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Cinclidotus confertus (Musci, Cinclidotaceae), a new species from Greece

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Abstract – *Cinclidotus confertus* Lüth *sp. nov.* is described and illustrated from Vikos-Aoos National Park in northwest Greece. It is a compact, brownish- to blackish-green plant with densely set leaves. In its papillose and reddish-brown peristome teeth the new species resembles *C. mucronatus* (Brid.) Mach., but differs in its entirely smooth laminal cells and shorter setae, 4-5 mm long.

Bryophyta / Musci / Cinclidotaceae / *Cinclidotus* / Greece / Vicos-Aoos National Park / taxonomy

INTRODUCTION

In spring 2000 I accompanied Prof. Dr. Albert Reif from the University of Freiburg for studies in Vikos-Aoos National Park, in the very northwest of Greece, near the border with Albania. It is an alpine area, more than 2000 m at its highest, with an average altitude of 600-1200 m, with some small villages with extensive agriculture and oak forests. In this park, there are two deep gorges at an altitude of 300-600 m: Aoos and Vikos gorges. The Vikos gorge is divided into two parts. The upper part, above the village of Vikos, has a seasonally dry river, which only has water after heavy rain, mainly in winter. Near the village of Vikos there is a large underground stream appears out of the mountain and from here the lower part of the gorge has plentiful water throughout the year.

In the heavy current of the stream floods *Cinclidotus aquaticus* (Hedw.) Bruch & Schimp. grows, and on limestone boulders in the river, mainly near the banks, there is *Cinclidotus fontinaloides* (Hedw.) P. Beauv., whilst *Cinclidotus mucronatus* (Brid.) Mach. grows above water level on the banks, both in the upper and in the lower part of the gorge.

In the upper part of the gorge, just above the stream, an unknown *Cinclidotus* grows on a limestone boulder in the middle of the seasonally dry river with the habit of *Racomitrium aciculare* (Hedw.) Brid., compact and densly packed (Fig. 1). Microscopic examination shows that this plant has a reddish-brown and papillose peristome like *C. mucronatus* but non-papillose laminal cells, a combination which is not known from any other species of *Cinclidotus*. A piece of the specimen was sent to Ryszard Ochyra, who confirmed that it is a new species.

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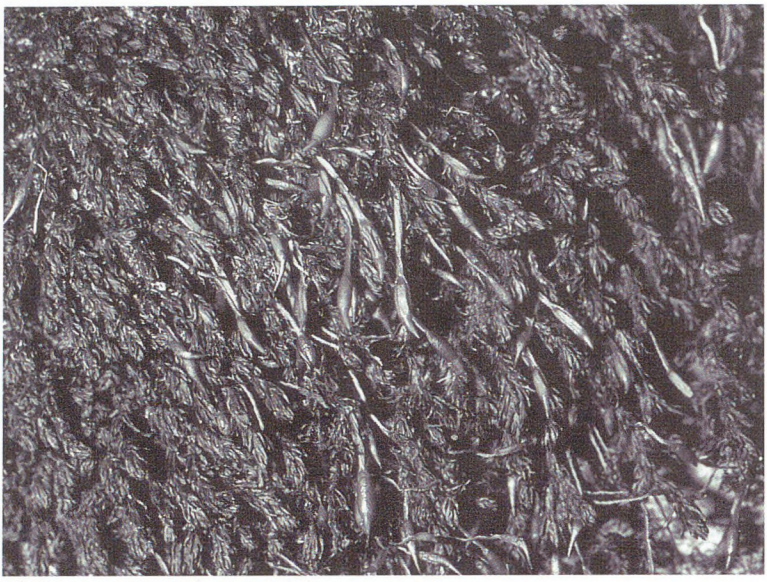

Fig. 1. Dense tufts of *Cinclidotus confertus* Lüth on a limestone boulder in Vikos gorge, which is in Vikos-Aoos National Park, Northwest Greece. The stems of the plant hanging slightly appressed to the substrate.

DESCRIPTION

Cinclidotus confertus Lüth *sp. nov.* (Figs. 2-3)

Diagnosis – *Species haec* C. mucronato *similis, sed foliis dense confertis, setis 4-5 mm longis et cellulis laminae laevissimis facillime diagnoscenda.*

Type – GREECE, Pindos, Vikos-Aoos National Park. Vikos gorge, on limestone boulder in episodically dry fallen river bed, altitude *ca* 490 m, 19 May 2000, *Lüth 2805* (Holotype: STU; isotype: BM, KRAM)

Description – Plants in dense, brownish- or blackish-green tufts, slightly appressed to the substrate. **Stems** 2-3 cm tall, mostly sparingly branched, sometimes with short branches in clusters, creeping or hanging, pale to reddish-brown, in cross-section irregularly rounded, 200-250 µm in diameter, consisting of 2-3(-4)-layered epidermis of small cells, 5-15 µm wide with strongly incrassate walls, surrounding larger cortical cells, 15-25 µm in diameter, with slightly thickened to thin walls, central strand absent. **Rhizoids** in dense clusters at base of stem, reddish-brown, smooth. **Axillary hairs** at stem or branch tips, frequent and numerous on male plants, less common on female plants, filiform, hyaline, consisting of 5-10 cells 40-60 µm long. **Leaves** appressed to somewhat curled and sometimes recurved below when dry, erecto-patent when moist, ovate-lanceolate to lingulate-ovate, mostly flat or broadly concave, sometimes sharply keeled above, 0.7-1.3 × 3-4 mm, bluntly acute to obtuse at the apex. **Costa** strong, brown, ending in or near the

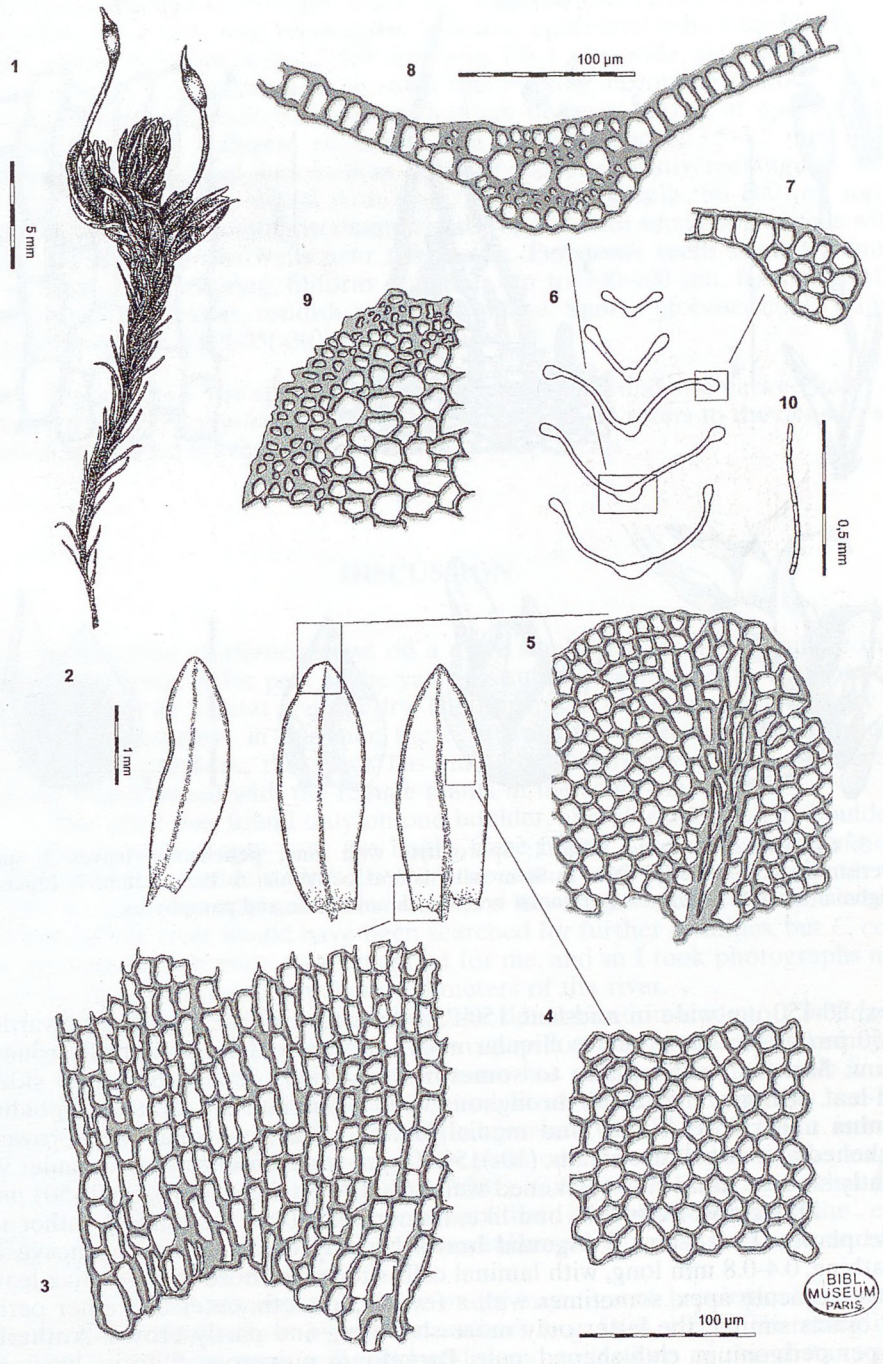

Fig. 2 *Cinclidotus confertus* Lüth. 1: Habit. 2: Leaves. 3: Basal cells. 4: Mid-leaf cells. 5: Leaf apex. 6: Sequence of leaf sections. 7: Section of leaf margin. 8: Nerve section. 9: Section of stem. 10: Axillary hair.

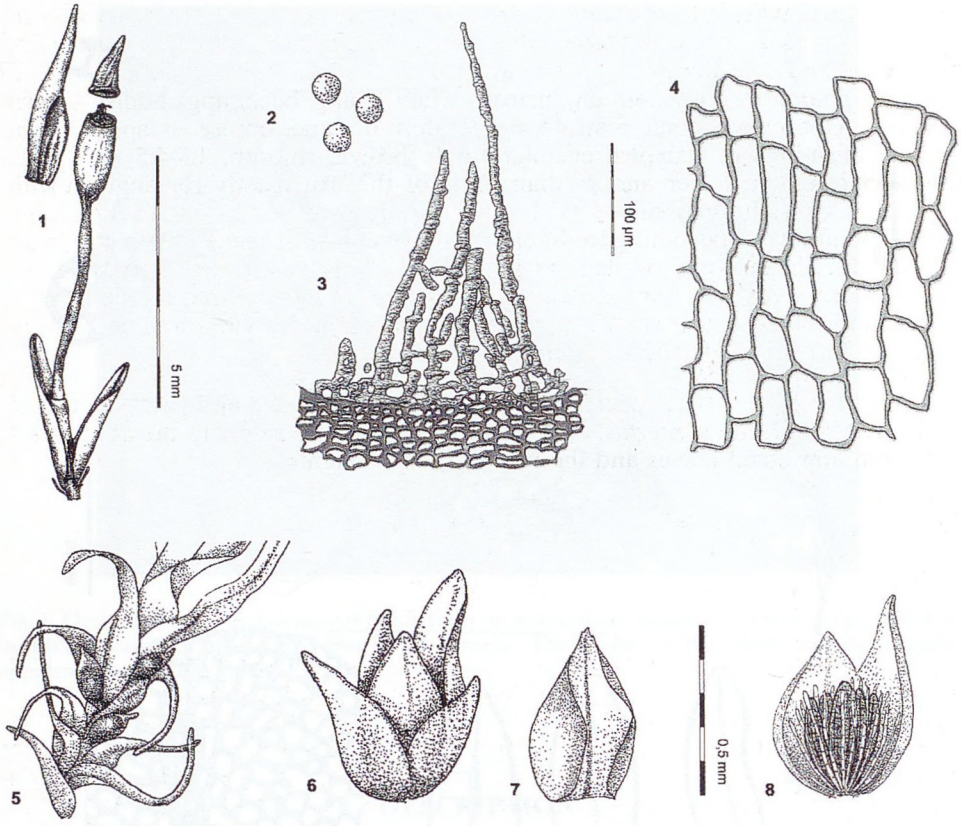

Fig. 3. *Cinclidotus confertus* Lüth. 1: Sporophyte with inner perichaetial leaves. 2: spores. 3: Peristome. 4: Exothecial cells. 5: Stem with lateral perigonia. 6: Perigonium. 7: Innermost perigonial bract. 8: Innermost perigonial bracts with antheridia and paraphyses.

apex, 80-150 µm wide in mid-leaf, 150-250 µm wide at base, tapering upwards to 20-50 µm at the apex, nearly circular above, ventrally flat and dorsally rounded below. **Margin** entire, plane to sometimes narrowly recurved at one side in mid-leaf, strongly thickened throughout with 4-8-seriate 2-4-stratose limbidium. **Lamina** unistratose. Upper and medial laminal cells hexagonal with brownish, thickened and not sinuose walls, (10-)15(-20) µm wide, basal cells rectangular with slightly sinuose and white thickened walls, (7-)10-15 (-20) × (15-)20-40(-50) µm.

Dioecious. Perigonia bud-like, numerous, lateral on stem of rather rare male plants, 0.5-0.8 mm. **Perigonial bracts** broadly ovate, strongly concave and sheathing, 0.4-0.8 mm long, with laminal cells similar to those in vegetative leaves, obtuse to acute apex, sometimes with a few single teeth, outer and inner perigonial bracts similar, the latter only more sheathing and partly brown. **Antheridia** 3-6 per perigonium, club-shaped, pale. **Paraphyses** numerous, filiform, hyaline to brownish, with cells up to 60 µm, exceeding the antheridia. **Perichaetial leaves** with similar areolation as in vegetative leaves; the innermost leaves convolute-sheathing, brown at base. **Seta** solitary, 4-5 mm long, straight or a little bent, golden to

golden-brown, twisted to the right when dry. **Vaginula** dark, from brown above to green below, 1.5-2 mm, with rectangular, esinuose epidermal cells. **Capsules** erect, straight, obloid to cylindrical, 1.5-1.8 mm long, 0.8-1 mm wide, smooth, wrinkled with age, golden to golden-green, lustrous when young, becoming reddish-brown with age. **Operculum** conic-rostrate, moderately oblique, obtuse at apex, 1 mm long, reddish-brown. **Calyptra** cucullate, pale brown, smooth, 3.5-4.5 mm long. **Exothecial cells** in lower and median parts of the urn mostly rectangular with somewhat curved walls, mixed with some isodiametric cells, 50-100 µm long, (20-)30-50 µm wide, becoming isodiametric above and with small, oblate cells with thickened, reddish-brown walls near the mouth. **Peristome teeth** strongly fenestrate at base, entire in long, filiform segments, up to 300-400 µm, fragile, mostly broken in older capsules, reddish-brown, papillose. **Spores** globose, finely papillose, pale brown, (15-)20-25(-30) µm in diameter.

Etymology – The species name signifies the crowded and packed habit of the plant (from Latin *confertus* = crowded, packed) which refers to the densely set and often appressed leaves and the relatively short stems.

DISCUSSION

Cinclidotus confertus grows on a quite small boulder in the middle of a seasonally dry river, so for part of the year it is submersed in a heavy flow, but for most of the year its habitat is quite dry. The northwest of Greece is not as dry as the south, nevertheless in summer there are months without rain. Although *C. confertus* is dioecious, the plant has numerous sporophytes. The rare male plants are found mixed with the female plants in the same mat.

The plant was found only on one boulder, and all other nearby boulders were without mosses; only near the banks were found *Cinclidotus fontinaloides* and higher on the boulders *Orthotrichum cupulatum* var. *riparium* Huebener. In the field, *C. confertus* was not recognized as a new species, otherwise the whole upper part of the river would have been searched for further localities, but *C. confertus* aroused my attention as a new plant for me, and so I took photographs and looked for the plant over a few hundred meters of the river.

On an examination of the plant, the determination leads to *Cinclidotus mucronatus*, because of the reddish-brown, papillose peristome (Mönkemeyer, 1927; Frahm & Frey, 1992), but *C. mucronatus* has papillose laminal cells and a much longer seta (8-12 mm) than *C. confertus*. From the habit, the leaves and the length of the seta (Smith, 1980), *Cinclidotus riparius* (Web. & Mohr) Arn. is indicated, but that has a nearly smooth, yellow peristome. From the habit, the length of the seta and the peristome (Frey *et al.*, 1995), *C. confertus* looks somewhat like *Cinclidotus pachylomoides* Bizot, a plant that is described from the east Mediterranean area, but like *C. mucronatus* it has papillose laminal cells and the cells of *C. confertus* are smooth.

Greece still remains a country under-investigated bryologically, despite recent notable contributions by various authors (e.g. Düll, 1995). Therefore it is likely that future field work will yield additional collections of this distinct and remarkable species.

The genus *Cinclidotus* is well represented in the Mediterranean area which is evidently the centre of its diversity. Frey *et al.* (1995) recorded no fewer

than six species from Europe and an additional three species are known in the Near East, including *C. pachyloma* E. S. Salmon from the Lebanon, Syria and Israel (Frey & Kürschner, 1991) and two recently described species from Turkey, namely *C. nyholmiae* Çetin (Çetin, 1988) and *C. bistratosus* Kürschner & Lübenau-Nestle (Kürschner & Lübenau-Nestle, 2000).

Acknowledgments. I am gratefull to Alfons Schäfer, who gave me the idea that the specimen nr. 2805 of my collection probably could be a new species and recommended me to turn to Ryszard Ochyra as an expert for *Cnclidotus*. My special thanks are due to Ryszard Ochyra, who confirmed that *Cinclidotus confertus* really is a new species. He encouraged me in a very friendly way, to do the description and also helped with the latin diagnosis and with additional comments. Also, I thank Brian O'Shea for the correction of my English.

Last, but not least, I thank Albert Reif, who provided the idea and the financial backing to the expedition. He was an edifying companion in travelling as well as in never-ending discussions in the tavern of Vikos.

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