

***Jungermannia exsertifolia* subsp. *cordifolia* – a liverwort new to Poland found in the Tatra Mountains (Western Carpathians)**

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Abstract — *Jungermannia exsertifolia* Steph. subsp. *cordifolia* (Dumort.) Váňa has been erroneously reported from Poland twice. These data were published in 1885 and 1975 from the Tatra Mountains and Beskid Sądecki Range (Western Carpathians) area. This paper presents the first correct record of *J. exsertifolia* subsp. *cordifolia* from Poland and the Tatra Mountains. It is also the third confirmed locality of this plant in the entire area of the Tatra Mountains.

INTRODUCTION

Jungermannia exsertifolia Steph. subsp. *cordifolia* (Dumort.) Váňa is a subarctic-subalpine species that is widely distributed in Europe (especially in northern and western parts) and North America (Váňa, 1973; Damsholt, 2002). In the Carpathians, it is known to occur in the Slovakian Tatra Mts., the Bihor Mts., the Retezat Mts., Mt Cernegura and areas of the Maramureş (Müller, 1957; Duda & Váňa, 1969; Lungu, 1963; Plămadă, 1973, 1974; Jakab, 2000). In the Slovakian Tatra Mts., *J. exsertifolia* subsp. *cordifolia* has so far been reported in six localities (Boros & Vajda, 1962; Šmarda, 1961; Duda & Váňa, 1969). It should be noted however, that the correct identification has been confirmed by J. Váňa for two localities only (see list of localities below). Herbarium material gathered from the four remaining localities collected by J. Šmarda and L. Vajda (see Boros & Vajda, 1962; Šmarda, 1961) has not been preserved. In 2013, the collection of J. Šmarda could not be found in BRNM, where he deposited most of his materials collected in the Tatra Mts. It is also worth noting that *J. exsertifolia* subsp. *cordifolia* has been erroneously recorded in two localities in the Polish and Slovakian Tatra Mts. by Szyszyłowicz (1885; as *Jungermannia cordifolia*). The correct identification of the herbarium material was *Jungermannia atrovirens* from the Polish side of Tatra Mts. (rev. W. Kulesza; Kulesza, 1920), and *J. pumila* from the Slovakian Tatra Mts. (rev. J. Váňa, Duda & Váňa, 1969).

In Poland, *J. exsertifolia* subsp. *cordifolia* has been erroneously reported twice. Apart from the above-mentioned data of Szyszyłowicz (1885), the second locality was described by Mamczarz (1975) from the Beskid Sądecki Range.

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A revision of the herbarium material from that locality (deposited in LBL) has shown that the voucher specimens belong to *Jungermannia atrovirens* (rev. R. Zobel; Zobel, 2008).

This paper provides the first data on the occurrence of *J. exsertifolia* subsp. *cordifolia* in Poland. Moreover, it documents the third locality of this plant in the entire area of the Tatra Mts, as supported by herbarium material.

DESCRIPTION OF THE SUBSPECIES

(according to Váňa, 1973; Damsholt, 2002)

Plants 2-12 (–20) cm long, 1-4 (–7) mm wide, in olive-green, grey-green to blackish-brown tufts, aromatic when fresh. Stems grey- to black-green, leaves distant to approximate or subimbricate, obliquely inserted, amplexicaul, cordate to rounded triangular, concave, with rounded apex. Median leaf cells $20-30 \times 30-60 \mu\text{m}$, with thin, always blackish-brown or dark brown walls and indistinct trigones. Plants dioicous, with long-exserted perianths, which are clavate to fusiform, smooth below and plicate above; perianth mouth crenulate, with female bracts similar to leaves, sheathing perianth. Male plants with (6-) 8-12 pairs of imbricate bracts, which are saccate at base, subtending 1(-2) antheridia.

Jungermannia exsertifolia subsp. *cordifolia* can be mistaken for *J. obovata* and *J. pumila* (both can occur in similar habitats). *J. exsertifolia* subsp. *cordifolia* differs from *J. obovata* and *J. pumila* in: 1) being dioicous, whereas *J. obovata* and *J. pumila* are paroicous, and 2) having cordate to rounded triangular leaves with an amplexicaul base, whereas leaves are ovate to broadly ovate in *J. obovata* and *J. pumila*. Furthermore, the purplish-coloured rhizoids and tall perigynium in *J. obovata* distinguish it from *J. exsertifolia* subsp. *cordifolia*. Confusion of *J. exsertifolia* subsp. *cordifolia* with large forms of *J. atrovirens* is possible. *J. exsertifolia* subsp. *cordifolia* differs from *J. atrovirens* in: 1) being mostly green to blackish green, whereas *J. atrovirens* is green to yellowish green, 2) having cordate leaves with an amplexicaul base, whereas leaves are ovate to cordate without an amplexicaul base in *J. atrovirens*, and 3) it occurs on non-calcareous rocks, whereas *J. atrovirens* is a calciphyte.

DESCRIPTION OF THE NEW LOCALITY

A new locality of *Jungermannia exsertifolia* subsp. *cordifolia* was found in the Polish High Tatra Mts., in the lower part of the Dolina Róztoki valley at 1260 m a.s.l., near to Dolina Pięciu Stawów Polskich. The liverwort grew on a stone in the Potok Róztoka stream; the specimens were fertile (with perianths). Herbarium material was collected on 21 August 2012 and deposited in the herbarium of the Department of Botany (POZNB), University of Life Sciences, Poznań, Poland. Duplicates were sent to the following herbaria: KRAM (Kraków, Poland) and POZW (Poznań, Poland).

LIST OF LOCALITIES OF *JUNGERMANNIA EXSERTIFOLIA* SUBSP. *CORDIFOLIA* IN THE TATRA MTS

Specimens examined

1. Western Tatra Mts., under Mt Baranec, alt. 1550 m a.s.l., *leg.*, *det.* J. Váňa, 13.09.1966 (Duda & Váňa, 1969; voucher specimen deposited in herb. Váňa).
2. High Tatra Mts., Slovakia, Kolová dolina valley, near Kolové pleso pond, alt. 1560 m a.s.l., *leg.* J. Růžička, *det.* J. Duda sub *J. tristis*, 1957 (Duda, 1962), *rev.* J. Váňa (Duda & Váňa 1969; voucher specimen deposited in OP).
3. High Tatra Mts., Poland, lower part of the Dolina Roztoki valley, 49°13.468'N, 20°04.241'E, alt. 1260 m a.s.l., on stone in Potok Roztoka stream, near route to Dolina Pięciu Stawów Polskich valley, *leg.*, *det.* P. Górski, 21.08.2012, *conf.* J. Váňa (POZNB 1459, KRAM, POZW; Fig. 1).

Literature data

4. High Tatra Mts., Slovakia, Hincova dolina valley, near Vel'ké Hincovo pleso pond, alt. 1800 m a.s.l., *leg.* L. Vajda (Boros & Vajda, 1962).
5. High Tatra Mts., Slovakia, Veľka Studená dolina valley, alt. 1600 m a.s.l., *leg.* L. Vajda (Boros & Vajda, 1962).
6. High Tatra Mts., Slovakia, Zlomisková dolina valley, alt. 1800 m a.s.l., *leg.*, *det.* J. Šmarda (Šmarda, 1961).
7. High Tatra Mts., Slovakia, Hlinská dolina valley, Malá zahrádka, alt. 1750 m a.s.l., *leg.*, *det.* J. Šmarda (Šmarda, 1961).

FINAL REMARKS

J. exsertifolia subsp. *cordifolia* is a very rare liverwort in the Tatra Mts. Despite the high availability of potential habitats, such as stone surfaces in streams in the crystalline area of the Tatra Mts., and showy, big gametophytes that are easy to find, the plant has been recorded in only a few localities. *J. exsertifolia* subsp. *cordifolia* is the fifth new species, together with *Cephaloziella massalongi*, *C. varians*, *Gymnomitrium adustum* and *Jungermannia borealis*, that has been recently recorded in Poland from the Tatra Mountains (Górski & Váňa, 2011; Ellis *et al.*, 2011, 2013a, b). All of those plants occur similarly in single localities, in the Slovakian Tatra Mts. (Váňa, 1969; Vajda, 1971; Duda & Váňa, 1974). Moreover, in the Slovakian Tatra Mts., two new liverworts, *Barbilophozia binsteadii* and *Nardia compressa*, have recently been reported for the first time in Slovakia (Górski, 2010; Ellis *et al.*, 2012). The former species has been known to exist in the Polish Western Tatra Mts. since 1960 (Szweykowski, 1960a, b), whereas the latter occurs only in one locality in the Slovakian Tatra Mts. As a result, the total number of species of this group is almost equal in the Polish and Slovakian Tatra Mts., despite differences in the covered area. Qualitative differences in the liverwort floras of both sides of the Tatra Mts. show the exclusive occurrence of nine species in the Slovakian Tatra Mts. (*Apomarsupella revoluta*, *Cephaloziella elegans*, *C. hampeana*, *C. grimsulana*, *Cladopodiella*

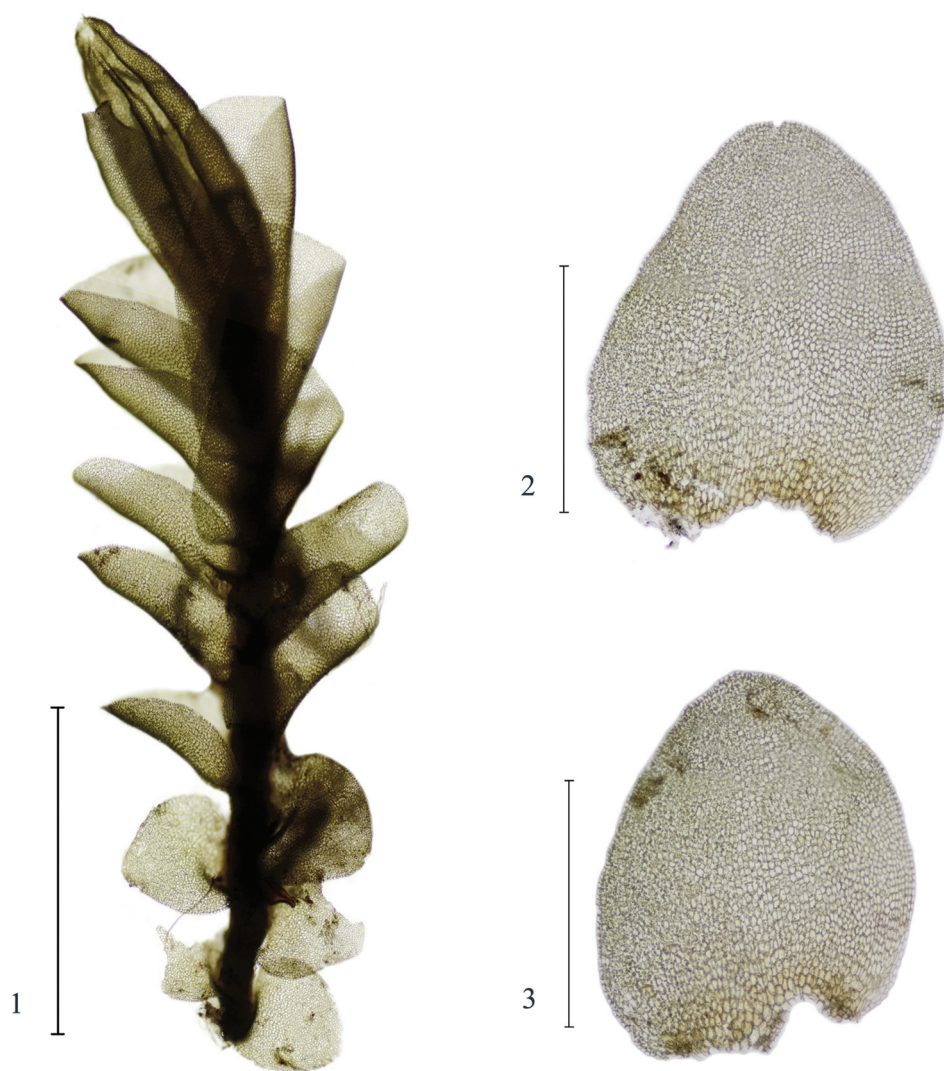


Fig. 1. *Jungermannia exsertifolia* Steph. subsp. *cordifolia* (Dumort.) Váša from the Tatra Mountains: **1.** Female plant, upper part of the shoot (bar = 2 mm) **2-3.** Two leaves (bar = 1 mm).

francisci, *Gymnomitrium obtusum*, *Mannia triandra*, *Nardia compressa* and *Riccia sorocarpa*) and 10 species in the Polish Tatra Mts. (*Anastrophyllum assimile*, *Aneura maxima*, *Arnellia fennica*, *Bazzania flaccida*, *Haplomitrium hookeri*, *Jamesoniella undulifolia*, *Lophozia groenlandica*, *L. schusterana*, *Porella arboris-vitae* and *Scapania paludicola*).

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