

***Entosthodon commutatus* Durieu et Mont.
(Funariaceae, Bryopsida), new to Europe and Morocco**

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Abstract – *Entosthodon commutatus* Durieu et Mont., heretofore considered an Algerian endemic, has been collected in Morocco and southern Spain. New morphological data, distribution and differences from *E. attenuatus* (Dicks.) Bryhn, the most closely related and morphologically similar species, are given. A lectotype and epitype for *E. commutatus* are designated.

Mosses / Taxonomy / Chorology / *Entosthodon* / Funariaceae / Algeria / Spain / Morocco

INTRODUCTION

During the revision of the genus *Entosthodon* as part of the *Flora Briofítica Ibérica* project we noticed that we had a few samples collected in the southeast of Spain and in Morocco corresponding to *E. commutatus* Durieu et Mont. This species was described from Algerian material (Montagne, 1849), and considered endemic to that North African country (Bescherelle, 1882; Ros *et al.*, 1999).

Entosthodon commutatus, together with *E. schimperi* Brugués and *E. mouretii* (Corb.) Jelenc, are species described from northern Africa and found later in the Iberian Peninsula (Brugués *et al.*, 1999; Brugués *et al.*, 2001), but also in other close areas namely the Canary Islands from whence *E. schimperi* has been reported (Brugués *et al.*, 2001; Sérgio *et al.*, 2006), and France from whence *E. mouretii* has been cited (Thouvenot, 2008).

A previous report of *E. commutatus* from the south of Spain (Casas & Oliva, 1982) appears to be due to a misinterpretation of Loeske (1929) by the editors of *Index Muscorum*, in which *E. durieui* Mont. appears as a synonym of *E. commutatus*.

In this paper we emend the original description of *E. commutatus*, particularly in regard to its peristome. In addition we provide data concerning its habitat preferences, distribution and the differences between it and *E. attenuatus*, the most closely related species in Europe.

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DESCRIPTION

Entosthodon commutatus Durieu *et* Mont., *Ann. Sci. Nat. Bot.*, sér. 3, 12: 317. 1849.

Figs 1-11, 12

Lectotype (here designated): [icon] Bory de Saint Vincent & Durieu de Maisonneuve, *Expl. Sci. Algérie*, pl. 35 fig 3. 1849. **Epitype** (here designated): [Algeria] Mustaphae, près Alger, *Trabut s.n.* (PC 0083753!).

Plants 0.2-0.4 cm high, yellow-green. **Stem** erect, reddish-brown with pale brown rhizoids, with a central strand, inner cortical cells large, thin walled, outer cortical cells in 2-3 rows, smaller, with thickened walls, reddish, hyalodermis frequently collapsed. **Leaves** slightly twisted when dry, erect-patent when moist, oblong, tapering gradually to an acute or acuminate point, 1.1-2.6 × 0.7-1.1 mm; margins entire or bluntly toothed in upper part, not bordered. Upper laminal cells thin-walled, oblong-hexagonal to rectangular, 35-130 × 20-38 μm, marginal cells not differentiated, basal cells rectangular, longer, the apical cell to 217 μm long. **Nerve** extending about 1/2-2/3 way up leaf, with 2-3 ventral cells in one layer and enlarged, a central stereid or substereid band and one layer of dorsal cells. Autoicous. Perichaetial leaves longer than vegetative leaves. **Seta** straight, 6.5-11 mm long, brownish. **Capsule** erect, symmetric or nearly so, pyriform, 1.2-2.2 mm long, reddish brown; mouth transverse, equal to the diameter of the moist capsule, neck long, 1/2-2/3 length of capsule, exothecial cells oblong or linear, with cuneate walls, with the narrow lumen in the outer surface, 51-80 × 10-12 μm, 5-8 rows of oblate cells near mouth. **Peristome** double, exostome with 16 main straight teeth, reddish, to 320 μm high, papillose or papillose-striate, trabeculate in the inner surface, hyaline at apex, fragile and fugacious, and 16 smaller intermediate teeth; endostome segments rudimentary, wider than exostome teeth at base, irregular in outline, hyaline, papillose, hard to observe (Fig. 8). **Operculum** convex or bluntly apiculate, with the cells arranged in somewhat curved rows. **Spores** globose or reniform, 24-28 μm, coarsely papillose under light microscope, baculate-insulate under SEM. **Calyptra** cucullate, *ca* 3 mm long.

Additional specimens examined:

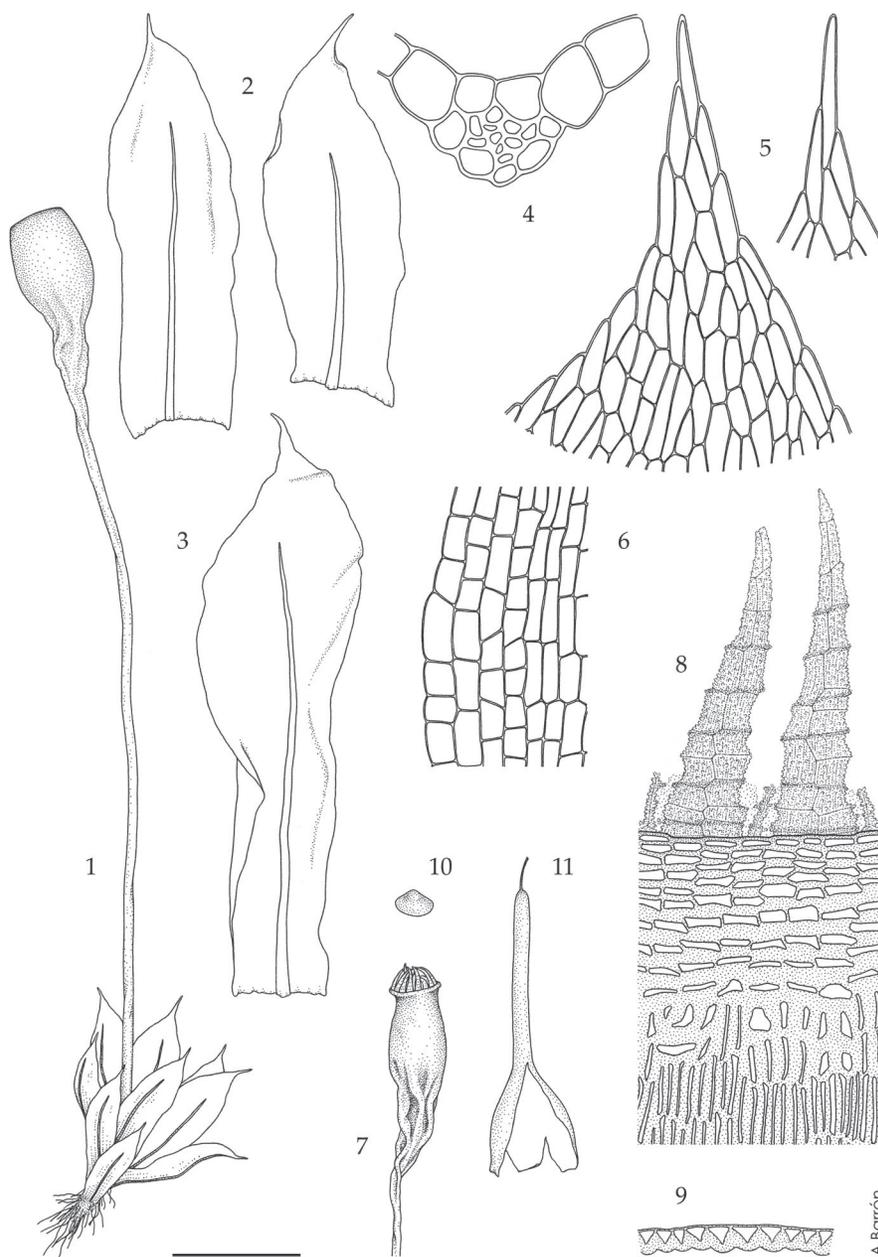
Algeria: Without precise locality, *Montagne* (PC-Thériot 0083760, PC-Montagne 0083763).

Morocco: 25 km E of Al-Hoceïma, dry slopes near the sea, 23-IV-2009, Sáez *et al.* (BCB 56920). **Spain:** Alicante, Elche, Santa Pola lagoons, 2-IV-1993, Ros & Cano (MUB 4911).

Murcia, between Cartagena and Los Urrutias, 27-II-1997, Ros & Schumacker (MUB 7903).

DISCUSSION

The protologue of *Entosthodon commutatus* reads: “*Entosthodon commutatus* D.R. et Montag. Mss., et Fl. d’Alg. Atlas, t. 35, f. 3 [...] Hab. in collibus Babazoum dictis prope Alger a cl. Durieu lectus”. According to Stafleu & Cowan (1976, 1981) the original herbaria of Durieu de Maisonneuve and Montagne are kept at PC. We have located two specimens labelled “*E. commutatus*” in the Montagne herbarium at PC. However, as there is no reference to the locality or collector provided in the protologue, we cannot be sure that these specimens were used by the authors to describe the species. Thus, our interpretation is that the only element eligible for the lecto-typification for



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Figs 1-11. *Entosthodon commutatus* Durieu et Mont. 1. Habit. 2. Leaves. 3. Perichaetial leaf. 4. Transverse section of nerve. 5. Leaf apices. 6. Median and marginal leaf cells. 7. Capsule in dry state. 8. Peristome and exothelial cells. 9. Transverse section of exothelial cells. 10. Operculum. 11. Calyptra. 1, 2, 5-11: MUB 4911; 3: PC-Thériot 0083763; 4: BCB 56920. Scale bars 1, 7, 10, 11: 1.5 mm; 2, 3: 0.9 mm; 4, 9: 90 μ m; 5, 6: 175 μ m; 8: 120 μ m.

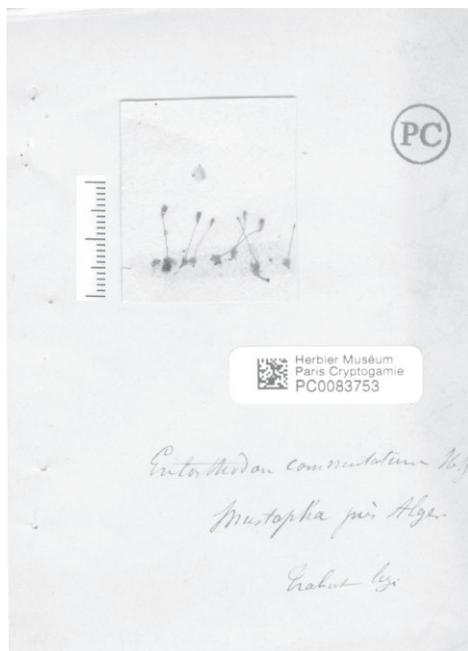


Fig. 12. Epitype of *Entosthodon commutatus* Durieu et Mont. [Mustaphae, près Alger, *Trabut s.n.* (PC 0083753)].

E. commutatus is the illustration cited in the protologue (Bory de Saint Vicent & Durieu de Maisonneuve, 1849). We here formally designate Plate 35, fig. 3 of the *Atlas* volume of Bory and Durieu's *Exploration scientifique de l'Algérie* as the lectotype of this name. In the illustration most of the differential characters are drawn, such as the acuminate leaf apex, the nerve extending 2/3 way up leaf, and exostome teeth of the peristome. However, some taxonomic character states such as the nature of the endostome and the intermediate teeth-like process of the exostome are not shown. Because of the absence of this information in the illustration, we here also designate as an epitype a specimen of *E. commutatus* from Algeria collected by Trabut (PC 008753) (Fig. 12).

According to the concept of Fife (1985, 1996), *E. commutatus* belongs to the subgenus *Entosthodon*, which is characterized by its symmetrical capsules with transverse mouth and oblong exothecial cells with thick, radially cuneate walls. The *E. commutatus* peristome was originally described as simple, but we have also observed a rudimentary endostome. Between the long exostome teeth there are some intercalary short structures regularly distributed and similar in colour and ornamentation to the long teeth; the denomination of "intermediate exostome teeth", used by Edwards (1984) in the description of the *Encalypta procera* Bruch exostome, has been adopted for naming the above mentioned intercalary structures. Brotherus (1924) shows some similar structures in the drawing of *Funaria bolanderi* (Lesq.) Holz peristome, although without any description.

E. attenuatus (Dicks.) Bryhn is a common species in Europe and also occurs in several North African countries (Ros *et al.*, 1999). This species could be confused with *E. commutatus* since both have a peristome with the exostome well

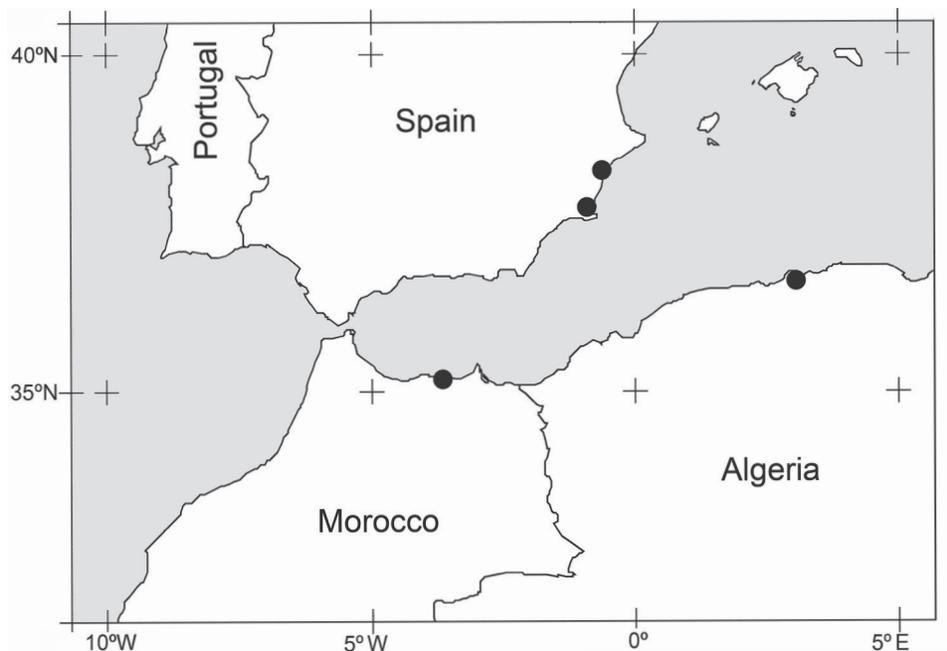


Fig. 13. Distribution map of *Entosthodon commutatus* Durieu et Mont.

developed and the endostome rudimentary, although *E. commutatus* has intermediate exostome teeth which are lacking in *E. attenuatus*. The best differential character is the colour of the rhizoids, which is bright cerise in *E. attenuatus* and pale brown in *E. commutatus*. Other differentiating features are, in *E. attenuatus* leaf apices acute, the nerve ending in or just below the apex, and 1-2 rows of marginal cells narrower. By contrast in *E. commutatus*, the leaf apices are acute to acuminate, the nerve extends only 1/2-2/3 up leaf, and the marginal cells are not differentiated.

With the addition of *E. commutatus* to the Spanish flora, and by reference to the checklist of Hill *et al.* (2006), the number of *Entosthodon* species documented from the Iberian Peninsula rises to 11. The two known Spanish populations of *E. commutatus* grow in open communities on salty substrates near the sea. Drastic transformation of Spanish coastal habitats in the last decades could account for its restricted distribution. In northern Morocco, *E. commutatus* grows in dry argillaceous crevices with northerly exposure, also near the sea, at between 50 and 80 m above sea level. The locality where *E. commutatus* was found in Morocco appears to be (unlike the Spanish localities) undisturbed, despite being near a road.

At present, the documented localities of *E. commutatus* are very scattered (Fig. 13), although its habitat preference suggests that it could be more widely distributed in North Africa as well as in dry places in southern Europe.

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