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Identity of North African endemic bryophytes, 2

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Abstract – The types of nine taxa described with material from Northern Africa have been revised, yielding the following results: *Fissidens viridulus* var. *algeriensis* Corb. is synomyzed with *Fissidens rufulus, Fontinalis antipyretica* var. *rufescens* Besch. *ex* Cardot with *Fontinalis antipyretica*, *Funaria hygrometrica* var. *ahaggarensis* Thér. *et* Trab. with *Funaria hygrometrica*, *Grimmia apocarpa var. auresiana* Besch. with *Schistidium crassipilum* H.H. Blom, *Homalothecium philippeanum* var. *maroccanum* Thér. *et* Trab. with *Homalothecium philippeanum*, *Maireola atlantica* Thér. *et* Trab. with *Distichium inclinatum*, *Orthotrichum anomalum* var. *algeriense* Thér. & Trab. with *Orthotrichum anomalum* and *Pleurochaete squarrosa* var. *maroccana* Jelenc with *Tortella squarrosa. Physcomitrium longicolle* Trab. is found to be conspecific with *Entosthodon hungaricus* (Boros) Loeske and, since the former has priority in the genus *Entosthodon*, a new combination is proposed: *Entosthodon longicolle* (Trab.) Ros *et* M. J. Cano. Lectotypes have been designated for all of them. Two nomina nuda have also been studied: *Barbula vinealis* f. *viridis* Besch., which is reidentified as *Didymodon rigidulus*, and *Rhynchostegiella maireana* Dixon *et* Thér., which has been used for specimens of *Brachytheciastrum dieckei* and *B. velutinum*.

Typification / taxonomy / endemic bryophytes / Northern Africa /*Entosthodon curvicolle*

INTRODUCTION

This paper represents part of the results of the studies carried out by the authors on the North African bryoflora, which started with the publication of a compilation of the taxa recorded for the area as a checklist (Ros *et al.*, 1999). The same paper mentioned the high proportion of endemics and the need for their revision. For this reason, a search was started at that time for the types of all these endemics, which resulted in a first publication by Cano *et al.* (2000). After that, the search continued and more findings were made, generally with poor results because many still remain to be found due to the difficulties mentioned by Cano *et al.* (2000). Fortunately, some important collections at PC (e.g., Bizot, Cardot, and Thériot) hold many original specimens, which have been the main source of material for this study. For each name the data of the protologue are mentioned in the text.

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RESULTS AND DISCUSSION

1. *Fissidens viridulus* var. *algeriensis* Corb., *Rev. Bot., Bull. Mens.* 7: 149. 1889. **Type:** [Algeria] "in … de Blida, … de Blida, Nº 2084". Lectotype PC!, designated here [= ***Fissidens rufulus*** Schimp., *Bryol. Eur.* 1: 199, pl. 102 (fasc. 46-47 Mon. Suppl. 2: 1. 2). 1851] **syn. nov.**

We have been able to find only one specimen among the Trabut specimens housed in PC (nº 2084). Although only the locality is indicated on the label, the protologue contains more information "Blida, bord d'un chemin frais et ombreux, sur la terre, 3 février 1887". In CHE, where the original herbarium of Trabut is kept, no material of this taxon was found, and so we chose the above specimen as lectotype.

The specimen was revised by M. A. Bruggemann-Nannenga in 1992, who identified the plants as *Fissidens rufulus*. We agree with her identification mainly due to the oblong leaves, with an L/W ratio of no more than 5, limbidium that reach the insertion of the dorsal lamina, upper laminal cells 8-10 µm wide, spores 16-20 µm diameter and the width of the peristome teeth of about 60 µm. In addition, the presence of freshwater algae in the plants suggests that it grew in an aquatic environment.

2. *Fontinalis antipyretica* var. *rufescens* Besch. *ex* Cardot, *Mém. Soc. Sci. Nat. Cherbourg* 28: 53. 1892. Type: [Algeria] "Tamsguida, Kabylie orientale, *Trabut*, Nº 1889". Lectotype PC!, designated here [= ***Fontinalis antipyretica*** **var. *antipyretica*** Hedw., *Sp. Musc. Frond.*: 298. 1801] **syn. nov**.

The only specimen found at PC that fits the locality and collector data given in the protologue ["Kabylie orientale: Tamsguida (Trabut)!"] is the specimen number 1889 from Trabut's original herbarium in Cardot's herbarium, which is selected as lectotype of the name. Another specimen identified with this name has been found at BM in Bescherelle herbarium (BM 674740), but the locality and collector do not fit the protologue (Algier, Djurjura, 1869, *Letourneux*). Nevertheless, it also pertains to the type variety.

This name was first published without description (and thus invalidly), by Bescherelle (1882). Later, Cardot (1892) validly published the new taxon and described it as a brown ironish copper-yellow large form, similar to the var. *gigantea*, but not so vigorous. The exemplar has keeled and densely arranged leaves. Those of the middle part of the stem are 3.3-4: 1 as long as wide (5.0-5.5 × 0.85-1.3 mm) when folded in half, and the middle leaf cells are 12-20 µm wide. In accordance with the descriptions and keys of the varieties provided by Smith (2004), the characters observed in the Algerian specimen are included within the variability of *Fontinalis antipyretica* var. *antipyretica*.

3. *Funaria hygrometrica* var. *ahaggarensis* Thér. *et* Trab., *Bull. Soc. Hist. Nat. Afrique N.* 22: 164. 1931. **Type:** [Algeria] "In ditione Ahaggar; Ideles ad terram udam, solo basaltico, 1500 m, 5.4.1928, 2^{e} éch/étudié*, leg. Dr. R. Maire*". Lectotype PC!, designated here; isolectotype PC! [= ***Funaria hygrometrica*** Hedw., *Sp. Musc. Frond.*: 172. 1801] **syn. nov.**

According to the description, the original material was collected in the so-called "Iter saharicum in 1928", by R. Maire. There are two specimens at PC-Thériot which match the data given in the protologue ["In ditione Ahaggar: Ideles, ad terram udam, solo basaltico, alt. 1500 m"], numbered "1er éch/ étudié" and "2^{e} éch/étudié". The first one ("1er éch/ étudié") was originally in Trabut's Herbarium and has Trabut's numeration (Nº 2443), and the second one was in

Thériot's herbarium. Both have "Hb. Maire" handwritten on the label or inside the envelope, identical locality, habitat and date of collection, and therefore they seem to be duplicates from Maire's herbarium. The specimen marked as "2^{e} éch/ étudié" is selected as lectotype because of its better condition.

In the protologue, the authors indicated: "Forme remarquable du type: folia angustiora, marginibus planis, peristomium brevius, dentes exostomi basi latissimi, spora 18-25 μ". In our opinion, these characters are within the variability observed in the cosmopolitan *Funaria hygrometrica*.

4. *Grimmia apocarpa* var. *auresiana* Besch., *Cat. Mous. Algérie*: 16. 1882. *Schistidium apocarpum* var. *auresian(a)um* (Besch.) Jelenc, *Bull. Soc. Géogr. Archéol. Oran* 74: 62. 1951. **Type:** [Algeria] "Aurès, ex herb. Bescherelle, *Balansa*, Nº 1790". Lectotype PC!, designated here [= ***Schistidium crassipilum*** H. H. Blom, *Bryophyt. Biblioth.* 49: 224, f. 90. 1996] **syn. nov.**

In BM we found no original material of this name. The only specimen found suitable for typification that matches the locality, and collector given in the protologue ["Aurès (BAL., 1853)!"], is in PC-Thériot, (Trabut nº 1790), a duplicate from Bescherelle's herbarium ("ex herb. Bescherelle").

The sample is very poor, with only 3-4 fructified shoots mixed with a *Syntrichia*; all are mouldy and in very bad condition.

Leaves have a very short or no hair point, although in the last case this seems to be because the point has been lost; the upper lamina is regularly bistratose, with entire, plane margins in the upper half of the leaf; the dorsal side of the costa lacks papillae; the upper laminal cells are 6-10 μm wide, and the basal cells are 8-12 μm wide; the perichaetial leaves are more or less elliptical and very different from the rest of the leaves; the urn is oblong, lacks stomata and the exothecial cells are predominantly oblong, with a more or less regular pattern; the peristome could not be observed, and seems to have been lost; the spores are 10 μm in diameter. Most of these characters, especially the perichaetial leaves and the exothecial cells (Blom, 1996) point to *Schistidium crassipilum* as the correct identification for this specimen.

5. *Homalothecium philippeanum* var. *maroccanum* Thér. *et* Trab., *Bull. Soc. Hist. Nat. Afrique N.* 21: 31. 1930. **Type:** [Morocco] "Azrou Moyen Atlas, *R. Maire*, original! Nº 7350". Lectotype PC!, designated here [= ***Homalothecium philippeanum*** (Spruce) Schimp., *Bryol. Eur.* 5: 93 (fasc. 46-47. Monogr. 3). 1851] **syn. nov.**

The only specimen found at PC, in Bizot's original collection, matches the information given in the protologue ["Hab. in rupibus calcareis et basalticis Atlantis Medii prope Azrou 1500-2000 m (D^{r} R. Maire, 1923)"], and is therefore designated as lectotype.

According to Hofmann (1998), the description in the protologue does not differentiate it from the typical variety of *Homalothecium philippeanum*. This was confirmed by the study of the type, which presents the costa reaching the apex, not ending in a spine but denticulate on the back.

6. *Maireola atlantica* Thér. *et* Trab., *Arch. Bot., Bull. Mens.* 1(3): 47. 1927. *Ditrichum atlanticum* (Thér. *et* Trab.) J.-P. Frahm *et* Seppelt, *Cryptog., Bryol.-Lichénol.* 8: 150. 1987. **Type:** [Morocco] "Gr. Atlas Marocain, 3500 m, Dj. Tachdirt, 1921, *Maire*, Nº 1682". Lectotype PC!, designated here [= ***Distichium inclinatum*** (Hedw.) Bruch & Schimp., *Bryol. Eur.* 2: 157. 194 (fasc. 29-31 Mon. 5. 2). 1846] **syn. nov.**

The type was kept originally in Trabut's herbarium, and later transferred to Thériot's herbarium. It matches the data of the protologue ["Hab. Maroc: fissures humides dans les rochers porphyriques du Grand Atlas, au Djebel Tachdirt, alt. 3.500 m; leg. R. Maire, 1921"].

The specimen selected as lectotype corresponds, beyond any doubt, to a *Distichium* species, because of the arrangement of leaves in two ranks along the stem, a character that is not mentioned for the genus *Maireola* or the species *M. atlantica* either by Thériot (1927) nor Frahm & Seppelt (1987), who synonymized the genus *Maireola* with *Ditrichum* and combined *M. atlantica* in this genus as *D. atlanticum*. According to Frahm & Seppelt (1987), *Maireola* should be merged with *Ditrichum* by the presence of central guide cells in the costa, autoicous sexual condition, straight seta, conic and short lid, and the non-vertically striate peristome teeth, with three prongs, characters that, according to these authors, are found in the Ditrichaceae but not in the Dicranaceae, where the genus was originally placed (Thériot, 1927). All these characters can be also found in *Distichium.* The big spore size described by Thériot (1927) as 36-40 µm in diameter, but that we have observed to reach only 22-30 µm, and the inclinate capsule led us to identify the specimen as *D. inclinatum*; according to Frey *et al*. (2006), spores are smaller in *D. capillaceum* (17-20 µm). *Distichium inclinatum*, a montane species, has been previously reported from the Moroccan High Atlas (Jelenc, 1955; Ros *et al.*, 1999).

There is another sample in PC named *Maireola atlantica*, but the information on the label ("Gr. Atlas Maroc, 2700, Legit R. Maire 22-7-24") does not match the protologue; it is also *Distichium inclinatum*.

7. *Orthotrichum anomalum* var. *algeriense* Thér. *et* Trab., *Bull Soc. Hist. Nat. Afrique N.* 21: 31. 1930. **Type:** [Algeria] "Babor, Nº 2125". Lectotype PC!, designated here [= ***Orthotrichum anomalum*** Hedw., *Sp. Musc. Frond.*: 162. 1801] **syn. nov.**

The single specimen found in PC herbarium, which presents Trabut's numeration 2125 and fits the protologue ["Hab. in Numidia: in monte Babor (TRABUT)"] has been selected as lectotype.

In the original description, the authors mentioned that the most reliable characters to separate this taxon from closely related taxa are the shorter peristome teeth and the stomata largely covered by the surrounding cells. They also pointed out that it differs from *Orthotrichum anomalum* in the exostome teeth joined in pairs, as occurs in *O. anomalum* var. *saxatile* Milde, which is considered a synonym of *O. anomalum* (Ignatov & Afonina, 1992). After a study of the type, we confirmed the presence of these characters but, in our opinion, they vary widely within *Orthotrichum anomalum* and do not merit recognition at any taxonomical level.

8. *Physcomitrium longicolle* Trab., *Rev. Bryol.* 49: 64. 1922 [1923]. **Type:** [Algeria] "*Ph. acuminatum* Besch. Cat. non Schl., Mechouneche". Lectotype PC!, designated here ≡ ***Entosthodon longicolle*** (Trab.) Ros & M. J. Cano, **comb. nov.**

Funaria hungarica Boros, *Magyar Bot. Lapok* 23: 73. 1925. *Entosthodon hungaricus* (Boros) Loeske, *Repert. Spec. Nov. Regni Veg. Sonderbeih. B* 3(2): 115. 1929. *Steppomitra hungarica* (Boros) Vondr., *Bull. Soc. Amis Sci. Lett. Poznań, Sér. D, Sci. Biol.* 6: 118. 1965 [1966] **syn. nov.** Type: [Hungaria] "Comit. Békés. Planitie magna hungariae. Laxe caespitosa rarissima in pseudonatronatis parum-graminosis inter pagum Kétegyháza et stationem viae ferreae " Ujkigyós " dict., 90 m, 23 May 1924, *Boros*". Type: BP!

Physcomitrium maroccanum Meyl., *Bull. Soc. Hist. Nat. Afrique N.* 28: 426. 1937. *Entosthodon maroccanus* (Meyl.) Hébr. *et* Lo Giudice, *Bull. Soc. Linn. Provence* 48: 145. 1997 **syn. nov.** Type: Maroc, Oued Noun, rochers gréseux, sur la terre (un peu calcaire) des fissures, *Ollivier* nº 25, Dr. R. Maire. Lectotype designated by Hébrard & Lo Giudice (1996): MPU-Herb. Maire (not seen).

We have selected as lectotype the only specimen found in Trabut's herbarium whose locality and initial identification by Bescherelle (1882), "*Physcomitrium acuminatum* Besch. Cat. non Schl." agrees with the original information in Bescherelle's (1882) catalogue: "Const. Sahara Mehounech (390 m), avril 1858, *La Perraudière*".

The identity of this name has not been discussed since its inception, and it is maintained in the checklist of Northern Africa (Ros *et al.*, 1999) and the checklist of mosses of the world (Crosby *et al.*, 1999).

Trabut, in the description of the taxon, compared his new species with *Physcomitrium acuminatum*, and stated that *P. longicolle* could be distinguished from the former by the capsule shape and the leaves with a margin formed by short cells. Hill *et al*. (2006) treated it as *Physcomitrium eurystomum* subsp. *acuminatum* (Bruch & Schimp.) Giacom., although they also mentioned that some authors do not recognize it as distinct from subsp. *eurystomum* Sendtn. In any case, the Algerian plants do not belong to *P. eurystomum* s.l., as this species has leaves dentate above, isodiametric exothecial cells, and spinose spores, whereas the type of *Physcomitrium longicolle* has entire leaves, predominantly oblong (very rarely isodiametric) exothecial cells, and spores that are not spinose. This combination of characters points to *Entosthodon* rather than *Physcomitrium* as the correct genus placement for this taxon (Fife, 1985; Brugués, 2003; Smith, 2004).

Its synonymy with *Entoshodon hungaricus* is also clear due to the mouth diameter, which is larger than the capsule and the oblong to obovate-lanceolate, acuminate leaves, not bordered with incrassate cells (Brugués, 2003).

Entosthodon maroccanus, another North African taxon synonymyzed with *E. hungaricus* by Cano *et al.* (1999), also pertains to *E. longicolle.* Our results extend the eastern distribution limit in northern Africa to Algeria, which suggests that this species could be more common in the area than previously considered. Summarizing the data presented by Cano *et al.* (1999), the species is distributed through central and southern Europe, western Asia and northern Africa.

9. *Pleurochaete squarrosa* var. *maroccana* Jelenc, *Bull. Soc. Hist. Nat. Afrique N.* 45: 72. 1954. *Pleurochaete squarrosa* var. *brevifolia* Thér. *et* Trab., *Bull. Soc. Hist. Nat. Afrique N.* 21: 29. 1930, *nom. illeg.*, non Amann 1916. **Type:** [Morocco] "Bent Hazim prope Gourrama, Maroc SE, *Humbert*, Nº 2129". Lectotype PC!, designated here [= ***Tortella squarrosa*** (Brid.) Limpr., *Die Laubm. Deutschl.* 1: 607. 176. 1888] **syn. nov.**

The specimen selected as lectotype (Trabut nº 2129) is the only one found in Thériot's original herbarium at PC, and its label includes most of the data of the protologue ["Hab. in rupestribus calcareis Imperii Maroccani austro-orientalis: in monte Bent-Hazim prope oppidum Gourrama, ad alt. c. 1700 m (H. HUMBERT, 1926)"].

Although the lectotype is a poorly developed specimen whose leaves are less clearly serrate above, shorter, and only curved, not squarrose, as it is typical for *T. squarrosa*, it unambiguously represents this taxon. The species is widely distributed in the Northern Hemisphere and also in some areas of the Southern Hemisphere (Hill *et al.*, 1992), and very common and abundant in the

Mediterranean. It accordingly shows a wide range of morphological variation, and we consider that this sample corresponds only to a form of the species growing in non-favourable conditions.

NOMINA NUDA

The specimens of two *nomina nuda* known to date only from Northern Africa have also been studied.

"Barbula vinealis f. viridis" Besch., *Cat. Mous. Algérie*: 16. 1882 nom. nud. "Barbula vinealis var. viridis Jelenc", *Bull. Soc. Géogr. Archéol. Oran* 75: 52. 1952 nom. nud.

A specimen labeled "*Barbula vinealis* forma *viridis*, Chiffa, Alger", was found in PC, and no other specimen with this name was found in PC or BM, where Bescherelle's specimens are kept. This specimen pertains to *Didymodon rigidulus* Hedw.

"Rhynchostegiella maireana" Dixon *et* Thér. *in* Maire & Werner, *Bull. Soc. Hist. Nat. Afrique N.* 25: 60. 1924 nom. nud.

Three specimens identified with this invalid name were found in PC-Thériot. One corresponds to the specimen treated in Maire & Werner (1934); it has papillose setae and has been identified as *Brachyteciastrum dieckei* (Roll) Ignatov *et* Huttunen. The other two specimens are both from Morocco; one of them contains a mixture of *B. dieckei* (seta papillose) and *Brachyteciastrum velutinum* (Hedw.) Ignatov *et* Huttunen (seta smooth or slightly papillose), and the other *B. velutinum*.

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