

CAMPYLOPUS UMBELLATUS (ARN.) PARIS (LEUCOBRYACEAE, MUSCI) –
A NEW SPECIES FOR RUSSIA

CAMPYLOPUS UMBELLATUS (ARN.) PARIS (LEUCOBRYACEAE, MUSCI) –
НОВЫЙ ВИД ДЛЯ РОССИИ

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Abstract

Campylopus umbellatus (Arn.) Paris is collected in southern part of Kamchatka Peninsula, Russian Far East. This locality is far beyond the main range of this species, that was known before northward to Korea and Japan (south of Honshu). The species grows on three thermal fields near Pauzhetka, on slopes of Kambalnyj Range and in a valley of Pauzhetka River. *Campylopus* is growing in places where the temperature of soil is quite hot, (+17-)30–50(–65)°C at the depth of 5 cm. Description, illustrations, and ecological data are provided.

Резюме

Campylopus umbellatus (Arn.) Paris собран на юге Камчатского полуострова. Новое местонахождение далеко отстоит от основного ареала вида, наиболее северные местонахождения которого были ранее известны в Японии (юг Хонсю) и Корее. Вид был найден на трех термальных полях в окрестностях пос. Паужетка, на склоне хребта Камбального и в долине реки Паужетка, где он рос на наиболее прогретых участках с температурой почвы на глубине 5 см (+17-)30–50(65)°C. Приводятся описание, рисунки, характеристика местообитания.

In the course of study of the vegetation of thermal fields on slopes of Kambalnyj Range (Russia, Kamchatka, Pauzhetka settlement surroundings), the second author collected mosses, and these collections were identified by the first author. Several species of the genus *Campylopus* were found there, and the most interesting is the finding of *Campylopus umbellatus* (Arn.) Paris, a species of temperate and tropical belts of East and South-East Asia, Malesia and Australia. It is the first record of *C. umbellatus* for the territory of Russia. The closest known localities are in southern part of Honshu, Japan (Noguchi, 1987).

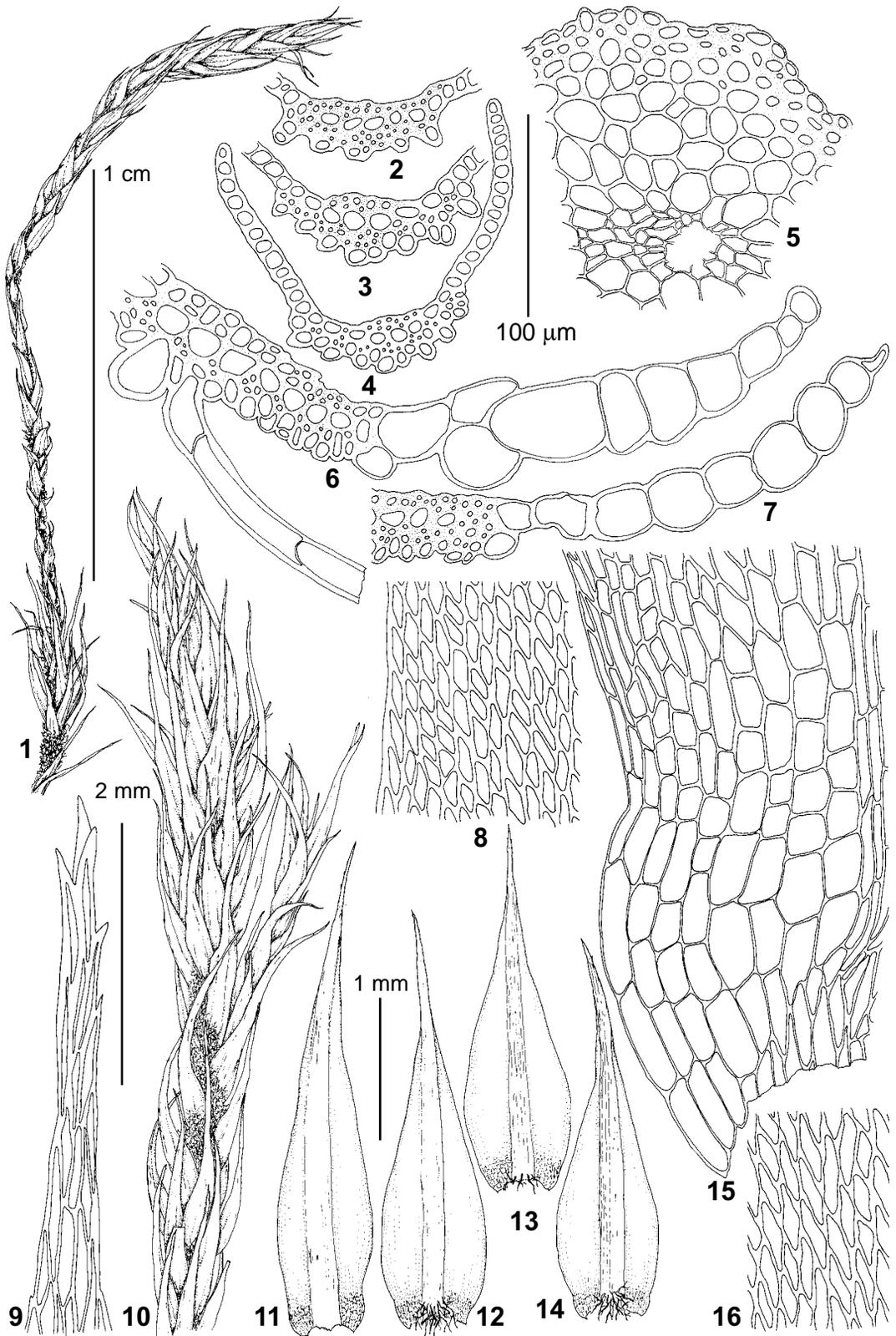
Campylopus umbellatus (Arn.) Paris, Ind. Bryol. 264. 1894. – *Thysanomitrium umbellatum* Arn., Mem. Soc. Linn. Paris 5: 263. 1827.

Plants in loose turfs, olivaceous-green or yellowish-green in upper part, brownish in lower part. Stems 1.5–4 cm, evenly foliose (in sterile plants), with central strand, without hyalodermis but with

thinner outer walls of surface cells, covered by dense reddish tomentum (also lower part of costa is usually tomentose on dorsal side). Leaves appressed when dry, straight or slightly curved, erect-spreading when moist, 2.2–3.0×0.6–0.8 mm, broadly lanceolate, slightly contracted at base, with auricles, lamina almost reaching to the leaf apex, margins entire or slightly serrulate near leaf apex, plane to incurved (leaves almost tubulose in upper part); costa occupying 1/5–1/3 of the leaf base width, 160–200 µm wide, with adaxial and abaxial stereid bands, ribbed throughout on abaxial side, excurrent in short, straight, dentate hyaline hair-point; median lamina cells thick-walled, usually not pitted, rhombic or obliquely oval, 14–34×7–9 µm; cells of auricles oval, inflated, hyaline or reddish brown, at places in 2 layers, ca. 70×45 µm; cells above auricles thick-walled, not or slightly pitted, subquadrate to short rectangular, 35–50×20–25 µm, basal marginal cells more narrow, ca.

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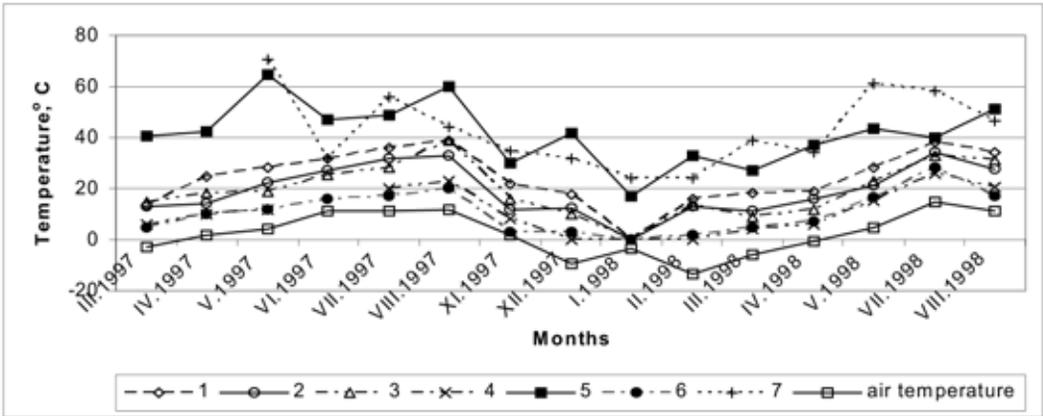


Fig. 2. Ground temperature of seven plots in thermal fields (1-7) and air temperature. Plot 5 is one where *Campylopus umbellatus* grows: note that it is one of two hottest plots (in another one, 7 any vegetation is absent). Note also that in winter the ground remains hot enough to melt snow.

12 µm wide. Dioicous. All collections from Russia are represented by sterile plants.

All plants from Kamchatka have rather low ridges (1 cell high) on the dorsal surface of costa, which is unlike from the most common phenotype of this species bearing dorsal lamellae of 2-4 cells high (Noguchi, 1987; Gao & al., 1999; Frahm & al., 1985). However the local populations of this species are extremely variable in plant and leaf size, width of costa, length of hyaline hair-points, etc. (Frahm, 1992). Dorsal lamellae are absent quite rarely, but the similar cases were described, e. g. from Queensland, Australia (Frahm, 1987).

In comparison with more widespread phenotypes, Kamchatkan plants are medium-sized for the species, with relatively wide leaves and narrow costa, and short hyaline hair-points.

Specimens examined: RUSSIA: Kamchatskaya Province, Ust-Bolsheretz District, Pauzhetka Settlement surroundings: (1) slope of Kambalnyj Range, Eastern-Pauzhetskoe thermal field, 2004, *Samkova s.n.* (MW); (2) Upper terrace of Pauzhetka River, Upper thermal field, *Samkova*, # 5, 6, 9, 13-3, 13-4 (MW); (3) Flood valley of Pauzhetka River, Southern thermal field, *Samkova*, # 21-2 (MW). These three fields are located at 51°27'-28.5' N – 157°48'-49' E, 170-260 m elev.

Distribution: *Campylopus umbellatus* is mostly tropical and subtropical species, occurring at equator, e. g. in Papua New Guinea (Frahm & al., 1985) not only in high mountains, but down to

1300 m elev., and in Queensland it grows in rain forest areas (Frahm, 1987). The locality in Kamchatka is far to the north of its main range (Fig. 3). The existence of so northern population is obviously explained by the climatic anomaly of thermal fields where it grows. There are another examples of localities of mainly tropical mosses far beyond their main ranges, e.g. *Trematodon longicollis* on volcanoes in Italy (Cortini Pedrotti, 2001) and *Splachnobryum obtusulum* at thermal springs in Hungary (Düll, 1992).

Ecology: The climate of the area is oceanic. The mean annual temperature is +1.9°C, mean February $t^{\circ} = -8.4^{\circ}\text{C}$, July $t^{\circ} = +12.8^{\circ}\text{C}$. Annual precipitation is 2056 mm (ranging from 1354 to 3748 mm), 227 days a year have rain or snow, and there are only 13 sunny days a year. Snow cover in March–April in flat place is 162 cm deep in average (max. 219 cm). Frostless period is 112 days (data of the second author and meteorostation Pauzhetka).

Campylopus umbellatus was collected on three thermal fields: Eastern-, Upper- and Southern-Pauzhetskoe (1.2, 2.0 and 0.06 hectares respectively), the distance between them 1.4-1.8 km. All thermal fields have hot springs and fumarols, the ground is hotted by vapour of thermal waters. The ground temperature at 5 cm deep is shown in Fig. 2. Snow cover is absent in the hottest sites during the whole winter. The vegetation of thermal fields

Fig. 1 (p. 124). *Campylopus umbellatus* (Arn.) Paris (from: Kamchatka, Ust-Bolshertzk Distr., Pauzhetka surroundings, 2004, *Samkova s.n.*, MW): 1, 10 – habit, dry; 2-4, 6-7 – leaf transverse sections; 5 – stem transverse section; 8, 16 – lamina cells of mid-leaf; 9 – lamina cells of upper part of leaf; 11-14 – leaves; 15 – basal leaf cells. Scale bars: 1 cm – for 1; 2 mm – for 10; 1 mm – for 11-14; 100 µm – 2, 9, 15-16.

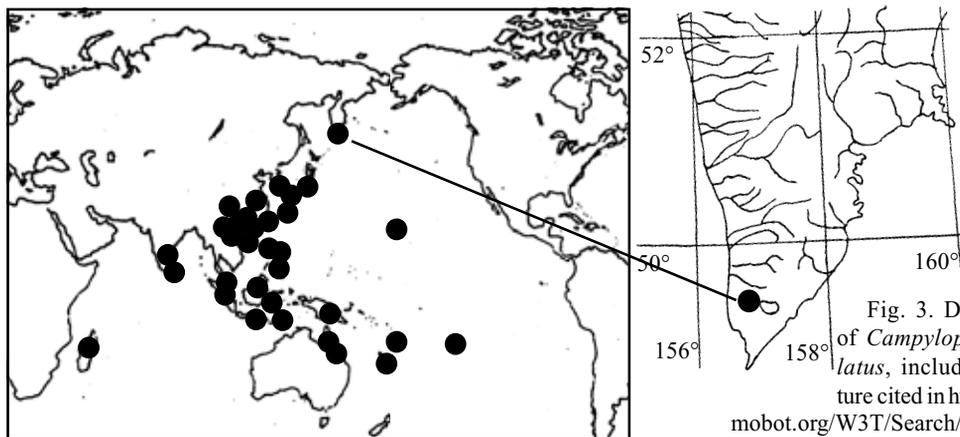


Fig. 3. Distribution of *Campylopus umbellatus*, including literature cited in <http://mobot.mobot.org/W3T/Search/mbib.html>

is represented by highly mosaic herb communities, with *Potentilla stolonifera* Lehm. ex Ledeb., *Artemisia opulenta* Pamp., *Geranium erianthum* DC., *Iris setosa* Pall. ex Link, *Lycopus uniflorus* Michx., *Prunella asiatica* Nakai, *Sanguisorba tenuifolia* Fisch. ex Link, *Thalictrum minus* L. s.l., etc.

Campylopus umbellatus is mostly restricted to the hottest places, with the temperature about 60°, in communities dominated by mosses, where the total coverage of herbaceous plants is less than 20%. Among the latter are common *Agrostis scabra* Willd., *A. pauzhetica* Probat., *Fimbristylis ochotensis* (Meinsh.) Kom. Other moss species associated with *C. umbellatus* are *Aulacomnium palustre* (Hedw.) Schwägr., *Campylopus atrovirens* De Not., *C. pyriformis* (Schultz) Brid., *C. subulatus* Schimp. ex Milde, *Dicranum scoparium* Hedw., *Entodon flavescens* (Hook.) A. Jaeger, *Niphotrichum canescens* (Hedw.) Bedn.-Ochyra & Ochyra, *N. ericoides* (Brid.) Bedn.-Ochyra & Ochyra, *Polytrichum commune* Hedw., *Polytrichastrum longisetum* var. *anomalous* (Milde) Ignatov & G.L.Sm., *Racomitrium*

lanuginosum (Hedw.) Brid., *Rhytidiadelphus squarrosus* (Hedw.) Warnst., *Sphagnum russowii* Warnst., *S. squarrosum* Crome, *Trematodon longicollis* Michx.

It is interesting, that all three other species of *Campylopus* found in Pauzhetka are rare in Russia: *C. atrovirens* is known only from here; for *C. pyriformis* this is the second record in Russian Far East; *C. subulatus* has fairly scattered distribution in Russia. The finding of *Trematodon longicollis* is also noteworthy: it is the first record in Kamchatka and the second in Russia.

The species of the genus *Campylopus* are quite characteristic in thermal habitats in e.g. Hawaii, New Zealand, subantarctic islands (Frahm, pers. comm.), and Japan (Glime & Iwatsuki, 1994).

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