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### *Dicranum dispersum* spec. nov. (Dicranaceae: Bryopsida: Bryophyta)

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With 3 figures

#### Summary

*Dicranum dispersum* (Dicranaceae: Bryopsida: Bryophyta) is described as a **new species**. Differentiating characters from other related taxa within the genus *Dicranum*, especially *D. crispifolium* Müll. Hal. are given. All important morphological characters and the habit are illustrated. The paper also provides information concerning the ecology and distribution of the new species, presently known from southwest Germany and southwestern and central Asia, as well as distributional data of *D. crispifolium* (figured in a map).

#### Zusammenfassung

*Dicranum dispersum* (Dicranaceae: Bryopsida: Bryophyta) wird als **neue Art** beschrieben und von anderen, nahestehenden Vertretern der Gattung *Dicranum*, insbesondere *D. crispifolium* Müll. Hal. abgegrenzt. Die Arbeit enthält Abbildungen der wichtigen morphologischen Merkmale und des Habitus und gibt Hinweise zur Ökologie sowie zur Verbreitung der neuen, bisher in Südwestdeutschland und Südwest- und Mittelasien nachgewiesenen Art und des nahe verwandten *D. crispifolium* (mit Verbreitungskarte).

#### Contents

1. Introduction .....	4
2. Description of <i>Dicranum dispersum</i> spec. nov. ....	4
3. Ecology and distribution .....	5
4. Discussion .....	7
5. Additional specimens seen .....	7
6. Acknowledgements .....	8
7. References .....	8

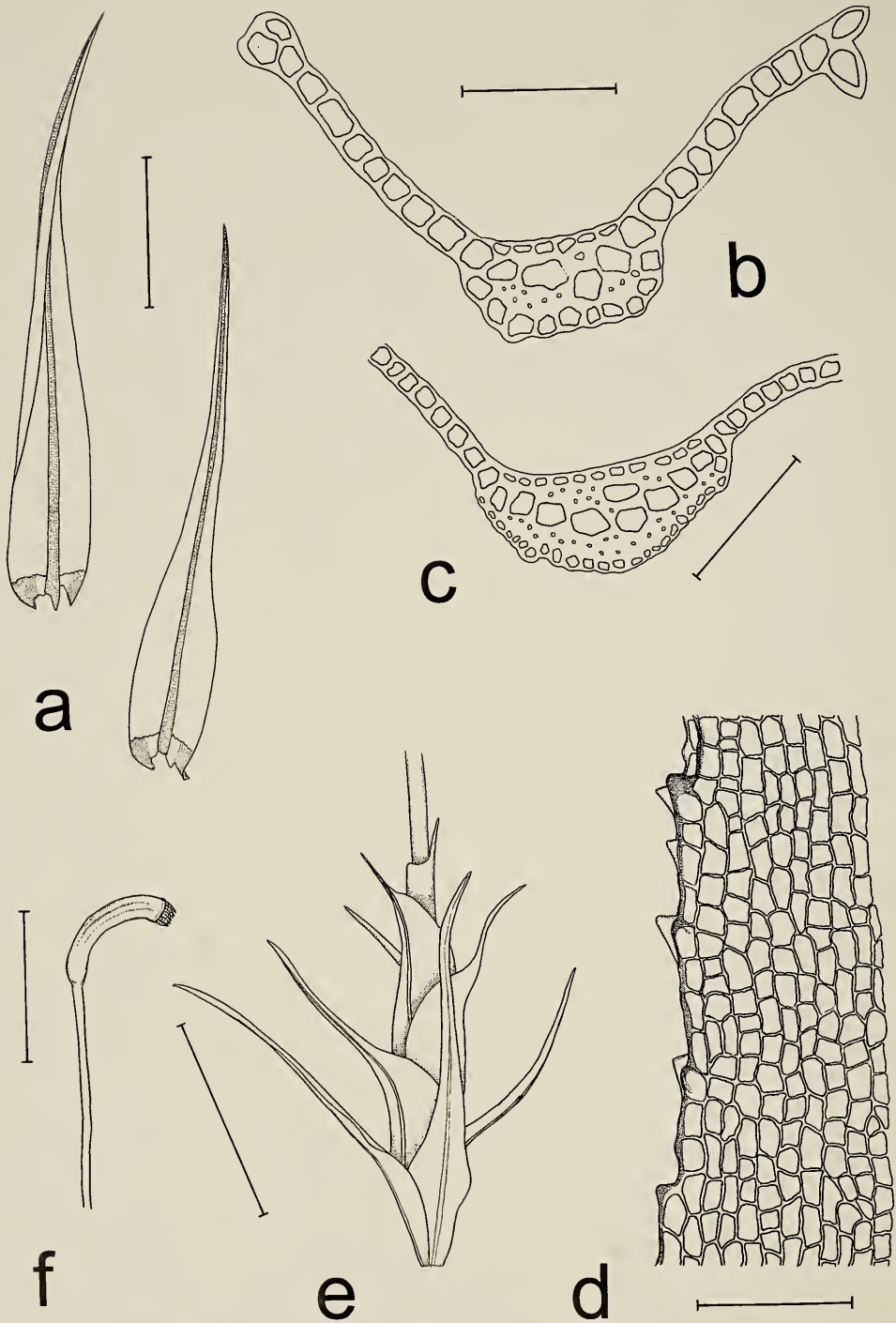
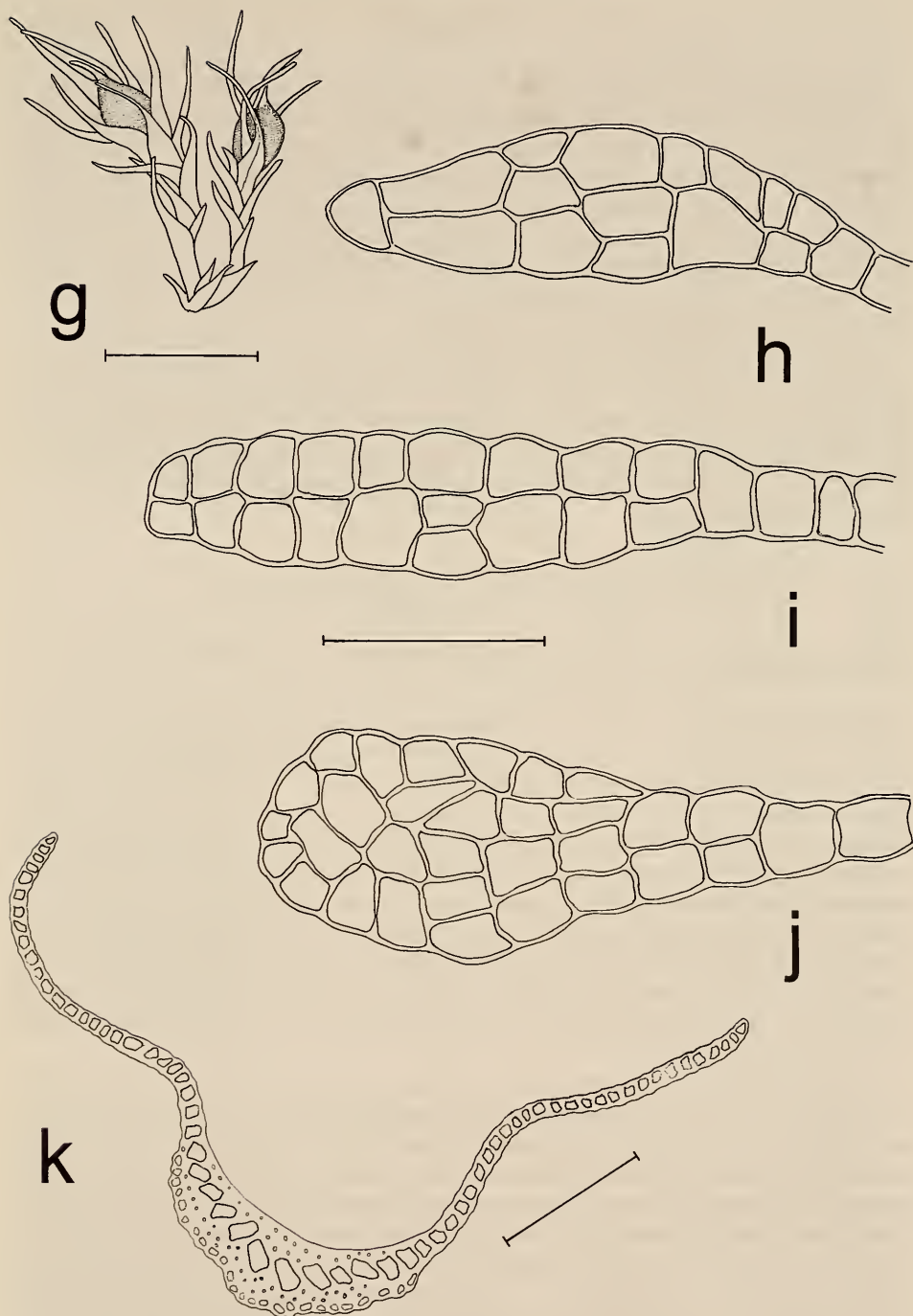


Fig. 1. *Dicranum dispersum* spec. nov. (a–i, Holotype, S) and *D. crispifolium* Müll. Hal. (j, k, Isotype, NY). – a. leaves; – b. cross-section of leaf above middle; – c. cross-section of costa near middle; – d. upper leaf margin and cells; – e. perichaetium; – f. sporophyte, upper part;



g. male plant; – h–j. cross-section of alar cells; – k. cross-section of leaf near middle.  
 – Scale: a, f, g = 2 mm; b = 60  $\mu$ m; c, d, h–k = 90  $\mu$ m; e = 4 mm.

## 1. Introduction

When studying herbarium specimens of *D. muehlenbeckii* Bruch & Schimp., one old sample, collected in 1875, of an apparently new species was found. As this specimen seemed to be most closely related to east Asian taxa, e.g. in its partly three-layered alar cell group, which separates it from all hitherto known European *Dicranum* taxa, it was rather surprising that, according to the label, it should have been collected in Baden-Württemberg in Germany. Although the sample initially was suspected to have been mislabeled, the given old locality was searched, and, on a visit in 1979, the plant was rediscovered still growing in the very same place, and furthermore at another locality some 50 km apart.

Since then, some additional herbarium specimens have been found, collected in the same part of Germany as well as from several localities in Asia. The few times this species had been collected or noted at all, it seems to have been confused with *D. muehlenbeckii* and *D. scoparium* Hedw. Lately it has been collected by MICHAEL SAUER during the work with the flora project of Baden-Württemberg (NEBEL & PHILIPPI in press).

## 2. Description of *Dicranum dispersum* spec. nov.

Types: Germany, Baden-Württemberg, Sigmaringen, Oberschmeien, T. ENGELMARK, May 13, 1980 (Holotype in S, Isotype in STU).

Diagnosis: Planta speciosa, sat robusta, viridescens vel brunneo-viridescens. Caules laxe caespitosi, ad 8 cm alti, rhizoidiis fere ad apicem impliciti. Folia stricta vel plus minusve flexuosa, patentia ad erecto-patentia, interdum falcata, in sicco crispata, lanceolata, graciliter acuminata, paene ad apicem caniculata; lamina parte alari bistratosa ex parte tristratosa, marginibus dimidio superiore bistratosi serratis; cellulis superioribus et medianis quadratis, breviter rectangularibus vel irregulariter angulatis; Pseudomonoica; folia perichaetalia interiora abrupte acuminata. Seta solitaria in quoque perichaetio 1.5–2.5 cm longa, flava vel flavo-rubescens; theca 2.5–3.5 mm longa, curvata, suberecta, in sicco valde curvata, horizontalis et sulcata; sporae globosae vel ovoideae, minute papillosae, 16–21  $\mu$ m. Dicrano crispifolio Müll. Hal. similis, sed parte alaria laminae bistratoso vel ex parte tristratoso haud 4–6-stratoso jam differt.

Morphology: Female plants (fig. 3) rather robust in loose green or brownish green tufts. Stem with central strand, up to 8 cm high, more or less matted with white or reddish brown rhizoids, often nearly to apex. Leaves (fig. 1a) 6–8  $\times$  0.8–1.2 mm, smooth, straight to somewhat flexuose, erect-spreading to spreading, loosely crisped when dry, lanceolate, slenderly acuminate, apical part caniculate, lamina unistratose except for partially bistratose upper margin and bistratose, sometimes in part tristratose alar region, margins toothed in upper half; costa percurrent to shortly excurrent, papillose on dorsal surface, with small teeth near apex, with a row of guide cells and two stereid bands, the dorsal and ventral epidermal layers of cells differentiated (fig. 1b, c); upper and median cells (fig. 1d) quadrate, short-rectangular or irregularly angled, smooth or with scattered papillae, thin to moderately thick-walled, nonpitted, 11–15  $\times$  15–35  $\mu$ m, basal cells above the alar region rectangular, relatively thin-walled, rarely pitted, 12–16  $\times$  45–80  $\mu$ m, alar cells reddish to brownish, thin-





Fig. 2. Approximate distributions of *Dicranum dispersum* spec. nov. (triangles) and *D. crispifolium* Müll. Hal. (quadrats).

walled, in a broad band from the margin towards the nerve. Pseudomonoicous; male plants (fig. 1g) dwarfed, attached to the rhizoids of female plants; perichaetial leaves (fig. 1e) convolute, sheathing, abruptly acuminate. Seta single in each perichaetium, 1.5–2.5 cm long, yellow or pale reddish yellow; capsule (fig. 1f) 2.5–3.5 mm long, curved, suberect to horizontal, furrowed when dry; peristome teeth normal dicranoid ca 550  $\mu$ m; spores globose to ovoid, brownish yellow, minutely papillose, 16–21  $\mu$ m.

### 3. Ecology and distribution

The type was found on a calcareous mountain slope facing west, in a mixed pine and beech forest. The altitude of this locality is ca 700 m a.s.l. *Dicranum dispersum* spec. nov. grew in pure, wide tufts together with *Rhytidium rugosum*, *Homalothecium lutescens*, *Rhytidiadelphus triquetrus*, *Campyliodelphus chrysophyllus*, *Hylocomium splendens* and *Tortella tortuosa*.

This new *Dicranum* derives its specific epithet from its dispersed known distribution. It is recorded hitherto from Central Europe and Asia. All European localities known so far are within the boundaries of the province of Baden-Württemberg in SW Germany. In this region, *D. dispersum* occurs quite widespread in the area of the Suabian Alps (SAUER in press). The present knowledge indicates a wide but scattered



Fig. 3. Female plant of *Dicranum dispersum* spec. nov. – Actual size: 3 cm.

Eurasian distribution (fig. 2), and a restriction to calcareous areas. Samples from Mongolia and the Alatau have been mixed with *Rhytidium rugosum* and *Abietinella abietina* which suggests the ecology in these areas to be close to that in Europe.

#### 4. Discussion

All *Dicranum* species have at least some two- to many-layered alar cell groups, in contrast, e.g., to the related genera *Orthodicranum* (Bruch & Schimp.) Loeske, and *Dicranoloma* (Renauld) Renauld, where these always are only single-layered. In east Asia, several *Dicranum* species constantly have multi-layered alar cell groups, but in all other geographical areas the known *Dicranum* species never have more than just two-layered alar cell groups. This new species, *D. dispersum*, has often sections with a few three-layered alar cells (fig. 1h, i) and approaches in that respect some east Asian taxa. *Dicranum dispersum* is most similar to *D. crispifolium* Müll. Hal., a southeast Asian species, known from India, the Himalaya and SW China. Both species have leaves channeled in the upper part with partly bistratose toothed margins, a rather similar cell net, and when dry, leaves crisped in the same manner. *D. crispifolium* differs in having relatively longer and narrower leaves, upper lamina cells much more papillose, alar cells (fig. 1j) in a narrower but much more swollen 3–6-stratose structure forming a distinct reddish band sharply delimited from the hyaline one-layered cells towards the nerve, the leaf nerve with not or poorly differentiated ventral epidermal layer of cells (fig. 1k), and the seta longer, 3–5 cm, darker, reddish brown. These two species are not sympatric anywhere where they are known to occur. In Asia *D. dispersum* obviously has a more northern distribution, north of the Himalayan shield.

The likewise east Asian *Dicranum thelinotum* Müll. Hal. is also rather similar in habit, but this species, like *D. muehlenbeckii*, has tubulous leaves without a partially bistratose upper leaf margin. Unlike *D. muehlenbeckii*, this species has a leaf nerve with the ventral epidermal layer of cells not or poorly differentiated. Further it has often two setae originating from each perichaetium.

*D. dispersum* has been reported as a probable hybrid between *D. scoparium* and *D. muehlenbeckii* (EGGLER 1916) and as *D. muehlenbeckii* (EGGLER 1926, FROELICH 1950). This last-mentioned species, though similar in ecology, is very different in its tubulous leaves, and in an unistratose lamina also in the upper leaf margin, and even in the field is easily recognizable by its smaller size, and in dry condition, by much stronger crisped leaves. Among the European species *D. dispersum*, with its loose crispatation, would in habit be most similar to a strong long-leaved plant of *D. spadiceum* J. E. Zetterst. This species differs in the same characters mentioned for *D. muehlenbeckii* and further by not having a stem with a thick tomentum, and the leaf cells more thickened and porous. *Dicranum brevifolium* (Lindb.) Lindb. has channeled leaves like *D. dispersum* but has a leaf nerve with a poorly differentiated ventral epidermal layer of cells, and thickened longitudinal lamina cell walls, and is a much smaller plant.

#### 5. Additional specimens seen

**Germany:** Baden-Württemberg, Pfullingen, Wackerstein, F. HEGELMAIER, July 11, 1875, as *Dicranum muehlenbeckii* (in S) 820 m alt., T. ENGELMARK, Sept. 3, 1979 (in S). – Baden-Württemberg, Sigmaringen, Oberschmeien, ca 700 m alt., T. ENGELMARK, Sept. 3, 1979 (in S). – Baden-Württemberg, Schwäbische Alb, 7522 NO: Hohenwittlingen bei Bad Urach, unterhalb der Ruine, W-exp. Steilhang mit Buchenwald, offener Felskopf auf Humus über Kalk, halbschattiger Standort, Weißjura, 600 m, M. SAUER, 12. 03. 1995, Nr. MS95022, as *Dicranum muehlenbeckii*? (Duplum in S).

**Russia:** Minusinsk, Kusnetski Alatau, ad fl. Nemir, E. SVEREFF, July 1886, as *Dicranum muehlenbeckii* (in S).

**Mongolia:** Urga, in monte Bogdo-ola, il silva, V. SMIRNOV, 1912, nr. 1395, as *Dicranum scoparium* (in S).

**Iran:** Prov. Mazandaran, Kudjur, between Kindj and Dasht-e Nazir, 800–1200 m alt, K. H. RECHINGER, Aug. 1948, as *Dicranum muehlenbeckii* (in S).

## 6. Acknowledgements

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Artikel/Article: [Dicranum dispersum spec. nov. \(Dicranaceae: Bryopsida: Bryophyta\) 1-8](#)