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A SURVEY OF MARCHANTIALES IN THE RUSSIAN FAR EAST II. WIESNERELLACEAE – A NEW FAMILY FOR THE RUSSIAN LIVERWORTS FLORA

ОБЗОР ПОРЯДКА MARCHANTIALES НА РОССИЙСКОМ ДАЛЬНЕМ ВОСТОКЕ II. WIESNERELLACEAE – НОВОЕ СЕМЕЙСТВО ДЛЯ ФЛОРЫ ПЕЧЕНОЧНИКОВ РОССИИ

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Abstract

In the course of revision of Marchantiales for the Russian Far East, *Wiesnerella denudata*, the only species of the monotypic family Wiesnerellaceae is recorded for the first time in Russia. The plant has been found in Iturup and Shikotan Islands of South Kurils), and this is the northernmost locality in the world, the nearest previously known locality being in Honshu in Japan and on the southern tip of the Korean Peninsula. The morphological description and figures based on specimens from Russia are provided.

Резюме

В ходе проведения ревизии порядка Marchantiales для российского Дальнего Востока, в двух образцах собранных на Южных Курилах (острова Итуруп и Шикотан), выявлено новое для России монотипное семейство печеночников Wiesnerellaceae. Для единственного вида семейства, *Wiesnerella denudata* – это самое северное местонахождение в мире. Ближайшие районы, из которых этот вид известен, находятся на о-ве Хонсю (Япония) и юге Корейского полуострова. Приводится описание вида, иллюстрации, обсуждается распространение.

KEYWORDS: *Wiesnerella denudata*, Wiesnerellaceae, the Russian Far East, distribution, taxonomy, Hepaticae

The family Wiesnerellaceae iincludes the only one species, *Wiesnerella denudata* (Mitt.) Steph. The genus *Wiesnerella* was described by Schiffner (1896), based on the collection from Javanese volcano Gedeh (=Gede), where it was collected in inner side of crater. Already in the time of gathering Schiffner has realized that the plant as a very peculiar one. As he wrote, by the general habit of vegetative plants *Wiesnerella* resembled *Lunularia*, but without semi-crescentic gemmae cups characteristic to the latter. Within *Wiesnerella* Schiffner (l.c.) described the only *W. javanica* Schiffn. Later Stephani (1898) transferred *Dumortiera denudata* Mitt. described from the East Himalayas (Mitten, 1861) to *Wiesnerella* and synonymized it with *W. javanica* with the former as priority.

One more species of the genus has been described from Xizang Province of China, *Wiesnerella fasciaria* (Gao & al., 1981). According to the original description and illustrations (Gao & al., 1981), *W. fasciaria* differs from *W. denudata* in (1) having narrower thallus – 30 mm length and 2 mm width; (2) having dark green band in the midline of thallus dorsal surface; (3) very elevated pores above epidermis surrounded by 6 concentric rows of 6 cells in each. However our observations and cited literature indicate that the above mentioned features are very variable and *W. fasciaria* may be regarded as a form of *W. denudata* from shady and wet place. Probably this results the acceptance of *Wiesnerella* in the current classification is as a monospecific genus (Bischler, 1998; Frey, 2009), although nobody formally still not synonymized

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W. fasciaria with *W. denudata* . We were not able to study the type of *W. fasciaria* and regard it as a synonym of *W. denudata* provisionally.

The main characteristics of *Wiesnerella* include: (1) simple air pores; (2) ventral scales in 2 rows, each with single appendage; (3) sporophytes on stalked receptacles, with the receptacles bearing compound air pores and the stalk with 2 rhizoid furrows; (4) bivalved involucres; (5) absence of pseudoperianth; (6) capsule dehiscent by 4 to 6 irregular valves; (7) specialized asexual structures absent. Inoue (1976) described a new family Wiesnerellaceae basing on the sole genus with one species. In the recent treatments (Crandall-Stotler et al., 2009) this family regarded as related to Ricciaceae, despite strong contrast in habit.

Wiesnerella denudata was very unexpected to be found in Kuril Islands since the species is not known in the neighboring Hokkaido in Japan. Our records is the northernmost in the world and the first record of the family participating in the boreal forest communities. Below we present the morphological description of *Wiesnerella denudata* largely based on materials from the Russian Far East.

WIESNERELLACEAE Inoue, Ill. Jap. Hepat. 2: 192. 1976.

Wiesnerella Schiffn., Oesterr. Bot. Z. 46: 86. 1896.

Wiesnerella denudata (Mitt.) Steph., Sp. Hepat. 1: 154. 1899. – *Dumortiera denudata* Mitt., J. Proc. Linn. Soc. 5: 125. 1860. – *Wiesnerella javanica* Schiffn. Oesterreich. Bot. Zeit. 46: 87. 1896. – ?*Wiesnerella fasciaria* C. Gao & K.C. Chang, Acta Bot. Yunnan. 3: 390. 1981. *syn. nov. prov*.

Illustrations: Kashyap, 1929 (p. 45, pl. VI: fig. 1-2); Horikawa, 1930 (p. 623, fig. 1; p. 624, fig. 2); Inoue, 1976 (pp. 150-151, pl. 75); Piippo, 1988 (p. 101, fig. 5: e-g; p. 102, fig. 6); Huang & al., 2012 (p. 319, fig. 1; p. 320, fig. 2).

Plants thallose, terrestrial, desiccation intolerant; pale to dark green without secondary pigmentation; prostrate; forming more or less pure and large patches. **Thalli** thin, large, 20-30 mm long, (4-)8-12 mm wide; closely or distantly furcate; **segments** linear-lingulate to oblong; **apex** retuse, ventral scales appendages slightly overlapping thallus apex; **upper surface** slightly concave; not reticulate; pores visible with hand-lens, whitish colored; **thallus margins** plane to undulate, often recurved; lighter colored than median parts. **Dorsal epidermis** delicate, mostly colorless; **cells** subisodiametric, (25-)30-40(-55) мм, with thin walls, trigones virtually absent; with scattered obscurely granulate oil-cells; **pores** simple, slightly elevated above epidermis, one per air-chambers, large, 35-42 мм in diameter; surrounded by 3-4(-6) concentric rows of 6-9 cells in each, cell walls thin. **Aerenchyma** compact, occupying ca. 1/5-1/4 of the thallus height in the middle; **air chambers** with few free secondary filaments, each terminated by rounded cell, in one layer; **ventral tissue** parenchymatous, consisting of thin-walled cells; 4/5–3/4 the thallus thickness in the middle; with few oil-cells; without sclerotic cells or mucilage cavities**; hyaline thallus border** (in frontal view) usually narrow, composed of 1-3(-4) rows of elongate cells. **Midrib** thallus 250–600 мм thick in middle part of cross-section; ±relatively well-defined below. **Rhizoids** smooth and pegged, hyaline to whitish; densely covering ventral surface of midrib of thallus. **Ventral scales** very delicate; hyaline to reddish; in one longitudinal row on each side; semicircular to lunulate; sometimes with a few slime-papillae on margin; **body** 600-900 мм long and (420-)500-700 мм wide; with numerous scattered obscure oil-cells, 10-25 мм in diameter; **appendage** one per scale, orbicular, strongly constricted basally, margins irregularly serrate or irregularly weakly crenulate**,** (200-)400- 600 мм long and (200-)300-400 мм wide, apex rounded. No asexual reproduction. [**Monoicous. Antheridia** in subsessile or shortly peduncled cushions surrounded by a few scales situated on leading thallus behind or before the female receptacle. **Gynoecia** terminal, arising in apical notch of leading thallus; **stalk of receptacle** hyaline to whitish-green, naked, to 4 mm long, with two rhizoidal furrows. **Archegonial scales** at base a lanceolate to almost linear. **Carpocephalum** green, **disc** convex; 4-7-lobed, each involucre with a single sporophyte; **pseudoperianth** lacking. **Capsule** globose, brownish black, dehiscence by 4-6 irregular valves. **Outer cells of capsule** with walls brown, with annular bands. **Spores** dark brown, spherical, reticulate, winged, wing broad, 34-38 мм in diameter. **Elaters** 2-spiral, to 340 мм long (Kashyap, 1929; Horikawa, 1930; Piippo, 1998; Huang & al., 2012)].

Differentiation: *Wiesnerella* is a rather easily recognized liverwort even in sterile condition and even in the field. It may be distinguished by the following combination of characters: (1) green to dark green colored dorsal thallus surface; (2) thin thallus with pores visible under hand-lens as whitish points; (3) air chambers with few free secondary filaments, each terminated by round cell; (4) very delicate, hyaline to reddish, broadly lunulate ventral scales with semicircular appendage.

Distribution. This is presumable temperate to subtropical Himalaya-East Asian species. It stretches the area from the eastern Afghanistan, India, Nepal and Bhutan, via discontinuous line in southern China (northernmost in Zhejiang) to Pacific region, from temperate to tropical zone: South Kurils (the present paper) to Korea, Japan, Taiwan, Java and Sumatra (Kashyap, 1929; Piippo, 1988; Yamada & Choe, 1997; Bapna & Kashroo, 2000; Yamada & Iwatzuki, 2006; Long, 2006; Katagiri & Furuki, 2012; Huang & al., 2012; Piippo & Koponen, 2013).

The localities of *Wiesnerella denudata* in South Kurils are distant from the nearest records in Honshu (Yamada & Iwatzuki, 2006) and Korean Jeju Island (Choi, pers. comm.); it is likely that the species occur also in Hokkaido.

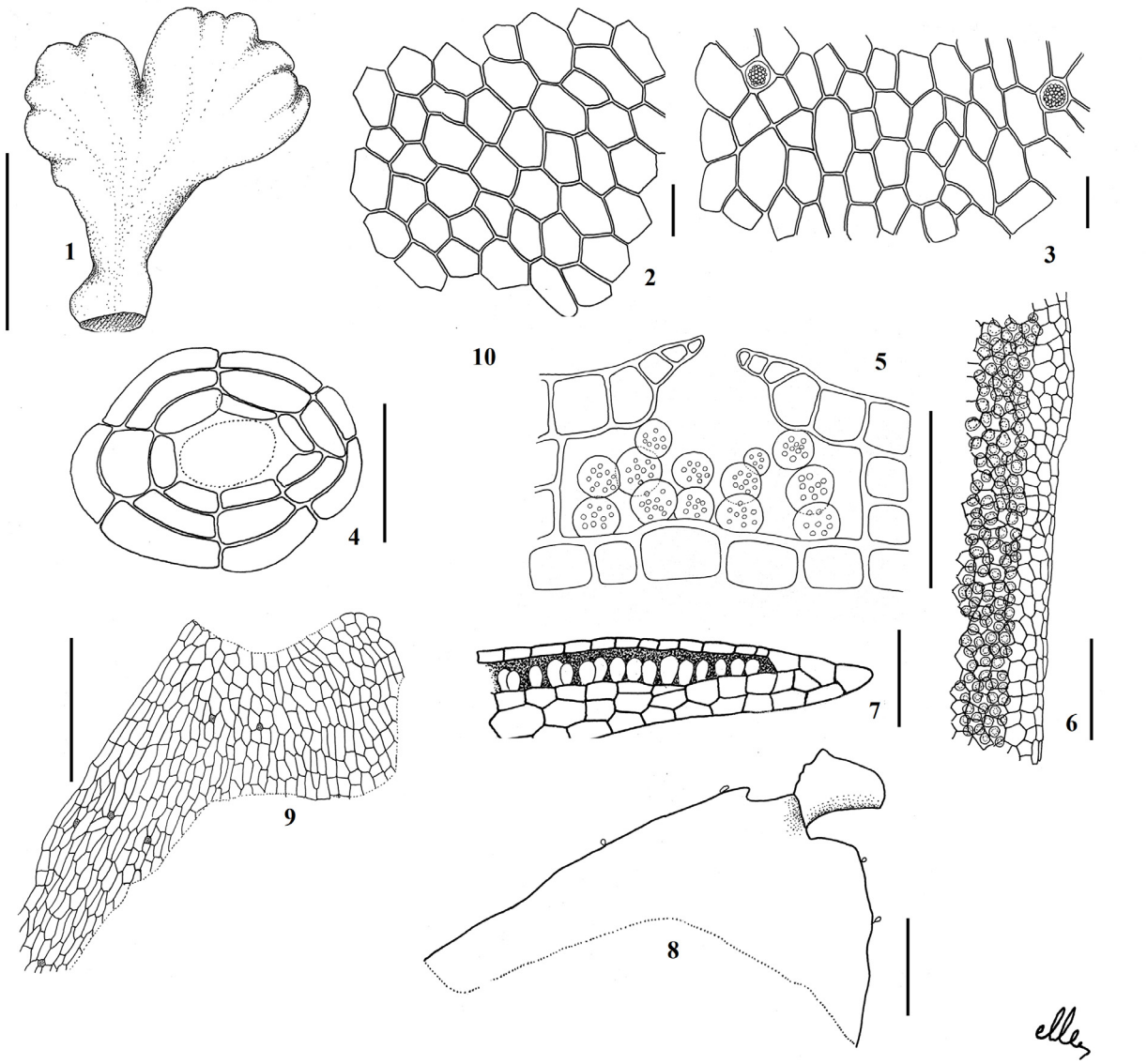

Fig. 1. *Wiesnerella denudata* (Mitt.) Steph. (from Sakhalinskaya Province, Kuriles Islands, *Bakalin #K66-14b-05*, Fig. 1. *Wiesnerella denudata* (Mitt.) Steph. (from Sakhalinskaya Province, Kuriles Islands, *Bakalin #K66-14b-05*, VBGI). 1 – habit of sterile plant, dorsal view; 2-3 – dorsal epidermis of thallus; 4 – air-pore from dorsal epidermis of thallus; 5 – part of transverse section with air-pore; 6 – margin of thallus; 7 – transverse section of margin of thallus; 8 – ventral scale with appendage; 9 – body of ventral scale. Scale bars: 10 mm for 1; 400 µm for 7-9; 150 µm for 5-6; 40 µm for 2-3; 20 µm for 4.

Ecology: According to literature data, *Wiesnerella denudata* grows on moist to wet soil rich in humus, as well as on cliffs near streams and especially near the waterfalls, in open to diffusely shaded places, but not in full shade. Within South Kurils and Honshu, where authors observed it in the field, the species grew in various types of communities starting northward from crooked *Alnus* forests (although not zonal there and occurring rather due to severe wind regime in the islands) to *Abies-Picea-Taxus* forests, enriched by many East Asian plants such as *Toxicodendron*, *Sasa*, etc., and to broad-leaved deciduous forests enriched by some evergreen trees in the middle part of Honshu. In places where we collected, the most common species growing intermingled with *W. denudata* was *Conocephalum salebrosum* Szweyk., Buczk. & Odrzyk.

Specimens examined: **RUSSIA:** Sakhalinskaya Province, Kuriles Islands, Iturup Island, Chyornye Skaly cliffs, about 8 km to the North from Reydovo Settlement along Okhotsk Sea Coast, 45°15'32''N-148°10'23'', 15 m alt., in crevices of sheer cliffs shaded by *Alnus* along sea cost, in mixture with *Conocephalum salebrosum*, 23.IV.2006, Bakalin ## K66-2a-05, K66-14b-05 (VBGI, duplicate in KPABG); Shikotan Island, Area of Malokurilsk Village, 43°52'17''N, 146°51'18''E, 100 m alt., *Abies-Picea* forest with admixture of *Taxus* and cover of grass and mosses, bank of stream, in mixture with *Conocephalum salebrosum*, 23.VIII.2007, Bakalin #P K37-5-07 (VBGI). **JAPAN:** Honshu, Tottori Pref., Tohaku-gun, Yurihama-cho, Urushibara, Fudo Water Fall, 35°28'55.1"N 133°56'09.3"E, 42 m alt., broadleaved (deciduous and evergreen)-coniferous (*Cryptomeria* and *Chamaecyparis*) shrub-by forest, very wet cliff in spray zone of waterfall, in part shade, 11.III.2013, Bakalin #J-2-19-13 (VBGI); Kokufu-cho,

Amedaki, Amedaki Water Fall, 35°28'42.5"N 134°24'04.0"E, 391 m alt., wet cliff in open place in the spray zone of waterfall, 12.III.2013, Bakalin #J-10-7-13 (VBGI); Kyushu, Kumamoto Pref., Yamaye, ca. 32°47'N 130°44'E, 100 m alt., stone wall, IV.1951, Mayebara (Hepaticae Japonicae, Ser. 4., 1951, No. 200, specimen in SAP); Miyazaki Pref., Obi, ca. 31°37'N 131°19'E, 100 m alt., on wet soil, V.1946, Hattori (Hepaticae Japonicae, Ser. 1, 1946, No. 44, specimen in SAP).

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