

ALOINA BIFRONS (DE NOT.) DELGAD. (POTTIACEAE, MUSCI) IN RUSSIA

ALOINA BIFRONS (DE NOT.) DELGAD. (POTTIACEAE, MUSCI) В РОССИИ

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Abstract

*Aloina bifrons* (De Not.) Delgad. was found in Russia for the first time in foothill part of Dagestan (Eastern Caucasus). Description and illustrations of Caucasian specimens are provided. Revision of herbarium material also reveals two localities of the species in Turkmenistan. From other species of the genus in Northern Hemisphere *A. bifrons* differs by leaves with hyaline hair-point. The species represents interesting bipolar distribution mainly in territories with Mediterranean climate.

Резюме

*Aloina bifrons* (De Not.) Delgad. впервые приводится для России из низкогорной части Дагестана (Восточный Кавказ). Дано описание и рисунки вида. При ревизии гербарного материала также были выявлены два местонахождения вида в Туркменистане. *Aloina bifrons* отличается от всех остальных видов рода Северного полушария листьями с гиалиновым волоском. Вид характеризуется биполярным распространением в районах со средиземноморским климатом.

KEYWORDS: *Aloina*, Caucasus, mosses, Pottiaceae, xerophytes.

*Aloina bifrons* was described from Sardinia by De Notaris in 1838 as a species of the genus *Tortula*. Bruch et al. (1842) did not evaluate it as a distinct species, recognizing it as a variety of *Barbula* (*Aloina*) *rigida* var. *pilifera*, an illegitimate name subsequently substituted by *Tortula* (*Aloina*) *rigida* var. *pilifera* by De Notaris, who apparently was convinced, that the taxon does not merit a specific status. It is worth to note that Bruch et al. (1842) reported 'var. *pilifera*' only from Sardinia, where from *A. bifrons* had been described. Later the European authors treated it in a rank of form (*A. rigida* f. *pilifera* (De Not.) Mönkem.) or variety (*A. rigida* var. *pilifera* (De Not.) Limpr.) during about a century.

The treatment of this taxon at an infraspecific status seems lead to a certain confusion. A good example provides the Warnstorf 'Flora der Mark Brandenburg' (1905), where the occasional presence of 'glassharz' is included in diagnosis of

*Aloina rigida*, but comments indicate that this variety does not occur in the area of the flora. Seems, at least sometimes, other authors left this morphological character in descriptions, but failed to indicate clearly if such plants were really found in their areas or not. For example in Ukraine (Bachurina & Mel'nichuk, 1988) and Bulgaria (Petrov, 1975) the occasional presence of hyaline hair point was noted in description and key, but the confirmed data on the presence of plants with hair points, e.g. *A. bifrons*, or var. *pilifera*, are not found for these countries. Limpricht (1890) cited var. *pilifera* for Germany, Austria and Switzerland, but the modern bryological literature for this area excluded or did not mention this species (e.g. Meinunger & Schröder, 2007; Erzberger & Papp, 2004).

The resurrection of the species status of *A. bifrons* has been done by Crum & Steere (1958), who however made a combination using not the

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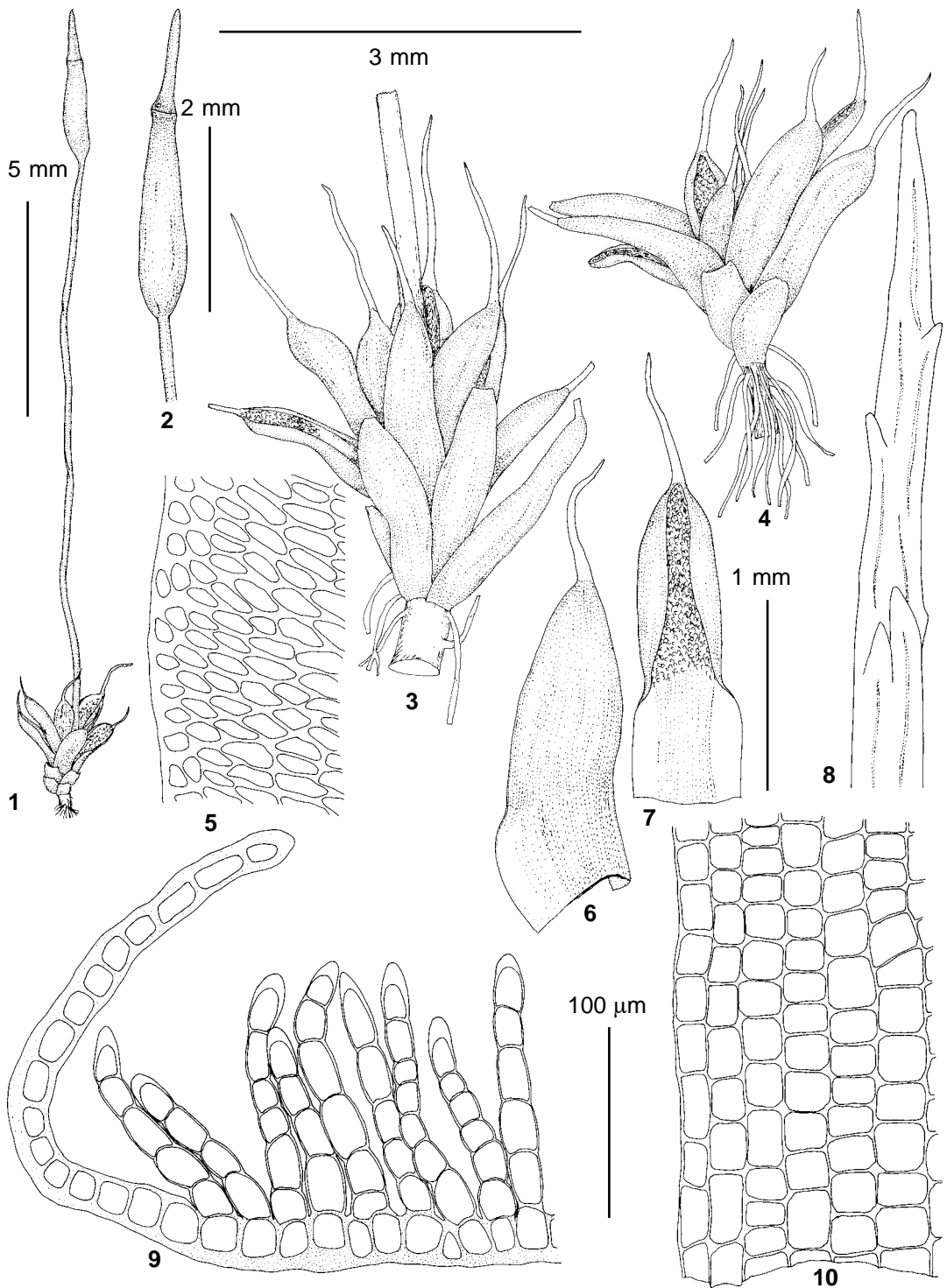


Fig. 1. *Aloina bifrons* (1-2 – from Turkmenistan, Mamatkulov #1279, LE; 3-10 – from Dagestan, Fedosov #10-2-147, MW); 1, 3-4 – habit, wet; 2 – capsule; 5 – median marginal cells; 6-7 – leaves; 8 – hyaline hairpoint; 9 – leaf transverse section; 10 – basal leaf cells. Scale bars: 5 mm for 1; 3 mm for 3-4; 2 mm for 2; 1 mm for 6-7; 100 μm for 5, 8-10.

earliest species epithet, which was corrected by Delgadillo (1973), who confirmed its status and showed that *Aloina* plants with hyaline hair points lack differentiated margin at leaf base and thus are well separated from *A. rigida*. After revision of Delgadillo (1975), the species was accepted in Europe (Corley et al., 1981), but the distribution in Europe still needs additional clarification due to above mentioned problems.

Similarly in Russia the occurrence of *A. bifrons* remained unclear, since Savicz-Lyubitskaya & Smirnova (1970) cited *A. rigida* f. *pilifera* (De Not.) Mönkem. for European part of the USSR and the Middle Asia, but due to indenifinite status of this record Ignatov & Afonina (1992) and Ignatov, Afonina, Ignatova et al. (2006) did not mentioned this taxon in checklists at all.

Only two species of *Aloina*, *A. rigida* (Hedw.) Limpr. and *A. brevirostris* (Hook. & Grev.) Kindb., were cited for Russia in the check-list of mosses of East Europe and North Asia (Ignatov, Afonina, Ignatova et al., 2006). Later Akatova (2008) found *A. aloides* (Koch ex Schultz) Kindb. in the Caucasian State Reserve, Western Caucasus. In May 2010 in vicinity of Makhachkala City, Dagestan, the *Aloina* plants with hyaline hair-points were found agreeing in all characters with *A. bifrons* and obviously representing a new species for Russia.

**Aloina bifrons** (De Not.) Delgad., Bryologist 76: 273. 1973. — *Tortula bifrons* De Not., Mem. R. Acc. Sc. Torino 40: 305. 1838.

*Aloina pilifera* (De Not.) H.A. Crum & Steere, Southw. Naturalist 3: 119. 1959. — *Tortula rigida* var. *pilifera* De Not., Musc. Ital. Spic. 1: 4, 19. 4. 1862. — *Aloina rigida* var. *pilifera* (De Not.) Limpr., Laubm. Deutschl. 1: 637. 1888.

Fig 1.

Plants green, with reddish brown tones, somewhat greyish due to hyaline hair-points, in loose tufts or as individual plants among other pioneer mosses. Stems unbranched, 1-1.5 mm. Leaves crowded, appressed, or lower leaves erect-spreading then dry, spreading then moist, variously lingulate: from narrowly lingulate in lower part of stem to ovate-lingulate in its upper part, often slightly constricted in proximal part, (0.8-)1.1-1.4(-1.6)×0.3-0.5(-0.6) mm (excluding hair-

point), strongly concave, infolded, leaf apex not cucullate, rounded or obtuse, rarely acute, hair-points hyaline, brownish proximally, (0.65-)1.0-1.3 mm long, 70-100 µm wide at base, gradually tapering, smooth or with few blunt teeth, somewhat flexuose, fragile; margins broadly involute, entire or slightly serrulate; costa ending below apex to excurrent into hyaline hair-point, in transverse section composed of 1-2(-3) layers of large thin-walled discolored cells, without or with few stereids, not forming stereid bands; cells of dorsal epidermis with moderately thin radial walls and strongly incrassate, brownish outer walls; ventral filaments loosely branched, 80-110 µm long, composed of 3-7 thin-walled subspherical cells, terminal cells shortly elliptical, with incrassate hyaline apical part, 20-36 µm; median laminal cells in regular longitudinal rows, with strongly incrassate transverse walls, transversely rectangular to transversely fusiform, 6-11×12-24 µm, along margins in oblique rows; surface cells on dorsal side of costa along midline in 3-5 longitudinal rows thin-walled, elongate-rectangular, 24-36×7-12 µm, gradually transiting into transversely rectangular cells of unistratose lamina; cells of sheathing base quadrate to rectangular or transversely rectangular, (12-)16-28(-36)×17-24 µm, with thin longitudinal walls and incrassate, yellowish transverse walls, at margins not differentiated. Dioicous [occasionally rhizoautoicous, according to Stark & Delgadillo, 2001]. Perichaetial leaves ovate to rounded, obtuse to acute, strongly concave, margins not involute, hair-points more flexuose of equal length with lamina. All plants from Dagestan with broken setae. [Sporophyte description after Delgadillo (1975) and based on specimen from Turkmenistan. Setae yellowish red, 6.0-23.5 mm long. Capsules cylindrical to ovoid-cylindrical, dark red to nearly black, 1.3-3.1 mm long, straight; annulus of 1-2 rows of large cells, revolute. Peristome with a high basal membrane, strongly twisted, 800-1320 µm long. Operculum high, conic, erect or slightly inclined, 0.6-1.4 mm long. Spores finely papillose, 9-24 µm (mean ~ 12 µm)].

**Differentiation.** *Aloina bifrons* can be easily distinguished from all other Eurasian *Aloina* species by presence of hyaline hair-points. Non-hyaline margins at leaf base composed of



Fig. 2. World distribution of *Aloina bifrons*.

short rectangular cells with thickened transverse walls differentiate *A. bifrons* and *A. aloides* from *A. brevirostris* and *A. rigida*, in which marginal cells are thin-walled and hyaline in 2-3 rows. Weakly differentiated, thin costa without stereid band separates *A. bifrons* and *A. brevirostris* from *A. aloides* and *A. rigida*.

**Ecology.** *Aloina bifrons* is a calciphilous xerophytic moss, mostly occurring in mountain foothills and more rarely in lowland regions. In Dagestan Republic *Aloina bifrons* was collected on calcareous alluvium at the bank of dry creek on the bottom of canyon, in a place with quite xeric microclimatic conditions. Canyon slopes are occupied by open *Juniperus* stands alternating with calcareous rock outcrops and xerophytic steppe communities. This canyon is the only locality in Dagestan where *Microbryum curvicollum* (Hedw.) R.H. Zander, *Pseudocrossidium hornschiianum* (Schultz) R.H. Zander and some other rare xerophytic mosses were collected. In Turkmenistan *A. bifrons* was found on calcareous fine soil on slope, in pioneer moss community with *Tortula brevissima*, and on calcareous soil in *Poa-Carex* open xerophyte community.

**Distribution.** *Aloina bifrons* is a rare species with bipolar distribution (Fig. 2). In the Northern Hemisphere it occurs mainly in the western Palearctic and western North America, being mainly restricted to Ancient Mediterranean and

Madrean floristic regions. These regions have been proposed to be combined into the Circum-Tethyan Subkingdom, regarding their richness in xerophytic mosses species (Frey & Kürschner, 1983, 1988; Kürschner, 2008). *Aloina bifrons* is known from Spain, Italy (Sardinia), Morocco, Tunisia, Lybia, Egypt, Turkey, Jordan, Israel, north-eastern Iran, Turkmenistan, Tajikistan, Canada (British Columbia), U.S.A. (Idaho, Nevada, California, Arizona, Washington, Utah) and Mexico (Cano et al., 2004; Delgadillo, 1975, 2007; Frey & Kürschner, 1991; Stark & Delgadillo, 2001; Gallego et al., 1999; Kürschner, 2005; Kürschner et al., 2006; McIntosh, 1989, 2003; Gallego & Cano, 2006; Mamatkulov 1990; Ros et al., 1999). In Southern Hemisphere *A. bifrons* occurs between 30° and 40° latitude in South Africa, Australia (Victoria), New Zealand (North Island) and Chile (Coquimbo Province) (Delgadillo, 1975, Weber, 1979, Magill, 1981).

Savicz-Lyubitskaya & Smirnova (1970) cited *A. rigida* f. *pilifera* (De Not.) Mönkem. for European part of USSR and Middle Asia without exact location and other specimen information. We failed to find any specimens determined as *A. rigida* f. *pilifera* in LE, but the revision of *A. rigida* collections revealed one specimen from Turkmenistan, representing *A. bifrons*. One more specimen was fortunately found as an admixture to *Tortula brevissima* Schiffn. from Turkmenistan.

*Specimens examined.* RUSSIA: **Dagestan republic**: Buinaksk Distr., vicinity of Talgi settlement (ca. 10 km SSW from Mahachkala), Talginskoe Uschel'e Canyon (42°52'39.95"N, 47°27'22.67"E), 530 m. alt., 28.V.2010, Fedosov #10-2-156 (MW). TURKMENISTAN: Yuzhny Shaartuzsky Distr., Aryk-Tau Ridge, 540 m. alt., 22.IV.1966, Mamatkulov #1279 (LE) (as *A. rigida*); northern slope of Kopet-Dag, 12 km south from Teok-Tele Settlement, 400 m. alt., 16.IV.1974, Bredkina #2062 (LE) (as an admixture in a specimen of *Tortula brevissima*).

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