µm, thin-walled, with thickened external wall, trigones moderate, convex, cuticle smooth. Dioicous? Perianth 1000–1300×600–800 µm, 3–4-plicate in upper half, gradually narrowed to indistinctly beaked mouth, upper part of perianth markedly purple colored, mouth crenulate, perianth composed by subsodiametric cells. (Fig. 26: 1–8).

**Comment.** *Solenostoma appalachiana* has never been validly published by Schuster, and later he referred this specimen to *S. pyriformum* Steph. (Schuster, 1969). The plants in the described specimens agreed well with the *S. pyriformum* type, with the exception of much larger size and slightly larger leaf cells, and also with the exception of purple colored perianth tip (in the absence of purple coloration in other parts of the shoot). The mentioned features, as well as strong geographic isolation between Japan and Eastern North America allow to treat *S. appalachianum* at the species level.

**64) *Solenostoma atrovirens*** Steph., Sp. Hepat. 2: 55. 1901.

**Holotypus:** Reunion 25.V.1875. G. de l'Isle (201) G14313/00045603.

**Accepted name:** *Solenostoma atrovirens* Steph., Sp. Hepat. 2: 55. 1901.

**Description.** Plants rather erect, brownish-green to greenish-brownish, no red pigmentation, ca. 1.5–2.0 mm

wide and 10–20 mm long. Stem 200–250 µm in diameter, flexuous in sterile shoots, not branched. Rhizoids of two types: 1) decurrent down the stem and forming fascicle, brownish in color, 2) erect spreading and forming mat under stem, purple-brown, rarely purplish in color. Leaves subtransversely inserted, obliquely to erect spreading, concave-canaliculate, sometimes with recurved apex, dorsally decurrent for 1/2–3/4 of stem width, distant to contiguous (most commonly latter) and subimbricate, commonly (especially larger ones) undulate at margin, suborbicular to transversely elliptic, 750–1000×900–1400 µm. Midleaf cells oblong, 25.0–31.5×12.5–20.0 µm, thin-walled, trigones moderate, concave, cuticle smooth. Dioicous. Perianth clavate, 3(4)-plicate in upper 1/5, suddenly contracted to the beaked mouth, exerted for 3/4 of its length, bistratose in lower half, cells in upper part of perianth subsodiametric, thin-walled, trigones moderate in size, concave to slightly convex, cells in lower part of perianth (lower third) elongate, 31.0–42.0×10.0–18.0 µm, with thickened walls, trigones moderate in size to small, concave; perigynium virtually absent; female bracts similar to leaves, but wider, undulate at margin and loosely sheathing the perianth. (Fig. 26: 9–15).

**Comments.** a) The species has been synonymized by Váňa (1973, 1974b) with *Jungermannia perloi* (Gola) Váňa (= *Solenostoma perloi* Gola Memor. Reale Accad. Sci. Torino, ser. 2 65: 4. 1914.), described from Kenia (Gola, 1914). At that time Váňa (1974b) regarded *Jungermannia* in a broad sense (as including *Solenostoma* and *Plectocolea*) and used for the species the name *Jungermannia perloi* (Gola) Váňa because although *Solenostoma atrovirens* had been described 13 years before than *S. perloi*, a combination “*Jundermannia atrovirens*” was blocked by the presence of the earlier homonym *Jungermannia atrovirens* Dumort. Here *Solenostoma* is treated as a genus clearly separate from *Jungermannia* and it is possible to use the earliest name *Solenostoma atrovirens*.

b) I have not studied the type of *Solenostoma perloi*, probably the statement on their identity needs further consideration.

**65) *Solenostoma australe*** Steph., Sp. Hepat. 6: 79. 1917.

**Holotypus:** N-E. Australia. Bellender Ker Montes. Karsten G14314/00067144.

**Accepted name:** *Plectocolea montana* (Steph.) Bakalin, Arctoa 23: 102. 2014.

**Description.** Plants prostrate, greenish-brownish to brownish-greenish, in loose patches, 1.25–2.0 µm wide, 5–7 mm long. Stem 125–200 µm in diameter, wider near perianth, sparsely branched as ventral geotropic scale-leaved ‘stolons’, rarely as lateral subfloral innovations. Rhizoids sparse or sometimes numerous, originated from ventral side of stem, obliquely to erect spreading, or decurrent down the stem, but not forming distinct fascicle, purple, purple-brown and (rarer) brownish in color. Leaves obliquely inserted, not decurrent dorsally, subtransversely

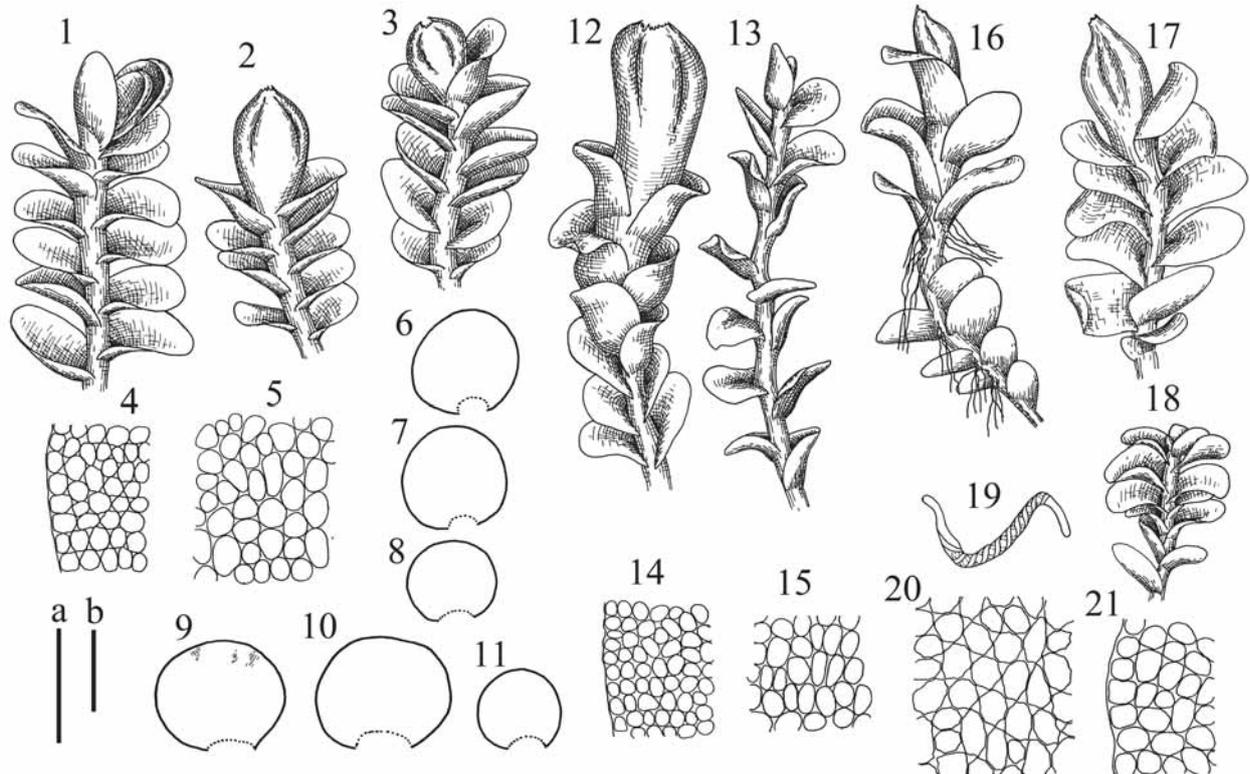


Fig. 26. *Solenostoma appalachianum* R.M. Schust. ex Bakalin, holotype (G25914/00067159): 1 – plant habit; 2, 3 – perianthous plants; 4 – cells along leaf margin; 5 – midleaf cells; 6–8 – leaves; *Solenostoma atrovirens* Steph., holotype (G14313/00045603): 9–11 – leaves; 12 – perianthous plant; 13 – plant habit; 14 – cells along leaf margin; 15 – midleaf cells; *Solenostoma australe* Steph., holotype (G14314/00067144): 16 – perianthous plant – ventral view; 17, 18 – perianthous plants; 19 – elater; 20 – midleaf cells; 21 – cells along leaf margin. Scales: a – 1 mm, for 1–3, 6–13, 16–18; b – 100  $\mu$ m, for 4, 5, 14, 15, 20, 21; b – 50  $\mu$ m, for 19.

to loosely arcuately inserted ventrally, where not decurrent, loosely sheathing the stem near base and obliquely to erect spreading above, in general outline slightly convex, but sheathing stem near base, mostly contiguous, ovate to obliquely ovate, 750–1600 $\times$ 500–1350  $\mu$ m. Midleaf cells subsodiametric to shortly oblong, 33.5–43.0 $\times$ 27.5–37.5  $\mu$ m, thin-walled, trigones moderate in size, convex, cuticle virtually smooth; cells along leaf margin 18.5–32.5  $\mu$ m, thin-walled to slightly thickened, trigones moderate, convex, external wall thickened. Dioicous? Perianth fusiform to subclavate, with 3 main plicae in upper half, gradually narrowed to the mouth, composed by elongated cells, ca. 1400–1500 $\times$ 600–750  $\mu$ m, exerted for 3/4 of its length, bistratose in lower 1/3; perigynium distinct, ca. 1/3–2/5 of perianth length, with two pairs of bracts; female bracts similar to large leaves, but wider, sheathing perianth near base and erect spreading above. Spores papillose, 18.5–22.0  $\mu$ m in diameter, brown. Elaters bispiral, ca. 100 $\times$ 7.5  $\mu$ m, with homogenous ends ca. 15–20  $\mu$ m long. (Fig. 26: 16–21).

**Comments.** a) Váňa added the notice to the herbarium sheet (G14314/00067144) “=*Jungermannia karsteniana* Beauverd”. The latter species was described as *Nardia montana* Steph., but due to an earlier homonym (*Jungermannia montana* Mart. Fl. Crypt. Erlangensis 155. 1817) was substituted by this new name. The description of *Solenostoma australe* is based on the same(!)

specimen, which was also stressed by Váňa (1975a).

b) Both *Nardia montana* Steph. and *Solenostoma australe* Steph. were regarded as synonymous with *Jungermannia watsiana* Steph. by Váňa (1975a), with whom I fully agree. The types of *J. hirticalyx* Steph., *J. watsiana* Steph. and *Solenostoma australe* Steph./*Nardia montana* Steph. represent one species, and its name should be *Plectocolea montana* due to priority principle.

**66) *Solenostoma cinerea* Mitt. in Steph., Sp. Hepat. 2: 49. 1901.**

**Lectotypus** (selected by Amakawa 1969): Java. In monte Pangerango Motley G12928/115353.

**Accepted name:** ?*Solenostoma strictum* (Schiffn.) Váňa, Hentschel & J. Heinrichs, Crypt. Bryol. 31(2): 138. 2010.

**Description.** Plants ascending to erect, in loose patches (mixed with *Riccardia*), 1.0–1.25 mm wide (in perianthous plants up 2.75 mm wide), 8–13 mm long, yellowish-brownish, with purplish tint to brownish-purple in perianth base and adjacent area. Rhizoids numerous, originated from ventral side of stem, forming distinct fascicle decurrent along the stem (similar in diameter to stem), brownish. Leaves concave, obliquely spreading, distant to contiguous, transversely inserted, dorsally decurrent for ca 1.0 of stem width, ventrally decurrent for ca. 1.0–1.5 of stem width, suborbicular to transversely elliptic,

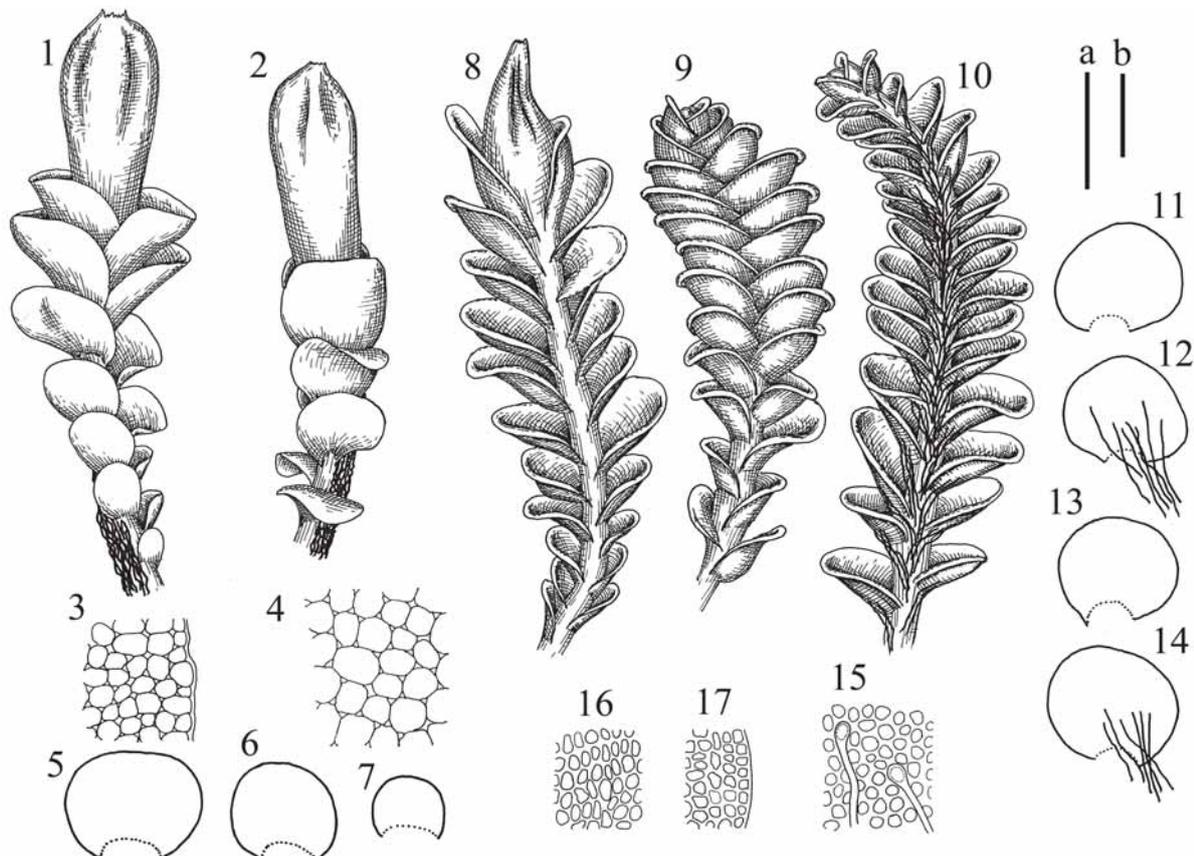


Fig. 27. *Solenostoma cinereum* Mitt., lectotype (G12928/115353): 1, 2 – perianthous plants; 3 – cells along leaf margin; 4 – midleaf cells; 5–7 – leaves; *Jungermannia flavorevoluta* Váňa, isotype (G11168/00115180): 8 – perianthous plant; 9, 10 – plant habits; 11–14 – leaves; 15, 16 – midleaf cells; 17 – cells along leaf margin. Scales: a – 1 mm, for 1, 2, 5–14; b – 100  $\mu$ m, for 3, 4, 15–17.

625–700 $\times$ 825–1375  $\mu$ m. Midleaf cells nearly isodiametric, 25–40 $\times$ 25–40  $\mu$ m, thin-walled, trigones moderate in size to large, convex, cuticle smooth; cells along leaf margin 12.5–19.0  $\mu$ m, walls thin to unequally thickened, trigones large, convex, sometimes confluent, cuticle smooth. Dioicous. Androecia intercalary, with 2–3 pairs of bracts, inflated in lower half and concave above (data on androecia based on very bad material). Perianth 2500–3000 $\times$ 900–1000  $\mu$ m, clavate, 4–5-plicate in upper 1/4(1/3), gradually narrowed to not beaked mouth, exerted for 4/5–6/7 of the length, perianth middle part composed by isodiametric to shortly oblong cells, thin-walled, with moderate in size, convex trigones, bistratose in lower half (where it composed by elongate cells); perigynium absent or up to 1/5 of perianth length; female bracts similar to large leaves, obliquely spreading, concave-canaliculate. (Fig. 27: 1–7).

**Comments.** a) *Solenostoma cinereum* Mitt. in Steph. was synonymized with *Jungermannia stricta* (Schiffn.) Steph. (= *Solenostoma strictum* (Schiffn.) Váňa, Hentschel & J. Heinrichs) by Váňa (1972b), although earlier Váňa had indicated in the label in G *Jungermannia herzogiana* Váňa. The plants of *S. cinereum* and *S. strictum* are strikingly different in color: purplish in *S. cinereum*, while totally lacking this pigmentation in *S.*

*strictum*. Other slight differences are in perianth size 1750 $\times$ 750  $\mu$ m in *S. strictum* versus 2500–3000 $\times$ 900–1000  $\mu$ m in *S. cinereum*. Whether these differences are sufficient to recognize these taxa at the species level is unclear for me.

b) In Mitten herbarium in NY there is no type material, thus Amakawa selected this specimen in G as the lectotype.

67) *Solenostoma gollanii* Steph., Sp. Hepat. 6: 81. 1917.

**Holotypus:** India. Sikkim. 7000 ped. Hartless G12929/00043700.

**Accepted name:** *Solenostoma purpuratum* (Mitt.) Steph. var. *gollanii* (Steph.) Bakalin *comb. nov.* Basionym: *Solenostoma gollanii* Steph., Sp. Hepat. 6: 81. 1917; = *Solenostoma purpuratum* (Mitt.) Steph. var. *koponenii* Bakalin et Li Wei Arctoa 22: 135. 2013. *syn. nov.*

**Description.** Plants greenish-brownish, erect, among *Riccardia*, 0.75–1.0 mm wide and 5–15 mm long. Stem 175–250  $\mu$ m in diameter, not branched, brownish. Rhizoids numerous, forming distinct fascicle decurrent down the stem, fascicle the same size or wider than stem, colorless to brownish. Leaves subtransversely to transversely inserted, dorsally decurrent for 1–2 of stem widths, ven-

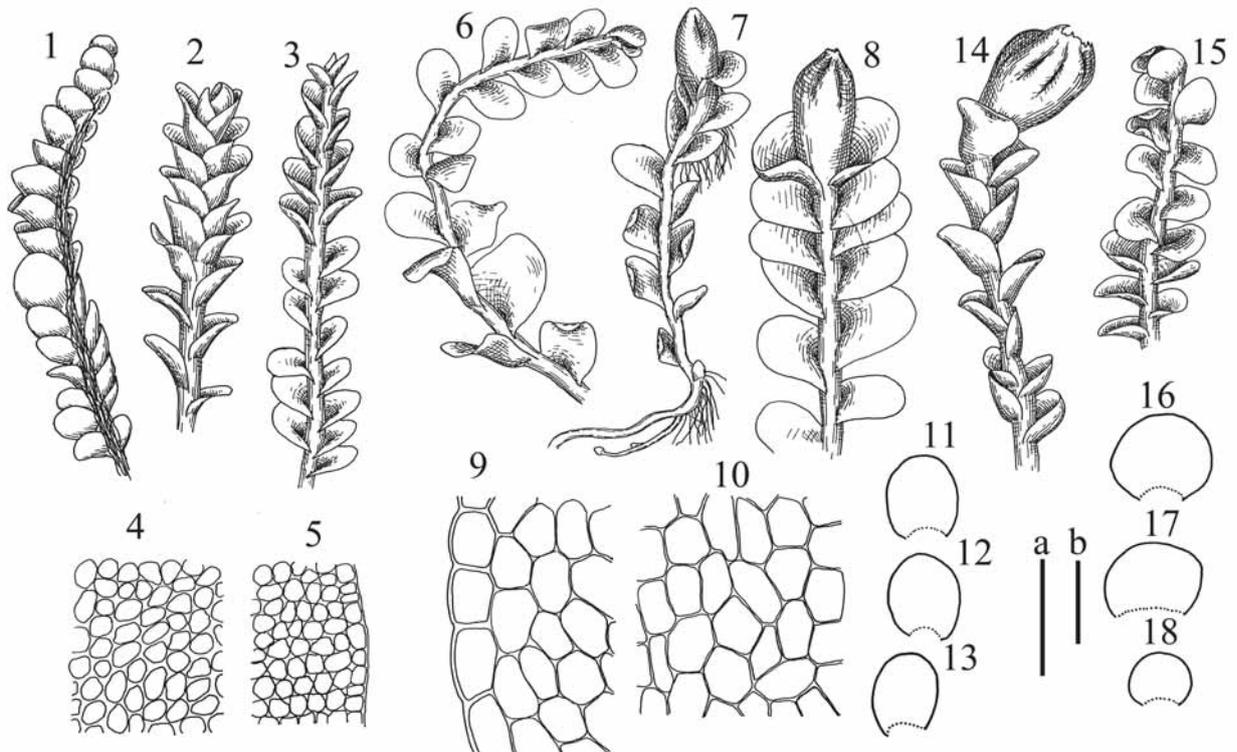


Fig. 28. *Solenostoma gollanii* Steph., holotype (G12929/00043700): 1 – plant habit, ventral view; 2, 3 – plant habit; 4 – midleaf cells; 5 – cells along leaf margin; *Solenostoma koreanum* Steph., holotype (G16635/00112199): 6 – plant habit; 7, 8 – perianthous plants; 9 – cells along leaf margin; 10 – midleaf cells; 11–13 – leaves; *Solenostoma obtusiflorum* Steph., holotype (G11677/00112187): 14 – perianthous plant; 15 – plant habit; 16–18 – leaves. Scales: a – 1 mm, for 1–3, 6–8, 11–18; b – 100  $\mu$ m, for 4, 5, 9, 10.

trally decurrent for 3/4–5/4 of stem width, concave to concave-canaliculate, obliquely spreading, suborbicular, 600–625 $\times$ 750–775  $\mu$ m. Midleaf cells subsodiametric to shortly oblong, 18.5–25.0 $\times$ 18.5–25.0  $\mu$ m, thin-walled, trigones moderate to large, convex, cuticle smooth; cells along leaf margin 12.5–19.0  $\mu$ m, thin-walled, trigones moderate to large, convex, sometimes confluent, cuticle smooth. Androecia spicate, intercalary, with 2–5 or more pairs of bracts, strongly inflated in lower half and recurved to erect spreading above. (Fig. 28: 1–5).

**Comment.** *Solenostoma gollanii* Steph. was synonymized with *Jungermannia appressifolia* Mitt. by Vána (1972b). The plants in the type of *Solenostoma gollanii* differ from *Solenostoma appressifolium* (Mitt.) Vána & D.G. Long in (based on comparison with holotype in NY, 00944021!) in: 1) size of shoots (0.75–1.0 mm wide in *S. gollanii*, versus 1.32–1.76 mm wide in *S. appressifolium*); 2) color (greenish-brownish versus yellowish-brown, with rusty to red tint); 3) leaf position (obliquely spreading versus appressed to the stem). Recently described *S. purpuratum* var. *koponenii* Bakalin et Li Wei does not differ from the type of *Solenostoma gollanii*, thus it is synonymized with *S. purpuratum* var. *gollanii*

**68) *Solenostoma koreanum* Steph., Sp. Hepat. 6: 81. 1917.**

**Holotypus:** Korea. Quelpart (Jeju Island) 1906 U. Faurie (No. 236) G16635/00112199.

**Accepted name:** ?*Solenostoma fusiforme* (Steph.) R. M. Schust., Hepat. Anth. North Amer. 2: 944. 1969.

**Description.** Plants prostrate, loosely ascending near the perianth, pellucid, pallid, pale yellowish-greenish to greenish-brownish, area near base of perianth, perigynium and adjacent parts of leaves and stem purplish colored, 1.0–1.5 mm wide (hardly wider in large perianthous plants), forming loose patches, more or less closely attached to the substratum by rhizoids, dorsiventrally flattened. Stem 100–150  $\mu$ m in diameter, slightly wider near the perianth, flexuous, especially in smaller plants, not branched, or with stolon-like ventral leafless branches, that sometimes become to normal branches. Rhizoids sparse, purple to colorless, originated from ventral side of stem, distributed not evenly, but in some areas of ventral side (commonly where stem curving). Leaves very obliquely inserted, horizontally spreading, distant to contiguous, dorsally shortly or up to 1/2 of stem width decurrent, ventrally obliquely to subtransversely, rarely arcuately inserted, not or barely decurrent, more or less flattened to loosely concave-canaliculate, obliquely ovate to obliquely lingulate, 550–725 $\times$ 575–875  $\mu$ m. Midleaf cells mostly penta- to hexagonal, oblong, 50.0–750 $\times$ 37.5–50.0  $\mu$ m, thin-walled, trigones small to vestigial, concave, cuticle smooth; cells along leaf margin 50.0–62.5  $\mu$ m, subequally thickened, trigones small, concave, cuticle virtually smooth. Dioicous? Perianth 3(4)-plicate in

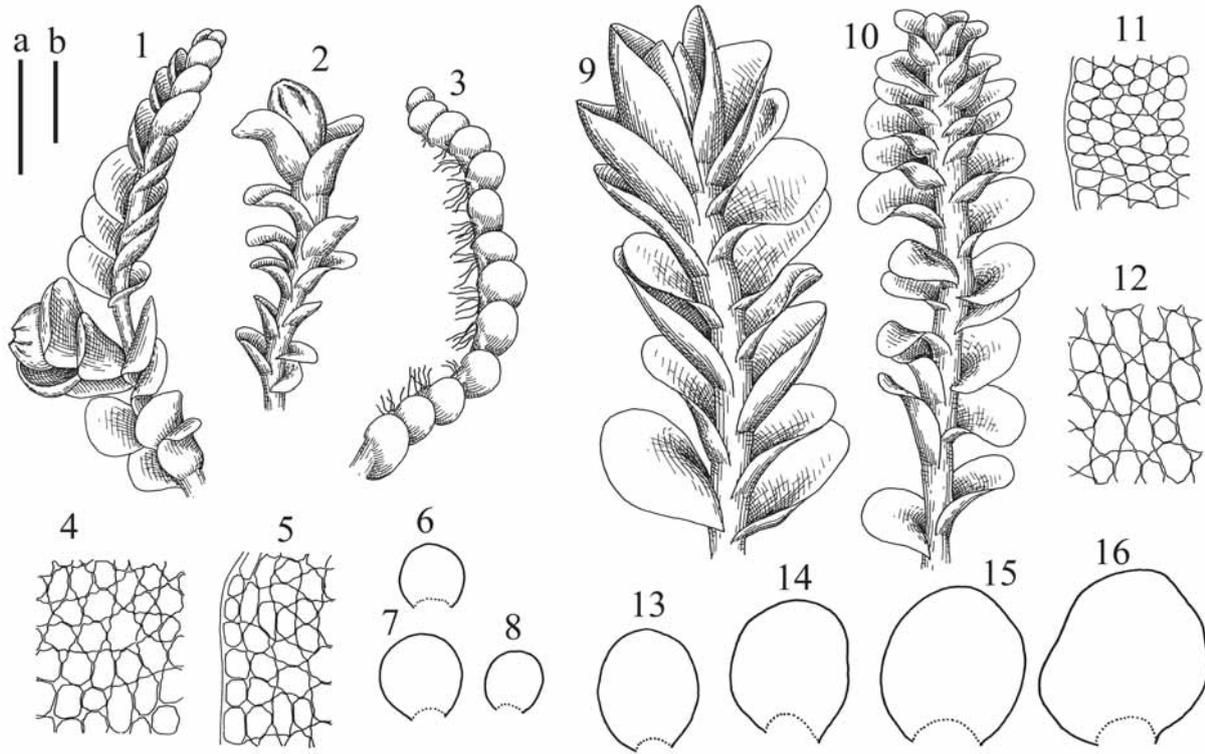


Fig. 29. *Solenostoma lacouturei* Steph., holotype (G14318/00045606): 1, 2 – perianthous plants; 3 – plant habit, lateral view; 4 – midleaf cells; 5 – cells along leaf margin; 6–8 – leaves; *Solenostoma ovicalyx* Steph., holotype (G16636/00067157): 9 – plant habit; 10 – male plant; 11 – cells along leaf margin; 12 – midleaf cells; 13–16 – leaves. Scales: a – 1 mm, for 1–3, 6–10, 13–16; b – 100  $\mu\text{m}$ , for 4, 5, 11, 12.

almost whole extent or almost free of plicae, fusiform to clavate, mostly gradually narrowed to distinctly or indistinctly beaked mouth,  $1250\text{--}1500 \times 400\text{--}650\ \mu\text{m}$ , exerted for  $2/3\text{--}3/4$  of its length, composed by elongated cells, virtually unistratose; perigynium present, ca.  $1/5\text{--}1/4$  of perianth length, with 1 pair of bracts; female bracts similar to leaves, sheathing the perianth near base (in lower half) and obliquely spreading above, where canaliculate. (Fig. 28: 6–13).

**Comment.** *Solenostoma koreanum* Steph. was synonymized with *Jungermannia fusiformis* (Steph.) Steph. (= *Solenostoma fusiforme* (Steph.) R.M. Schust.) by Vána (1975c) and H. Inoue (1975). This is contrasting to Amakawa (1960) who believed two names correspond to different species. Common phases(?) of “*Solenostoma koreanum*” differ from a typical *S. fusiforme* in presence of purplish pigmentation in some parts of shoot and commonly purplish rhizoids. Whether these distinctions merit a species level is the question of further study. Currently I accept (with some doubts) the concept of synonymy of both epithets, with *S. fusiforme* as a priority name.

**69) *Solenostoma lacouturei* Steph., Sp. Hepat. 6: 81. 1917.**

**Holotypus:** Madagascar. 1907 Camboue G14318/00045606.

**Accepted name:** *Solenostoma lacouturei* Steph., Sp. Hepat. 6: 81. 1917.

**Description.** Plants ascending to erect, in dense to loose patches, yellowish-brownish, 0.75–1.5 mm wide and 5–8 mm long, more or less rigid. Stem 100–250  $\mu\text{m}$  in diameter, wider near the perianth, not branched, with the exception of lateral subfloral innovations (1 per perianth, rarely 1 ventral and 1–lateral), that becoming into normal branch, but remain sterile. Rhizoids sparse, brownish to colorless, originated mostly near ventral leaf base, but not only there, obliquely to erect spreading, separated. Leaves concave (small sterile branches) to concave-canaliculate (bigger, mostly fertile branches), contiguous to subimbricate, obliquely spreading or loosely laterally appressed to the stem and overlapping one to another, suborbicular to transversely elliptic,  $550\text{--}800 \times 550\text{--}960\ \mu\text{m}$ , obliquely inserted (subtransversely to transversely near the perianth), dorsally not or barely decurrent, ventrally subtransversely to arcuately inserted, not or barely decurrent. Midleaf cells isodiametric to oblong,  $25.0\text{--}50.0 \times 25.0\text{--}37.5\ \mu\text{m}$ , slightly thick-walled, trigones moderate in size, convex, sometimes bulging, cuticle distinctly papillose; cells along leaf margin  $22.5\text{--}37.5\ \mu\text{m}$ , thin- to slightly thick-walled, external wall thickened, cuticle virtually smooth, trigones moderate in size, convex to bulging. Dioicous? Perianth clavate,  $850\text{--}1100 \times 500\text{--}850\ \mu\text{m}$ , 4(5)-plicate in upper  $1/3$ , suddenly contracted to the not beaked mouth, exerted for  $1/2\text{--}2/3$  of the length, composed by subsodiametric cells, slightly rhizogenous and bistratose in lower  $1/3$ , perigynium virtually absent. (Fig. 29: 1–8).

**Comment.** *Solenostoma lacouturei* Steph. was synonymized with *Jungermannia borgenii* Gott. (= *Solenostoma stoloniferum* (Steph.) S.W. Arnell) by Váňa (1974b). In contrast, I found two taxa different in size of shoots (0.75–1.5 mm wide in *S. lacouturei* versus 1.5–2.0 mm wide in *S. borgenii*), midleaf cells measurements (25.0–37.5  $\mu\text{m}$  wide versus 15.0–19.0  $\mu\text{m}$  wide), size of perianthium (850–1100 $\times$ 500–850  $\mu\text{m}$  versus 1500–2000 $\times$ 1000–1500  $\mu\text{m}$ ). For this reason I cannot follow Váňa (1974b) arguments and prefer to treat *S. lacouturei* as a species separate from *S. stoloniferum*.

**70) *Solenostoma obtusiflorum*** Steph., Kungl. Svensk. Vetensk. Handl. 46(9): 16 1911.

**Holotypus:** Juan Fernandez. Masafuera. 1908. Skottsberg (No. 105) G11677/00112187.

**Accepted name:** *Solenostoma crassulum* (Nees et Mont.) Steph., Sp. Hepat. 2: 59. 1901.

**Description.** Plants soft, prostrate to ascending, in loose patches, 0.5–1.2 mm wide and 3–7 mm long, yellowish-greenish to greenish-brownish, marked with red or purple in the branch base and perianth tips, dorsiventrally flattened. Stem 125–200  $\mu\text{m}$  in diameter, not branched, even as subfloral innovations, brownish to brownish-yellowish. Rhizoids sparse, colorless to grayish, erect spreading and not forming fascicles. Leaves obliquely inserted, not or rarely (rarely up to 1/4 of stem width) decurrent dorsally, arcuately inserted, not or barely decurrent ventrally, loosely concave (sterile branches) to concave-canalicate (fertile branches), contiguous to distant, orbicular to reniform and transversely elliptic, sometimes undulate and loosely crispate at margin, 450–750 $\times$ 400–1050  $\mu\text{m}$ . Midleaf cells subisodiametric to shortly oblong, 18.5–29.0(35.0) $\times$ 18.5–27.5  $\mu\text{m}$ , thin-walled, trigones moderate, triangle to slightly concave or convex, cuticle virtually smooth; cells along leaf margin 12.5–24.0  $\mu\text{m}$ , thin-walled, external wall not thickened, trigones moderate in size, concave, cuticle smooth. Dioicous? Perianth rhizogenous in lower 1/4–1/3 if the length, obovate, 1250–1500 $\times$ 800–1200  $\mu\text{m}$ , with 4–5 main plicae in upper half, gradually or more or less suddenly contracted to the not beaked mouth, exerted for 3/4–4/4 of its length; perigynium virtually absent; female bracts similar to large leaves, obliquely spreading, concave-canalicate to concave. (Fig. 28: 14–18).

**Comments.** a) Váňa (1974a, p. 191) synonymized “*Solenostoma obtusiflos* Steph. K. Svenska-Vet. Akad. Hndl. 46(9): 16, 1911” with *Jungermannia crassula* Nees et Mont. (= *Solenostoma crassulum* (Nees et Mont.) Steph.). Váňa refers to page 16 in paper of Stephani (1911), where only three species of *Solenostoma* are listed: “*S. crassulum* Mont.,” “*S. obtusiflorum* n. sp.” and “*S. rostratum* n. sp.”. Thus it is rather obvious that “*obtusiflos*” is a misprinting of *S. obtusiflorum*.

b) In comparison with the description of *Jungermannia crassula* Nees et Mont. provided by Váňa (1974a) plants in the type of *S. obtusiflorum* differ in leaf cell

size. However, since I have not studied the type of *Jungermannia crassula*, I tentatively accept Váňa’s (l.c.) decision.

**71) *Solenostoma ovicalyx*** Steph., Sp. Hepat. 6: 82. 1917.

**Holotypus:** Japan. Mt. Komagadake. VIII.1903. K. Tamura (37) G16636/00067157.

**Accepted name:** *Plectocolea infusca* Mitt., Trans. Linn. Soc. London, Botany 3(3): 196. 1891.

**Description.** Plants prostrate to ascending, 1.75–3.0 mm wide and 10–15 mm long, in loose patches, yellowish-brownish. Stem 200–450  $\mu\text{m}$  in diameter, not branched, with the exception of lateral subfloral innovations that becoming into normal branch and easily fertilized again. Rhizoids numerous, brownish, obliquely spreading in unclear fascicles or decurrent down the stem, sometimes forming unclear fascicle. Leaves obliquely inserted, contiguous to subimbricate (then enclosed one to another), concave-canalicate to canalicate, obliquely spreading, dorsally decurrent for 2/3–3/3 of stem width, ventrally arcuately inserted, barely or up to 1/2 of stem width decurrent, larger leaves undulate at margin, rarely loosely crispate (in area adjacent to female branch), suborbicular (smaller) to obliquely ovate, 1000–1500 $\times$ 1100–1750  $\mu\text{m}$ . Midleaf cells subisodiametric to oblong, 27.5–44.0 $\times$ 25.0–37.5  $\mu\text{m}$ , thin-walled, trigones moderate to large, bulging; cells along leaf margin 18.5–25.0  $\mu\text{m}$ , thin-walled, trigones moderate to large in size, convex, rarely confluent in tangential wall, external wall thickened. Dioicous. Androecia intercalary, with 2–3 pairs of bracts, bracts smaller than leaves, strongly inflated in lower half and recurved (sometimes revolute at margin) above. Perianth conical, pluriplicate, with 5–6 main plicae, gradually narrowed to the mouth, not turbinate, ca. 1250–1400 $\times$ 850  $\mu\text{m}$ , exerted for 1/4–3/4 of the length; perigynium well developed, ca. 1/3–1/2 of perianth length; female bracts similar to leaves, but wider, sometimes crispate, undulate at margin, sheathing the perianth in lower 1/3 and concave-canalicate ad obliquely spreading above. (Fig. 29: 9–16).

**Comment.** *Solenostoma ovicalyx* Steph. was treated as *Jungermannia (Plectocolea) infusca* (Mitt.) Steph. var. *ovicalyx* (Steph.) Amakawa. The differences suggested by Amakawa (1960: 33) are that “leaves are nearly circular and not so imbricate as in the latter [in var. *infusca* – VB] and the oil-bodies are fewer in number so that they do not seem to fill the cell lumen”. I (as well as Amakawa) could not compare oil-body characteristics in the type material. Other differences are strongly variable, even in the type collections of the both species (holotype of *Plectocolea infusca* Mitt., NY00967542 was studied by me as well), thus I prefer to treat *Solenostoma ovicalyx* as a synonym of *Plectocolea infusca*.

**72) *Solenostoma purpurascens*** Steph., Sp. Hepat. 6: 82. 1917.

**Holotypus:** Java. Goenoeng. 1909. Miede G537/00112201.

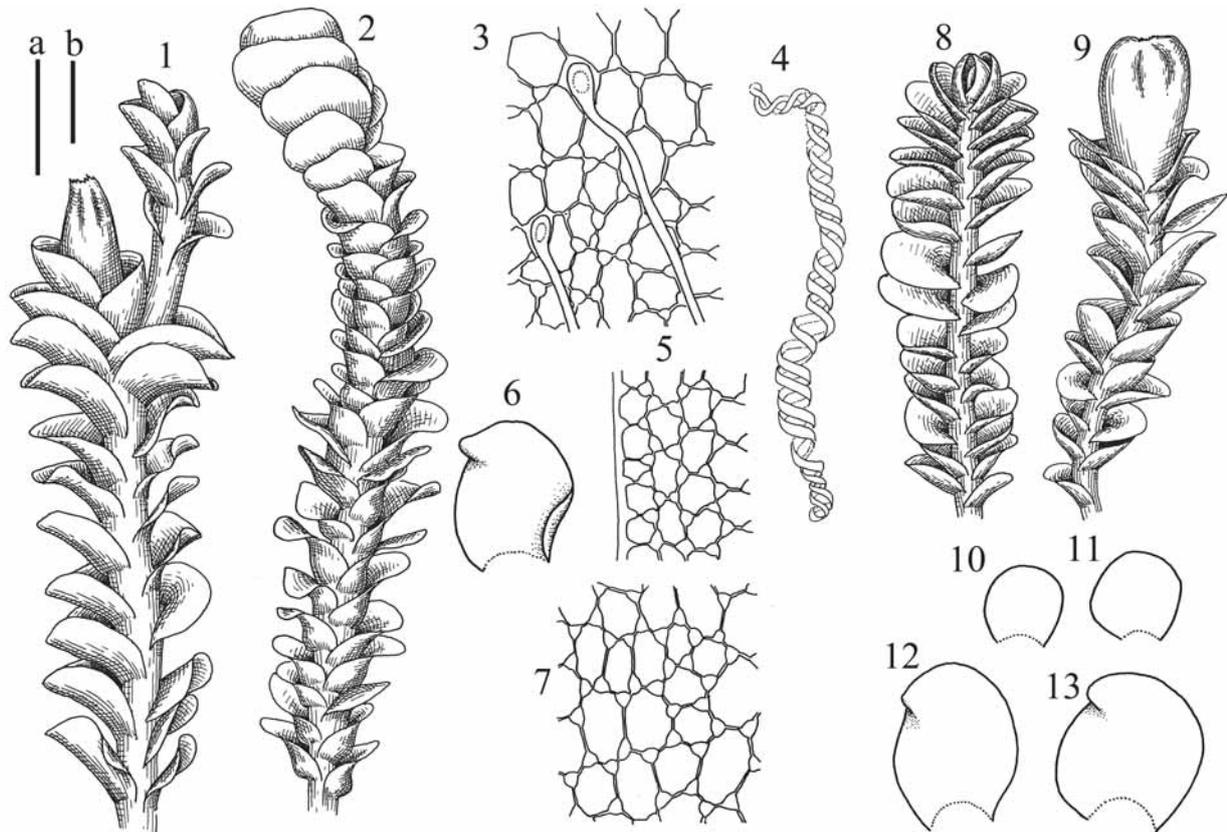


Fig. 30. *Solenostoma purpurascens* Steph., holotype (G537/00112201): 1 – perianthous plant; 2 – male plant; 3 – rhizogenous cells in the midleaf; 4 – elater; 5 – cells along leaf margin; 6 – leaf; 7 – midleaf cells; *Solenostoma pyriferum* Steph., holotype (G668/00067160): 8 – plant habit; 9 – perianthous plant; 10–13 – leaves. Scales: a – 1.25 mm, for 1, 2, 6; b – 100  $\mu$ m, for 5, 7; a – 1 mm, for 8–13; b – 50  $\mu$ m, for 4.

Accepted name: *Plectocolea hasskarliana* (Nees) Mitt., Flora Vitiensis, 405. 1871.

Description. Plants purplish to pink brownish, 2.0–2.5 (near perianth up to 3.0) mm wide and 20–40 mm long. Stem 400–500  $\mu$ m in diameter, not branched, with the exception of lateral subfloral innovations, becoming into normal branch and easily fertilized again. Rhizoids numerous, originated from leaf lamina, decurrent down the stem in distinct fascicle, brownish to purplish. Leaves transversely to subtransversely inserted, dorsally decurrent for 1/2 of stem width, ventrally decurrent for 1/2–2/3 of stem width, undulate, rarely loosely crispate, concave-canaliculate to canaliculate, ovate to elliptic, 1250–1400 $\times$ 1250–1300  $\mu$ m, contiguous to subimbricate or distant, obliquely to (rarer) erect spreading. Midleaf cells oblong, 40–75 $\times$ 37–50  $\mu$ m, thin-walled, with moderate in size, strongly convex trigones, cuticle virtually smooth; cells along leaf margin 25–32  $\mu$ m, unequally thickened, trigones large, bulging, sometimes confluent, cuticle virtually smooth. Dioicous? Perianth conical, pluri-plicate, gradually narrowed to the mouth, ca. 2500 $\times$ 700  $\mu$ m, exerted for 1/4–1/3 of its length, rhizogenous in 2/3–3/4 of its length, composed by elongated cells, cells in the perianth middle 62.5–87.5 $\times$ 25.0–31.5  $\mu$ m, thin-walled, with moderate in size to large, coarsely bulging trigones; peri-

gynium well developed, ca. 2/3 of perianth length; female bracts similar to leaves, but wider, sheathing the perianth and loosely obliquely spreading in upper 1/4–1/3 of their length. (Fig. 30: 1–7).

Comment. *Solenostoma purpurascens* Steph. was synonymized by Váňa (1975a) with *Jungermannia hasskarliana* (Nees) Steph. (= *Plectocolea hasskarliana* (Nees) Mitt.), which I fully accept.

**73)** *Solenostoma pyriferum* Steph., Sp. Hepat. 6: 83. 1917.

Holotypus: Japan. Yizogatake. 1903 U. Faurie (1293) G668/00067160.

Accepted name: *Solenostoma pyriferum* Steph., Sp. Hepat. 6: 83. 1917.

Description. Plants ascending to erect, in loose patches, greenish-brownish to brownish, 1.25–1.5 mm wide and 5–8 mm long. Stem 200–275  $\mu$ m in diameter, loosely flexuous or straight, not branched (even as subfloral innovations). Rhizoids colorless to grayish, originated near ventral side of stem, obliquely spreading (separated or in indistinct fascicles) or decurrent down the stem, but not formed clear fascicle. Leaves subtransversely inserted, shortly, up to 1/4 of stem width decurrent dorsally and transversely to loosely arcuately inserted ventrally, where not or barely decurrent, contiguous to subim-

bricate, concave to canaliculate-concave, suborbicular to transversely elliptic, ca. 650–700×850 µm. Midleaf cells subisodiametric to shortly oblong, 18.5–31.5×15.0–22.5 µm, thin-walled, trigones moderate in size, convex, cuticle virtually smooth; cells along leaf margin 12.5–19.0 µm, thin-walled, external wall thickened, trigones moderate to large, convex, rarely confluent. Dioicous. Androecia intercalary, with 2–3 pairs of bracts, male bracts similar to leaves in size, but strongly inflate in lower 2/3 and obliquely spreading above. Perianth fusiform to clavate, 4–5-plicate in upper 1/3, gradually narrowed to beaked mouth, bistratose in lower 2/3, exerted for 3/4–4/5 of its length; perigynium virtually absent; female bracts similar to leaves, but wider, concave, commonly slightly recurved in upper 1/4 of the length. (Fig. 30: 8–13).

**Comment.** See annotation to *Jungermannia pyriformis* Steph.

**74) *Solenostoma radiceolusum* Mitt., J. Linn. Soc., Botany 8: 156. 1865.**

**Isolectotypus:** Japan. Nagasaki. Oldham G531/265243.

**Accepted name:** *Plectocolea radiceolosa* (Mitt.) Mitt., Trans. Linn. Soc. London 2, 3: 196. 1891.

**Description.** Plants rather erect (if possible to suggest, because only a few separated plants are in the specimen), yellowish-brownish, 2.0–2.5 mm wide and 15–25 mm long. Stem 375–425 µm in diameter, distinctly, but not strongly flexuous, sparsely laterally branched. Rhizoids dense, originated in masses near ventral leaf bases, decurrent down the stem in distinct thick fascicle, some of rhizoids spreading upward of leaf lamina (as in *P. comata*), colorless to grayish. Leaves obliquely to subtransversely inserted, dorsally not or barely decurrent, ventrally subtransversely to arcuately inserted, not or barely decurrent, in general outline leaves are concave, but in dorsal part of them they are convex that gives ‘plagiocliloid’ appearance, leaf margin flat or narrowly incurved in dorsal side and narrowly recurved in ventral side, contiguous to subimbricate, obliquely ovate to widely obliquely ovate, rarely crispate and undulate at the margin, 1100–1300×1100–1600 µm. Midleaf cells oblong, 37.5–50.0×25.0–31.0 µm, thin-walled, with moderate in size to large bulging trigones, cuticle smooth; cells along leaf margin 12–22 µm, obscurely thickened, trigones moderate to large, convex, rarely confluent, cuticle smooth. (Fig. 24: 10–15; 25: 1, 2).

**Comment.** Above placed description is well corresponding with Stephani’s (1901) description as well as with plants in the lectotype in NY (NY00967552!), but disagrees with the Mitten original description (1865), especially in the rhizoid coloration and growth form. This situation (the discrepancy of type specimen features and original description) was also stressed by Amakawa, 1960).

**75) *Solenostoma rostratum* Steph., Kungl. Svensk. Vetensk. Handl. 46(9): 16. 1911.**

**Holotypus:** Juan Fernandez. Masafuera. 1908. Skottsberg (No. 126) G11666/00112195.

**Accepted name:** *?Solenostoma crassulum* (Nees et Mont.) Steph., Sp. Hepat. 2: 59. 1901.

**Description.** Plants ascending, in dense patches, loosely attached to the substratum, 0.75–1.0 mm wide and 3–6 mm long, brownish-yellowish, with common purplish tint in the base of branches and near perianth, perianths always purplish colored, but with discolored tip, noticeable that apices of male branches brownish to brown, but not purplish. Stem 150–200 µm in diameter, brownish, sparsely laterally (sometimes it looks as terminal, but branch origin is in the leaf sinus) branched, no subfloral innovations. Rhizoids sparse to brownish, numerous, originated mostly near ventral leaf base, but not only there, obliquely to erect spreading, in unclear fascicles. Leaves concave, subtransversely inserted, not or barely decurrent dorsally, transversely to arcuately inserted ventrally, where not decurrent, contiguous to subimbricate, transversely elliptic, 375–750×575–1120 µm. Midleaf cells subisodiametric to shortly oblong, 25.0–31.5×17.5–25.0 µm, thin-walled, cuticle smooth, trigones moderate in size, triangle to slightly convex; cells along leaf margin 17.5–27.5 µm, thin-walled, trigones moderate, convex, external wall thickened, cuticle virtually smooth. Dioicous. Androecia intercalary, with 2–3 pairs of bracts; bracts strongly inflated in lower 2/3, in upper 1/3 recurved or sometimes even revolute. Perianth cylindrical to fusiform, 3–4-plicate in upper half, gradually narrowed to not or indistinctly beaked mouth, exerted for 3/5–3/4 of its length, composed by subisodiametric cells; female bracts similar to large leaves, concave. (Fig. 24: 16–20).

**Comment.** *Solenostoma rostratum* Steph. was synonymized with *Jungermannia crassula* Nees et Mont. (= *Solenostoma crassulum* (Nees et Mont.) Steph.) by Vána (1974a).

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