

THE GENUS NECKERA (NECKERACEAE, BRYOPHYTA)
IN THE RUSSIAN FAR EAST

РОД NECKERA (NECKERACEAE, BRYOPHYTA) ВО ФЛОРЕ
РОССИЙСКОГО ДАЛЬНЕГО ВОСТОКА

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Abstract

Three species of *Neckera* new for Russia are added to the moss flora of the southern Russian Far East: *N. goughiana* Mitt., *N. polyclada* Müll. Hal. and *N. konoii* Broth. *Neckera oligocarpa* Bruch was reported by mistake from this region. Key for identification of six species of *Neckera* known in the Russian Far East, including also *N. borealis* Nog., *N. pennata* Hedw. and *N. yezoana* Besch. is provided, description and illustrations are given.

Резюме

На юге российского Дальнего Востока найдены три новых для России вида *Neckera*: *N. goughiana* Mitt., *N. polyclada* Müll. Hal. и *N. konoii* Broth. *Neckera oligocarpa* Bruch приводилась в этом регионе по ошибке, она исключается из флоры мхов юга Дальнего Востока. Для шести видов *Neckera*, включая также *N. borealis* Nog., *N. pennata* Hedw. и *N. yezoana* Besch., приводится ключ для определения, описания и иллюстрации.

KEYWORDS: mosses, *Neckera*, taxonomy, Russia, phytogeography

INTRODUCTION

Recent bryofloristic exploration of the Russian Far East resulted in many interesting findings, including three species of *Neckera* new to Russia, in addition to four species recorded from the area previously. As these species are relatively little known, the key for identification and description of species are provided for the southern part of the Far Eastern region of Russia.

Neckera Hedw., Sp. Musc. Frond. 200. 1801.

Plants medium-sized to large, in loose mats, pale green, often glossy. Primary stems with unlimited growth, creeping, stoloniferous, with small distant leaves; secondary stems spreading, pendent or ascendent, curved upwards, without

hyalodermis and central strand, irregularly or pinnately to bipinnately branched, shoots complanate, rarely terete. Leaves on secondary stems oblong-lanceolate or lingulate, ±asymmetric, more rarely almost symmetric, acute, subobtusate or shortly acuminate, often undulate, margins serrulate distally or from apex to base, inflexed on one side in proximal part; costa short and double or single, to 1/2–3/4 of leaf length; upper leaf cells rhombic, median leaf cells elongate-rhomboidal, basal juxtacostal cells oblong, basal marginal cells subquadrate to short-rectangular. Branch leaves similar to stem leaves but smaller. Autoicous or dioicous. Perichaetial leaves enlarging after fertilization, lanceolate, straight, with

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double or single costa. Capsules immersed, emergent or exerted, erect, straight, oblong-ovate. Operculum conic, with short beak. Annulus persistent, weakly differentiated. Exostome teeth hygrocastique, erect when wet, narrow, upper surface smooth or striolate at base; endostome reduced, segments short, slender and fragile or rudimentary. Spores medium-sized or large. Calyptrae small, cucullate, naked or with few hairs.

Type – *Neckera pennata* Hedw. The genus includes 40-70 species distributed mostly in the temperate zone; in the southern Russian Far East 6 species.

KEY FOR IDENTIFICATION OF SPECIES OF
NECKERA IN THE RUSSIAN FAR EAST

1. Leaves turgid, shoots indistinctly complanate *N. yezoana*
— Leaves scarcely turgid, shoots distinctly complanate 2
2. Costa double and short or rarely single or forked, extending to 0.3-0.5 of leaf length .. 3
— Costa single or forked, extending to 0.3-0.7 of leaf length 4
3. Leaves not or slightly undulate, plants intense light green *N. borealis*
— Leaves strongly undulate, plants whitish-green *N. pennata*
4. Leaves strongly undulate distally, 2.2-2.8 mm long *N. konoii*
— Leaves not or slightly undulate, 1.4-2 mm long 5.
5. Leaves not undulate, acute ... *N. goughiana*
— Leaves weakly undulate, rounded at apex and shortly apiculate *N. polyclada*

Neckera goughiana Mitt., J. Proc. Linn. Soc., Bot., Suppl. 2: 120. 1859. – Fig. 1.

Plants medium-sized, light olivaceous-green, slightly glossy. Secondary stems 2-4(-7) cm long, 1.5-2.0 mm wide with leaves, curved upwards, bipinnately branched, shoots strongly complanate, branches ca. 5 mm long. Leaves of secondary stems oblong to oblong-lingulate, 1.1-1.5(-1.8) × 0.4-0.5 mm, flat to weakly concave, not undulate, slightly asymmetric, acute, margins serrulate at apex, crenulate at mid-leaf, subentire at leaf base, incurved at base on one side; costa single or forked, ending at mid-leaf; laminal cells thin-walled, not porose, upper laminal cells

rhomboidal, 20-25×5-8 μm, median and basal juxtacostal laminal cells elongate-rhomboidal, 25-50×5-7 μm, basal marginal cells subquadrate to short rectangular. Dioicous. Perichaetia on secondary stems, inner perichaetial leaves from sheathing base linear lanceolate, gradually tapering to narrow acumen. Sporophytes absent in collections from Russia. [Capsules deeply immersed (Noguchi, 1989)].

Specimens examined: RUSSIA: **Primorsky Territory:** Partizansk District, Lozovyy Range, Chandolaz Mt., 500-600 m alt., *Ignatov* #07-19, 07-41, 07-56 (MHA); Nakhodka City Area, Sestra Mt., 300 m alt., *Ignatov* #08-245 (MHA).

Differentiation. *Neckera goughiana* differs from most species from the Russian Far East in smaller size of plants, not undulate leaves and long, single or forked costa. Leaves of *N. polyclada* are weakly undulate, with widely acute or subobtuse apices vs. gradually tapering leaf apices in *N. goughiana*.

Distribution and ecology. *Neckera goughiana* was collected in two rather close (ca. 15-20 km from each other) localities in Primorsky Territory, on limestone cliffs in an open oak forest, on a steep N-faced slopes but in rather dry habitats. The species has been considered as endemic of Japan (Honshu, Shikoku, Kyushu) by Noguchi (1989). Later it was reported for China, Shandong by Readfern et al. (1996).

Neckera borealis Nog., J. Hattori Bot. Lab. 16: 124. 1956. – Fig. 2.

Plants medium-sized to large, light green, strongly glossy. Secondary stems 4-6 cm long, 4.0-5.0 mm wide with leaves, prostrate, pinnately branched, shoots strongly complanate, branches ca. 5-8 mm long. Leaves on secondary stems oblong to oblong-lingulate, 1.6-2.0(-2.2) × 0.5-0.7 mm, flat, not or scarcely undulate, asymmetric, widely acute, subobtuse to shortly acuminate, margins serrate distally, minutely serrulate to crenulate or subentire at leaf base, incurved at base on one side; costa mostly short and double, in some leaves single or forked, reaching 1/3-1/2 of leaf length; laminal cells thin-walled, not porose, upper laminal cells rhomboidal, 15-30×5-6 μm, median laminal cells linear, 35-60×5-6 μm, basal juxtacostal laminal cells 30-60×5-8 μm, basal marginal cells short rectangular. Autoicous,

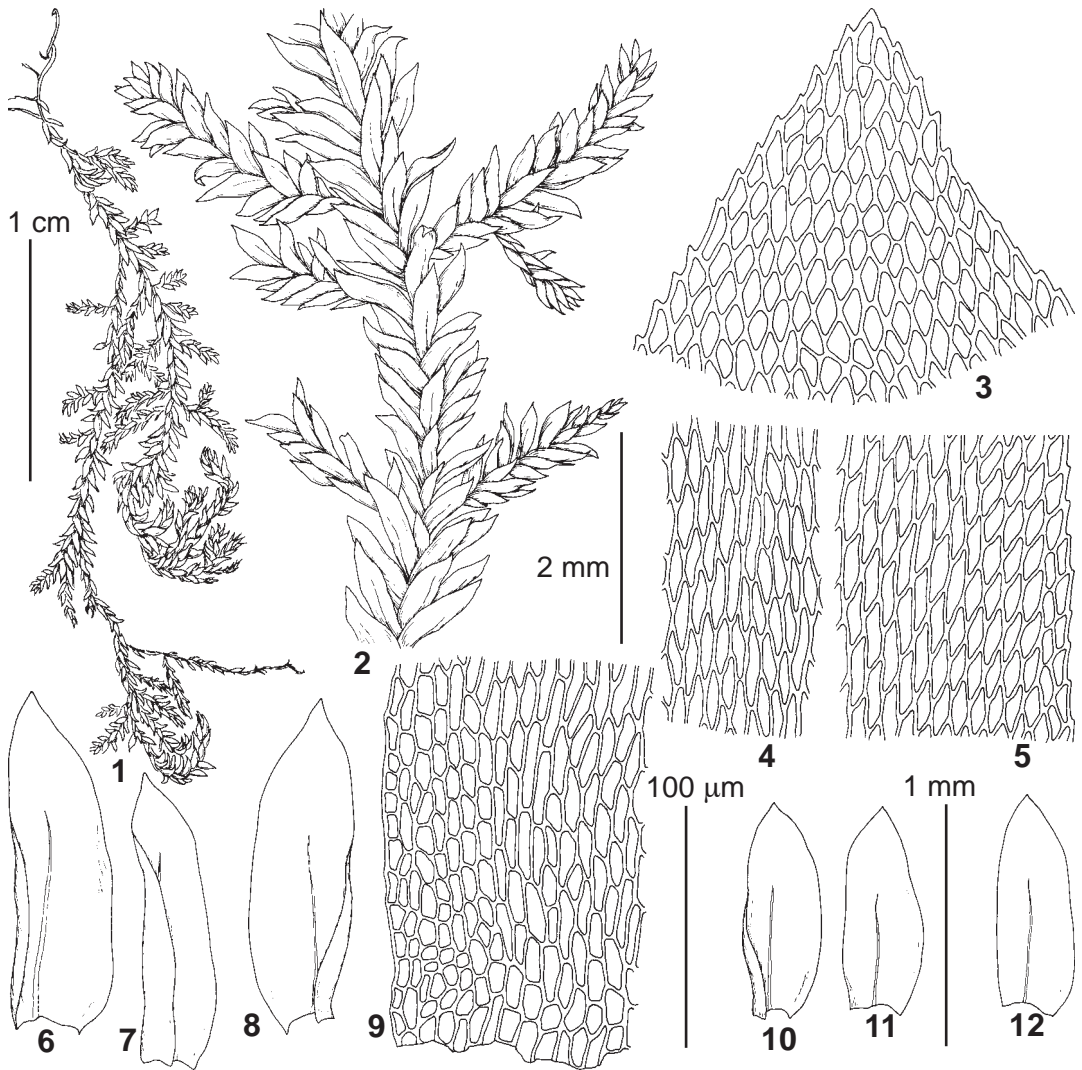


Fig. 1. *Neckera goughiana* Mitt. (from Primorsky Territory, Partizansk District, Chandolaz Mt., Ignatov *et al.* #07-56, MHA): 1-2 – habit, dry; 3 – upper laminal cells; 4-5 – median laminal cells; 6-8 – stem leaves; 9 – basal laminal cells; 10-12 – branch leaves. Scale bars: 1 cm for 1; 2 mm for 2; 1 mm for 6-8, 10-12; 100 μm for 3-5, 9.

perichaetia and perigonia on secondary stems. Inner perichaetial leaves linear lanceolate, gradually tapering to narrow acumen, slightly concave, costa weak, forked or single. Sporophytes frequent. Setae 0.3-0.4 mm long. Capsules immersed, oblong-ovoid, ca. 1.5 \times 1 mm. Operculum conic, with short beak. Exostome teeth pellucid, narrow, variously striolate at base, smooth in most of length. Spores 20-25(-28) μm , minutely papillose.

Specimens examined: RUSSIA: Primorsky Territory: Chuguevka Distr., upper course of Berezovyj

Creek, 800 m alt., Cherdantseva #07-527 (MHA); same distr., Faddevo 23.IX.1976 Bardunov *s.n.* (IRK, dupl. MHA). Sakhalinskaya Province: Kuril Islands, Kunashir Island, Ruruj Mt.: 500 m, Ignatov #06-1122; 450 m, Ignatov #06-1114 (MHA).

Differentiation. *Neckera borealis* is similar to *N. pennata* in plant size, autoicous sexual condition and immersed capsules. However the not or weakly undulate leaves and more intense green colour of plants make them more similar to *Homalia* than to *Neckera*. Occasionally *N. bore-*

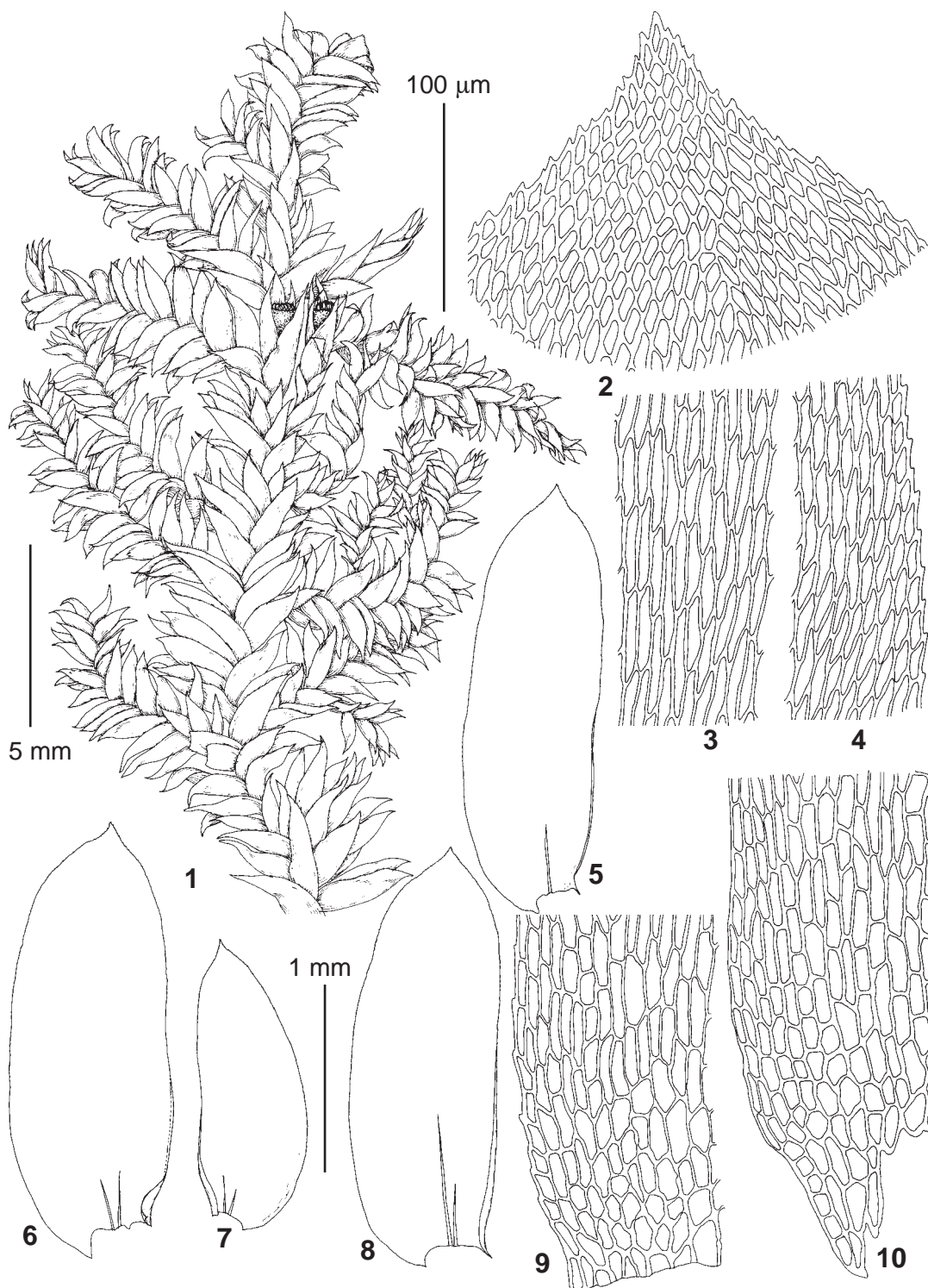


Fig. 2. *Neckera borealis* Nog. (from Primorsky Territory, Chuguevka District, Berezovyy Creek, Cherdantseva #07-527, MHA): 1 – habit, dry; 2 – upper laminal cells; 3-4 – median laminal cells; 5-6, 8 – stem leaves; 7 – branch leaf; 9-10 – basal laminal cells. Scale bars: 5 mm for 1; 1 mm for 5-8; 100 μm for 2-4, 9-10.

alis has plants with weakly undulate leaves when dry, but in wet state they become flat, whereas deep undulation remains in wet leaves of *N. pennata*. Leaves in *N. borealis* are more shortly acute than in the latter species, often rounded-acute, while leaves of *N. pennata* are more narrowly acute and sometimes shortly acuminate. In addition, costa in *N. borealis* is variable and in some, although not many leaves single or forked, to 1/3–1/2, while costa is always short and double in *N. pennata* (the difference in this character is based on a rather limited material and further observations are desirable). Bardunov (1969) introduced one another character: leaf margins are serrulate from apex to base in *N. borealis*, while always smooth in a lower part of the leaf in *N. pennata*. However, we found this character to be variable in both species.

Variation. Plants from Primorsky Territory have slightly smaller leaves than it is indicated by Noguchi (1989) and Bardunov (1969): 1.6–2.2 mm long vs. 2.0–2.5 mm long; spores of *N. borealis* from the Russian Far East and Siberia (Bardunov, 1969) are larger than in plants of Japan (Noguchi, l.c.): 20–25 μm vs. 13–20 μm .

Distribution and ecology. *Neckera borealis* is included as a rare species in the Red Data Book of Russian Federation. In the Russian Far East it was reported from several localities in Kunashir Island and one in the southern part of Sakhalin; in Primorsky Territory it was found twice: at the upper course of Ussuri River and in Chuguevka District, at sources of Beresovyj Creek. It is also known from several localities in South Siberia: Western Sayan Mts. (Krasnoyarsk Territory), Vitimsky Nature Reserve (NE of Baikal Lake) and SE of Baikal Lake, at Pereemnaya and Mishikha Rivers in Buryatia (Cherdantseva & Kazanovsky, 2008). In Japan it occurs in Hokkaido and Honshu (Noguchi, 1989).

The species grows at low elevations, in Kunashir Island up to 500 m alt. and in Primorsky Territory to 800 m alt., in mixed and conifer forests in river valleys and on mountain slopes, on trunks of coniferous and deciduous trees (*Betula*, *Kalopanax*, *Ulmus*, *Abies*, *Populus*). Many labels indicate that collections were made from tree bases or inclined and dead trunks.

Neckera pennata Hedw., Sp. Musc. Frond. 200. 1801. – Fig. 3.

Plants medium-sized to large, light green, whitish- to brownish-green, glossy. Secondary stems 4–7 cm long, 3.0–4.0 mm wide with leaves, curved upwards, pinnately branched, shoots strongly complanate, branches 5–12 mm long, obtuse at apex. Leaves on secondary stems oblong to oblong-lingulate, 2.0–2.8(–3.0) \times 0.7–1.1 mm, not concave, strongly undulate, asymmetric, acute or shortly acuminate, margins serrate distally, minutely serrulate at mid-leaf, subentire or crenulate at leaf base, incurved at base on one side; costa short, double or forked; laminal cells thin-walled, not or scarcely porose, upper laminal cells rhomboidal to vermicular, 25–35 \times 7–9 μm , median and basal juxtacostal laminal cells linear, 40–80 \times 6–10 μm , basal marginal cells well differentiated, isodiametric to short rectangular. Autoicous, perichaetia and perigonia on secondary stems. Inner perichaetial leaves linear lanceolate, gradually tapering to narrow acumen, slightly concave, costa weak, double or forked. Sporophytes frequent. Setae 0.3–0.6 mm long. Capsules immersed, oblong-ovoid, ca. 1.5–2.0 \times 0.8–1.0 mm. Operculum conic, with long oblique beak. Exostome teeth ca. 500 μm long, pellucid, narrow, transversely and obliquely striolate at base, smooth in most of length. Spores 14–25 μm , minutely papillose.

Selected specimens examined: RUSSIA: **Primorsky Territory:** Partizansk District, Olkhovaya Peak, 520 m alt., *Ignatov et al.* #06-2412; 1550–1600 m alt., #06-2620 (MHA); Shkotovo District, Pidan Mt., 400–500 m alt., *Ignatov & Ignatova* #06-2288 (MHA); Ussurijsk District, Ussurijsky Reserve, 150 m alt., *Ignatov & Ignatova* #06-2881 (MHA). **Sakhalinskaya Province:** SAKHALIN: Dolinsk District, Sokol, Belaya Creek, 50 m alt., *Ignatov & Teleganova* #06-601 (MHA); Smirnykh District, Nature Reserve “Vaida Mountain”, 350 m alt., *Ignatov & Teleganova* #06-241 (MHA); Tymovsk District, Khrebtovyj Creek, 350 m alt., *Ignatov & Teleganova* #06-499 (MHA); KURIL ISLANDS: Kunashir: 2 km N of Yuzhno-Kurilsk, 10 m alt., *Ignatov* #06-3010 (MHA); Ruruj Mt., Dalnij Creek, 450 m alt., *Ignatov* #06-1114 (MHA).

Differentiation. The combination of strongly complanate shoots, glossy plants, strongly undulate leaves with short double costa and immersed capsules on short setae differentiate *N. pennata*

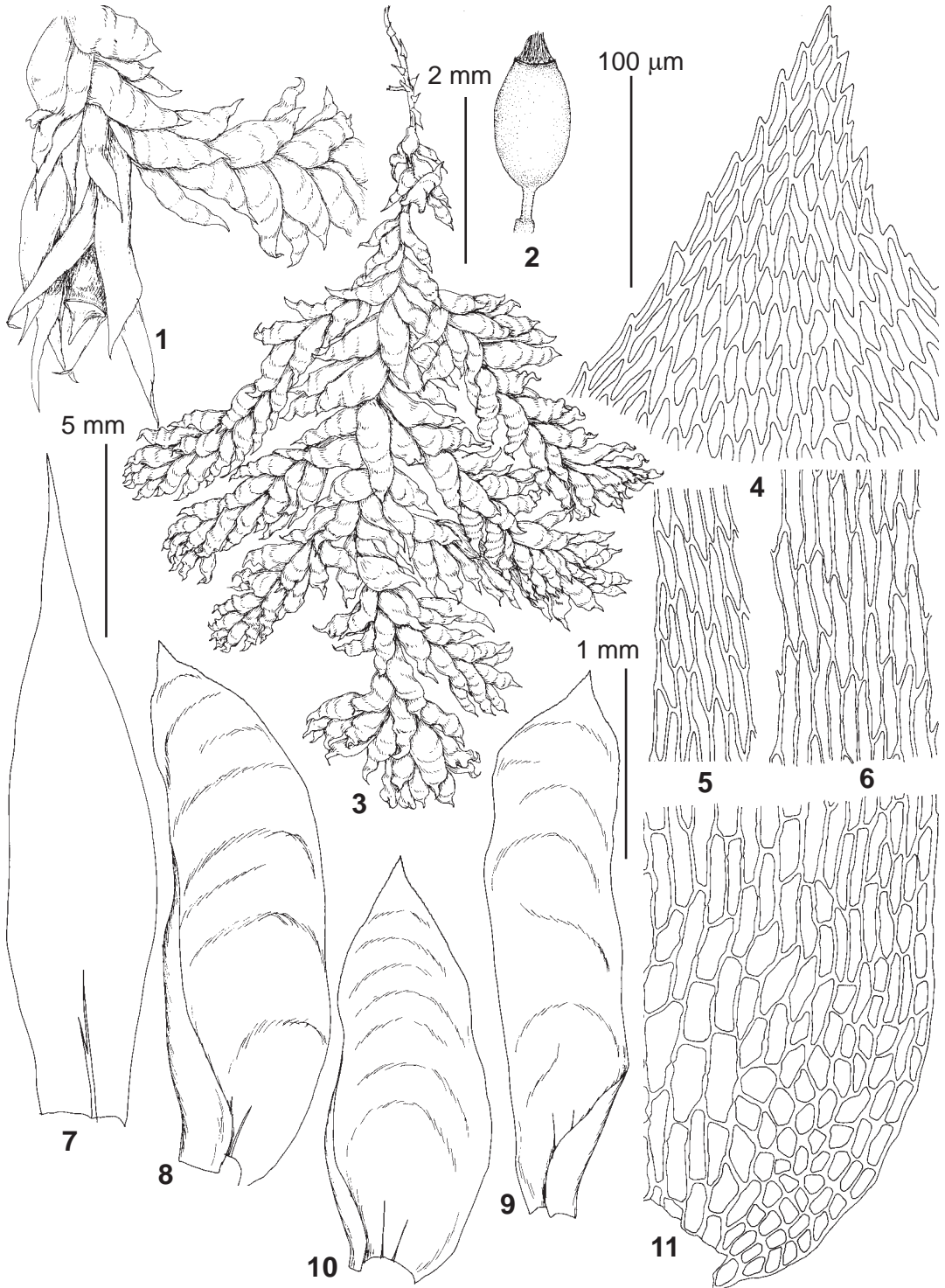


Fig. 3. *Neckera pennata* Hedw. (from Primorsky Territory, Olkhovaya Mt., Ignatov et al. #06-2659, MHA): 1 – perichaetia; 2 – capsule; 3 – habit, wet; 4 – upper laminal cells; 5–6 – median laminal cells; 7 – inner perichaetial leaf; 8–9 – stem leaves; 10 – branch leaf; 11 – basal laminal cells. Scale bars: 5 mm for 3; 2 mm for 1–2; 1 mm for 7–10; 100 μm for 4–6, 11.

from other species. *Neckera konoii* differs in long single costa and dioicous sexual condition; it lacks sporophytes in Russia, but when present, its capsules are exerted on a long setae (Noguchi, 1989). *Neckera yezoana* can be separated from *N. pennata* by variable costa and scarcely complanate, turgid shoots. Differences from *N. borealis* are discussed under that species.

Variation. *Neckera pennata* is rather variable in plant size. Smaller phenotypes from rocks were sometimes identified as *N. oligocarpa*, a closely related species, which is probably absent in the southern part of Russian Far East (see 'excluded taxa'). Leaf undulation is mostly strong, but in some specimens, both from tree trunks and rocks, it is variable, becoming weaker near shoot tips, and in this case the choice between *N. pennata* and *N. borealis* is problematic.

Ecology. *Neckera pennata* is frequent and abundant on tree trunks, both of coniferous (fir and spruce) and deciduous trees (*Acer*, *Ulmus*, *Tilia*, *Populus*); more rarely it grows on rocks, in the forest belt and above the tree line.

Distribution. Common in the continental part of Russian Far East and on Sakhalin, rare in Kuril Islands. Widespread species, known in Eurasia from Arctic to South Europe, Iran, China, Japan, in North, Central and South America, South Africa, Australia, New Zealand. However, its frequency and abundance decreased greatly in some areas of Europe, including the broad-leaved forest zone of European Russia (Smith, 2004; Ignatov & Ignatova, 2004).

Neckera yezoana Besch., Ann. Sci. Nat. Bot., sér. 7, 17: 358. 1893. – Fig. 4.

Plants large, pale green in upper part, light brownish-green below, slightly glossy. Secondary stems 4-5 cm long, 3.0-4.0 mm wide with leaves, straight or arcuate, pinnately branched, shoots scarcely complanate, branches 5-8 mm long, obtuse at apex. Leaves on secondary stems turgid, ovate-oblong, 3.0-3.5×0.9-1.3 mm, concave, deeply undulate, almost symmetric, gradually tapering to apex, acute or acuminate, margins minutely crenulate or subentire distally, entire at leaf base, incurved at base on one side; costa slender, single or forked, short or ending at mid-leaf; laminal cells thick-walled and porose, upper laminal cells rhomboidal, 15-25×10-12

µm, median laminal cells linear, 40-60×10-12 µm, basal juxtacostal laminal cells linear, 60-90×10-12 µm, basal marginal cells well differentiated, isodiametric to short rectangular, dark-coloured and strongly porose, forming small alar group. Autoicous, perichaetia and perigonia on secondary stems or on branches. Inner perichaetial leaves linear-lanceolate, gradually tapering to long and narrow acumen, concave, costa weak, forked. Sporophytes frequent. Setae ca. 0.3 mm long. Capsules deeply immersed, oblong-ovoid, ca. 1.5-1.7×0.9-1.1 mm. Operculum conic, with oblique beak. Exostome teeth 350-400 µm long, pellucid, smooth. Spores 25-30 µm, minutely papillose.

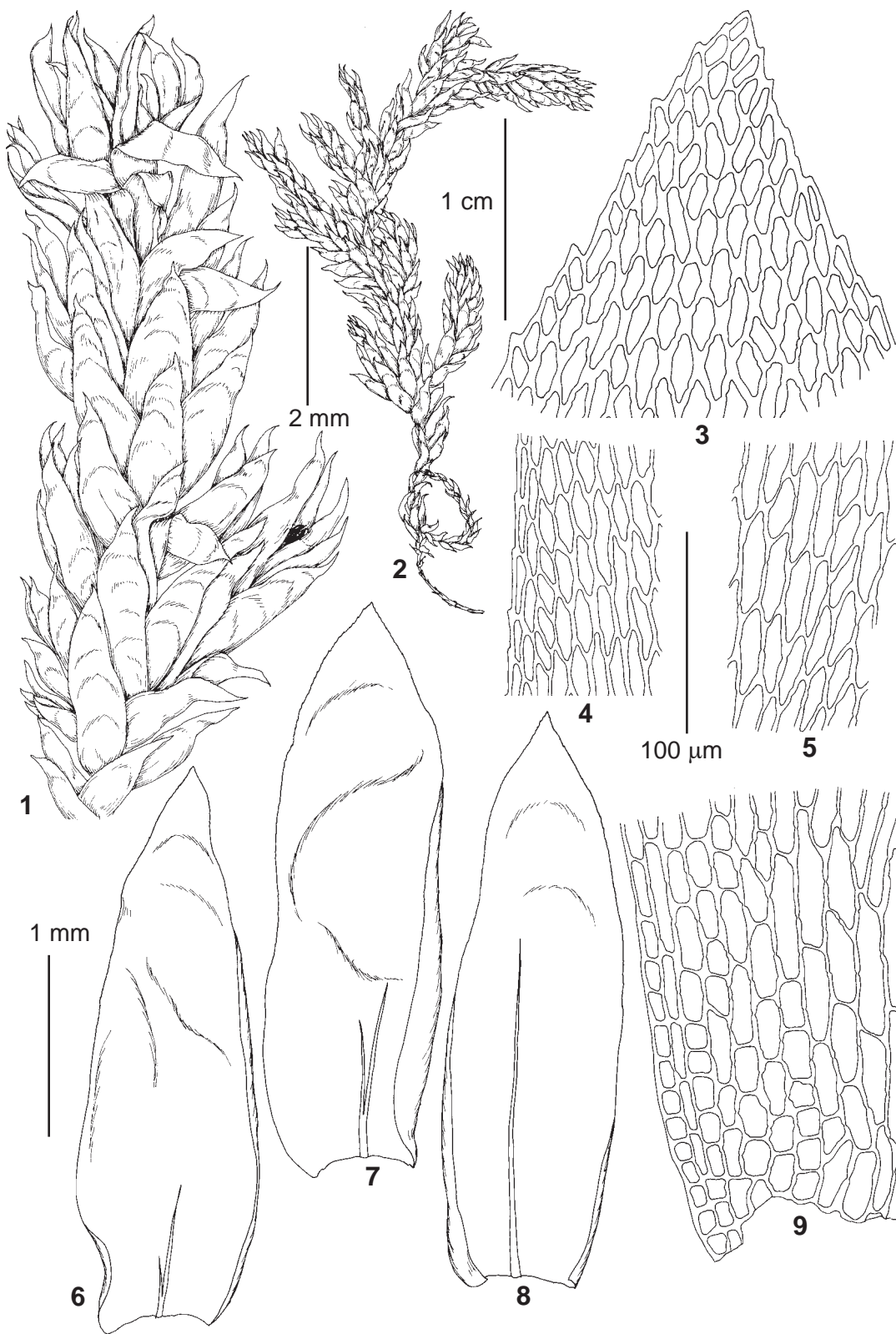
Selected specimens examined: RUSSIA: **Sakhalinskaya Province:** KURIL ISLANDS, KUNASHIR: Saratovka, 20 m alt., *Ignatov #06-1333* (MHA); Ruruy Mt., 50 m alt., *Ignatov #06-1893*; 150 m alt., *Ignatov #06-1265* (MHA); Tyatya Mt., 40 m alt., *Ignatov #06-1823* (MHA).

Differentiation. Turgid, not or indistinctly complanate shoots of *N. yezoana* easily separate it from other species of the genus; thick-walled and strongly porose laminal cells and variable costa are additional diagnostic characters.

Distribution and ecology. *Neckera yezoana* occurs on South Kuril Islands, it is quite common in Kunashir, but was not found in the next island, Iturup and northwards. It was also collected on small islands at Petr Velikij Bay of the Sea of Japan (Gorobetz, 2004), but the special search in the continental coastal area close to these localities gave no results. It grows in various types of forests on trunks of *Alnus*, *Ulmus*, *Tilia*, *Acer*, *Abies*, *Picea*, *Hydrangea*, *Kalopanax*, *Taxus*, *Juniperus*, more rarely on rocks, at 20-200 m alt. It occurs throughout Japan and was reported from many provinces in China (Readfern et al., 1996) and in Korea (Noguchi, 1989).

Neckera polyclada Müll. Hal., Nuovo Giorn. Bot. Ital., n. s. 3: 114. 1896. – Fig. 5.

Plants medium-sized, pale or yellowish-green, slightly glossy. Secondary stems 2-4 cm long, 2-3 mm wide with leaves, straight or curved upwards, pinnately branched, shoots strongly complanate, branches ca. 5-7 mm long, sometimes flagelliform at apex. Leaves on secondary stems oblong-lanceolate, 1.7-2.0×0.6-0.8 mm,



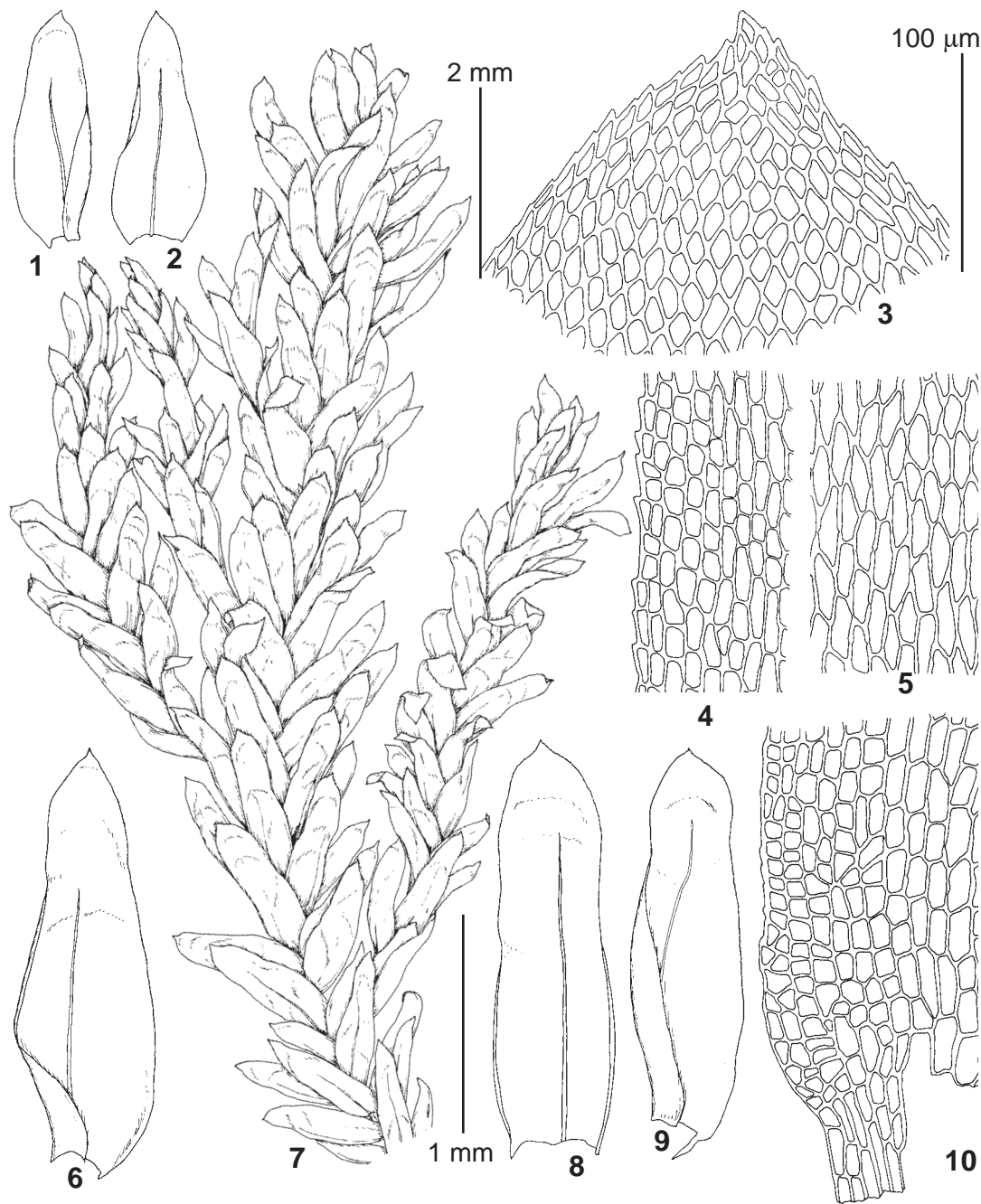


Fig. 5. *Neckera polyclada* Müll. Hal. (from Primorsky Territory: Partizansk District, Lozovyj Range, Chandolaz Mt., Ignatov #07-43, MHA): 1, 2 – branch leaves; 3 – upper laminal cells; 4-5 – median laminal cells; 6, 8-9 – stem leaves; 7 – habit, dry; 10 – basal laminal cells. Scale bars: 2 mm for 7; 1 mm for 1-2, 6, 8-9; 100 μm for 3-5, 10.

Fig. 4. (see page 184) *Neckera yezoana* Besch. (from Sakhalinskaya Province, Kuril Islands, Kunashir, Ignatov #06-1333, MHA): 1, 2 – habit, dry; 3 – upper laminal cells; 4-5 – median laminal cells; 6-8 – stem leaves; 9 – basal laminal cells. Scale bars: 1 cm for 2; 2 mm for 1; 1 mm for 6-8; 100 μm for 3-5, 9.

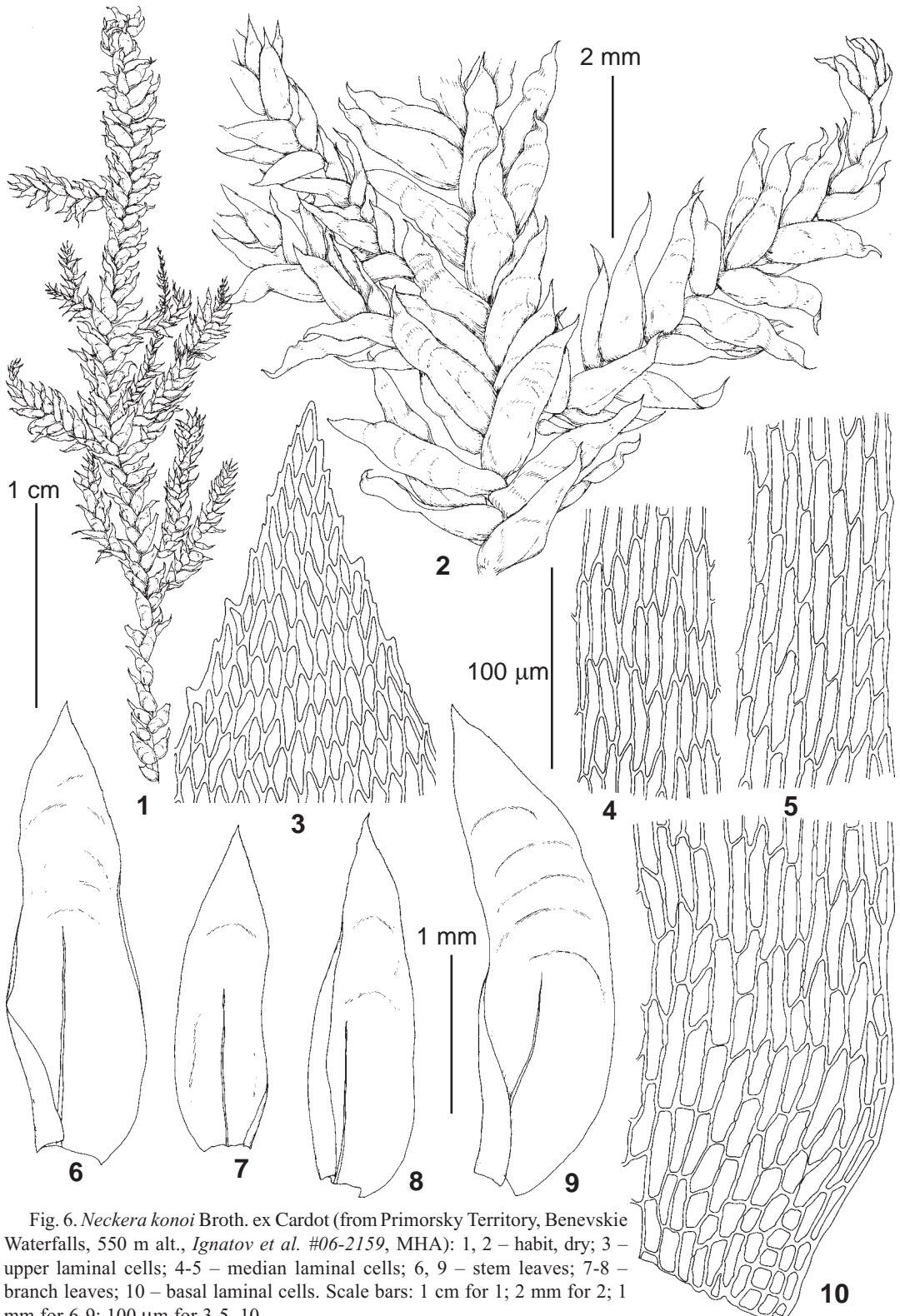


Fig. 6. *Neckera konoi* Broth. ex Cardot (from Primorsky Territory, Benevskie Waterfalls, 550 m alt., Ignatov *et al.* #06-2159, MHA): 1, 2 – habit, dry; 3 – upper laminal cells; 4-5 – median laminal cells; 6, 9 – stem leaves; 7-8 – branch leaves; 10 – basal laminal cells. Scale bars: 1 cm for 1; 2 mm for 2; 1 mm for 6-9; 100 µm for 3-5, 10.

weakly concave, slightly undulate distally, almost symmetric, widely acute to subobtuse, margins serrulate from apex to mid-leaf, subentire or minutely crenulate at leaf base, incurved at base on one side; costa single, extending to $2/3$ – $3/4$ of leaf length; laminal cells with moderately thickened porose walls, upper laminal cells ovate-rhomboidal, $15\text{--}20 \times 10\text{--}14 \mu\text{m}$, median laminal cells oblong, irregular in size, $20\text{--}40 \times 8\text{--}15 \mu\text{m}$, basal juxtacostal laminal cells linear, $35\text{--}60 \times 10\text{--}14 \mu\text{m}$, basal marginal cells subquadrate to short rectangular, forming small alar group. Dioicous. Gametangia and sporophytes absent in collections from Russia. [Capsules on long setae, exserted (Noguchi, 1989)].

Specimens examined: RUSSIA: **Primorsky Territory:** Partizansk District, Lozovyj Range, Chandolaz Mt., 200–750 m alt., *Ignatov #07-43* (MHA); same place, 10.VIII.1980, *Gambaryan s.n.* (VLA).

Differentiation. Plants of *Neckera polyclada* from Primorsky Territory are smaller than described by Noguchi (1989), but fit the latter circumscription in almost symmetric and slightly undulate leaves with long single costa and comparatively short and porose laminal cells. *Neckera goughiana* which grows in the same locality and habitats with *N. polyclada* differs in bipinnate branching, shorter and more gradually tapering and not undulate leaves, shorter costa, and more thin-walled, non-porose laminal cells. Both species lack sporophytes in Russia, but *N. goughiana* is known as having immersed capsules, while *N. polyclada* has exserted ones.

Distribution and ecology. *Neckera polyclada* is a calciphilous species, collected several times in one limestone area in Primorsky Territory, on Lozovyj Range (Chandolaz Mt.), on dry shaded limestone cliffs in an open oak forest on a steep N-faced slope. The species is known in Japan (Honshu, Shikoku) and several provinces of China (Noguchi, 1989; Readfern et al., 1996).

Neckera konoii Broth. ex Cardot, Bull. Soc. Bot. Genève 3: 277. 1911. – Fig. 6.

Plants large, pale green in upper part, light brownish-green below, glossy. Secondary stems 6–8 cm long, 3–4 mm wide with leaves, straight or turned upwards, pinnately or irregularly pinnately branched, shoots foliage complanate and

sometimes slightly homomallous, branches 8–15 mm long, attenuate to flagelliform at apex. Leaves on secondary stems oblong-lanceolate, $2.2\text{--}2.8 \times 0.9\text{--}1.1 \text{ mm}$, slightly concave, deeply undulate, asymmetric, gradually tapering to apex, acute or acuminate, margins serrulate at apex, minutely crenulate to the base, incurved at base on one side; costa single, extending to $1/2$ – $2/3$ of leaf length; laminal cells thin-walled, scarcely porose distally, rather strongly porose proximally, upper laminal cells elongate-rhomboidal and vermicular, $20\text{--}25 \times 8\text{--}10 \mu\text{m}$, median and basal juxtacostal laminal cells linear, $35\text{--}60 \times 7\text{--}10 \mu\text{m}$, basal marginal cells isodiametric to short rectangular, thick-walled and strongly porose, dark-coloured, forming small alar group. Branch leaves similar to stem leaves. Dioicous, perichaetia and perigonia on secondary stems. Inner perichaetial leaves linear-lanceolate, gradually tapering to long and narrow acumen, concave. Sporophytes unknown in Russia. [Capsules on long setae, exserted (Noguchi, 1989)].

Specimen examined: RUSSIA: **Primorsky Territory:** Lazo District, Elomovskij Creek, Benevskie Waterfalls, 550 m alt., *Ignatov et al. #06-2159* (MHA).

Differentiation. Large plants with strongly undulate leaves resemble common *N. pennata*; however attenuate ends of branches and often slightly homomallous leaves separate *N. konoii* from the latter species. Microscopically, leaves of *N. konoii* are more gradually tapering to apex, costa is single and long. *Neckera yezoana* differs from *N. konoii* in not complanate foliage, more strongly incrassate cell walls and autoicous sexual condition.

Distribution and ecology. Noguchi (1989) reported *Neckera konoii* from Japan and Korea, where it grows on tree trunks and occasionally on rocks. In Russia it was collected only once in Primorsky Territory, near Benevskie Waterfalls at Elomovskij Creek, on vertical surface and in crevices of moist cliffs, at 550 m alt.

EXCLUDED TAXON

Neckera oligocarpa Bruch (*N. pennata* var. *tenera* Müll. Hal.) was reported for the south of the Russian Far East in the recent check-list of mosses of East Europe and North Asia (Ignatov, Afonina, Ignatova et al., 2006) by mistake, but there is another record from the region by Brothe-

rus et al. (1916). However, all so-called collections from the southern part of the Russian Far East studied by us were re-identified as *N. pennata*. The difference between these two species had not been treated identically until Appelgren & Cronberg (1999) provided a careful comparison of them and indicated that the most reliable characters of *N. oligocarpa* are emergent capsules on setae 0.75-0.9 mm long vs. immersed ones, on setae 0.3-0.6 mm long in *N. pennata*, shorter leaves, 1.5-2.0 mm vs. 2.1-3.3 mm in *N. pennata*, and widely acute leaves vs. more narrowly acute to shortly acuminate ones in *N. pennata*. *Neckera oligocarpa* is known from Scandinavia, it was found in NW European Russia, Karelia (Volkova & Maksimov, 1993) and Murmansk Province (Schljakov & Konstantinova, 1982). Records from other parts of Russia are in need of a revision.

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