

***Didymodon nicholsonii* Culm. (Pottiaceae, Musci): new taxonomical, chorological and ecological data**

Juan A. JIMÉNEZ, Rosa M. ROS*, María J. CANO & Juan GUERRA

Departamento de Biología Vegetal, Área de Botánica, Facultad de Biología,
Universidad de Murcia, Campus de Espinardo, E-30100 Murcia, Spain.

(Received 10 March 2003, accepted 27 June 2003)

Abstract — *Didymodon nicholsonii* Culm. is reported as new to Afghanistan, Algeria, Italy and continental Greece. A description of the specimens studied is given, together with ecological details. *Barbula cucullata* J. Froehl. is proposed as a new synonym of *D. nicholsonii*.

***Didymodon nicholsonii* / *Barbula cucullata* / Afghanistan / Algeria / Greece / SW Asia**

Resumen — Se cita por primera vez *Didymodon nicholsonii* Culm. en Afganistán, Argelia, Italia y Grecia continental. Se realiza una descripción basada en los especímenes estudiados y se añaden detalles de su ecología. *Barbula cucullata* J. Froehl. se propone como sinónimo de *D. nicholsonii*.

***Didymodon nicholsonii* / *Barbula cucullata* / Afganistán / Argelia / Grecia / SO de Asia**

INTRODUCTION

The research carried out into the genus *Didymodon* in Europe has been very slight. Thus, only the works of Düll (1984a), Düll-Hermanns & Düll (1985) and Kučera (2000) on Central European taxa and Kučera (2002) on North European taxa can be mentioned. No studies have been made about north African and southwestern Asian taxa.

During a taxonomic revision of the genus *Didymodon* Hedw. in the Mediterranean Region, Macaronesia and southwestern Asia, several specimens of *Didymodon nicholsonii* Culm. have been identified. According to current literature, this species is quite rare in Europe although it is known from several different countries.

Barbulla cucullata J. Froehl. was described by Froehlich (1964) from Mazar-i-Sharif province, and since then it has not been collected again. It has been until now considered as an Afghan endemic.

* Corresponding author: rmros@um.es

STUDIED MATERIAL

AFGHANISTAN: Prov. Mazar-i-Sharif, in faucibus fluvii Balkh supra Aq Kupruk, 7-8.06.1962, *K.H. Rechinger 19762* (GZU, S). **New record.**

ALGERIA: Algeria, 17.03.1838, *A. Roussel s.n.* (RO). **New record.**

FRANCE: Seine-Maritime, edge of R. Seine, La Vacquerie, SW of Caudebec, 31.10.1987, *R.C. Stern s.n.* (E).

GREECE: De Egira a Oassi, 250 m, 38°07'N 22°20'E, 21.03.1999, *M.J. Cano et al. s.n.* (MUB 12956). Is. Karpathos, Othos ca 2 km vor der Taverne, 750-800 m, 11.05.2000, *R. Düll s.n.* (Herb. R. Düll). Is. Lesvos, south-part of Olymbos Oros, Mgalochori, creek valley, at road towards Plomari, 29.05.1999, *R. Düll s.n.* (Herb. R. Düll). **New records.** Creta, Lassíthi, 2 km westl. Amigdali, 8.04.1972, *R. Düll s.n.* (Herb. R. Düll).

ITALY: Rom, Forum Romanum, 14.05.1928, *H. Witte s.n.* (S). **New record.**

PORTUGAL: Baixo Alentejo, Almodôvar, Ribeira de Oeiras, próximo de Monte Pereiro, 20.03.1997, *C. Sérgio & C. Garcia s.n.* (LISU). Douro Litoral, Porto, Ponte de Pedra, 1916, *A. Machado s.n.* (PO 727). Mihno, Guimarães, 1928, *A. Machado s.n.* (PO 718). Trás-os-Montes e Alto Douro, Gimonde para Varge, 23.11.2000, *C. Sérgio s.n.* (LISU 11516).

SPAIN: Alava, Ribera Alta, Anúcita, Río Bayas, 30.08.1987, *P. Heras 958/87* (VIT 10296). Badajoz, Oliva de la Frontera, 23.04.1992, *R. Oliva 1851* (Herb. R. Oliva). Islas Baleares, Mallorca, Escorca, 5 m, 25.03.1994, *U.W. Abis s.n.* (BCB 49805). Jaén, Salfaral, 25.04.1985, *M.N. Jiménez s.n.* (MUB 14939). Lugo, 450 m, 31.03.2002, *M.J. Cano s.n.* (MUB 12737). Sevilla, entre Aznalcóllar y Escacena del Campo, *J. Guerra s.n.* (MUB 11701).

TURKEY: Prov. Antalya, SE side of Manavgat, 6.04.1972, *E. Nyholm 566d/72* (S). Prov. Izmir, Yamanlar Dag, 10.04.1970, *E. Nyholm 9ba/70* (S). Prov. Muğla, 2 km NW of Ula, 31.03.1971, *E. Nyholm 404a/71* (S).

RESULTS

Taxonomical Data

Several herbarium specimens of *Didymodon* have been identified as *D. nicholsonii*. Of them, one sample from Algeria and another one from Afghanistan stand out. The Algerian material and two other Turkish specimens were found with sporophytes, which is very unusual. Until now this species had only once been reported with sporophytes from England (Corley *et al.*, 1987). The second sample of interest is the type material of *Barbula cucullata*, which was examined from S (Stockholm) and GZU (Graz) herbaria. It has been identified as *D. nicholsonii*.

A complete description of the taxon is provided, including the variations observed in the three samples with sporophytes (Fig. 1). The characters whose variation is amplified or was not found in previous published descriptions are in italic type.

Didymodon nicholsonii Culm., *Rev. Bryol.* 34: 100. 1907.

Type: England "wall of a culvert, Amberley Wild Brooks, Sussex" 1905, *W.E. Nicholson* (lectotype: BM, designated by Zander (1981); isolectotype: FI!).

Barbula cucullata J. Froehl., *Ann. Naturhist. Mus. Wien* 67: 149-158. 1964.

Type: "Afghanistan, Prov. Mazar-i-Sharif, in faucibus fluvii Balkh supra Aq

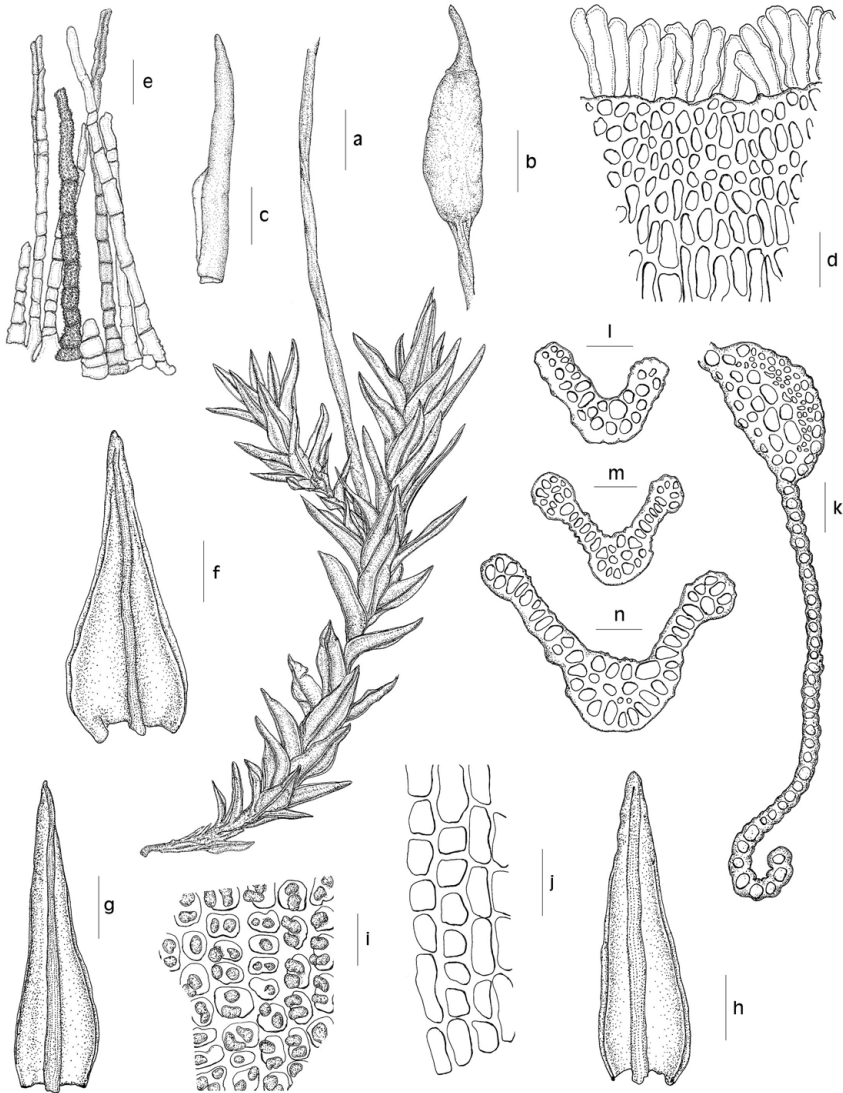


Fig. 1. *Didymodon nicholsonii* Culm. **a**: Habit. **b**: Capsule. **c**: Calyptra. **d**: Annulus and exothecial cells. **e**: Peristome teeth. **f, g, h**: Leaves. **i**: Upper laminal cells. **j**: Basal laminal cells. **k, l, m, n**: Leaf cross-sections. Scales: a, b = 1 mm; c = 0.5 mm; d = 30 μ m; e = 0.1 mm; f, g, h = 0.4 mm; i = 10 μ m; j = 20 μ m; k, l, m, n = 20 μ m. (a-e, *E. Nyholm* 404/71 (S); f-n, MUB 12737).

Kupruk, ca 700-800 m, ca 36°5'N, 66°52'E" 7-8.06.1962, K.H. Rechinger 19672 (holotype: S!; isotype: GZU!) **syn. nov.**

Plants 0.8-3 cm high, growing in loose or dense turfs, dark-green to brown-reddish. Stems erect, simple or branched, central strand differentiated. *Leaves* appressed, sometimes lightly twisted when dry, erect-patent to patent, rarely spreading when moist, *ovate to ovate-lanceolate, more rarely lanceolate,*

(0.98)1.3–3.2 x 0.5–0.9 mm; lamina partly bistratose, sometimes totally bistratose near the apex, yellowish to red-orange with KOH; apex rounded to obtuse, sometimes acute, often slightly cucullate; margins entire, recurved from base to the apex or in the proximal 3/4 of the leaf, sometimes only in the proximal 1/2, bi- to tetrastose in 2–3(4) rows of cells in the upper middle of the leaf. Costa 60–100 µm wide at leaf base, ending below the apex or percurrent, thickened in the apex, ventral cells of the costa, in the upper middle of the leaf, subquadrate to quadrate, smooth or papillose, dorsal cells of the costa, in the upper middle of the leaf, subquadrate to quadrate, smooth or papillose, in transverse section at leaf base semi-circular, with 2(3) layers of guide cells, with (2)3–6(7) cells in each one of them, without ventral stereids, 1–2 layers of dorsal stereids, ventral epidermis differentiated, smooth or papillose, dorsal epidermis differentiated, smooth or papillose. Upper and middle laminal cells rounded, subquadrate or hexagonal, 4–10 x (4)5–10(12.5) µm, thick-walled, with 1–3 simple papillae per cell, basal cells quadrate to rectangular, 10–42.5 x 5–13 µm, generally thick-walled, smooth. Dioicous. Seta erect, 0.8–1.7 cm long, orange-reddish, spirally twisted to left throughout. Capsule erect, cylindrical, 1.0–2.7 x 0.42–0.7 mm, brown; annulus constituted by one row of inflated cells. Peristome of 32 filiform, teeth, uneven, 0.45–1.2 mm long, spirally twisted to the left, brown-yellowish; basal membrane 60–100 µm high. Operculum rostrate, 0.9–1.5 mm long. Calyptra cucullate, 3 mm long. Spores spherical, 9–15 µm in diameter, smooth, brown-yellowish.

Chorological and Ecological Data

Didymodon nicholsonii is a rare suboceanic-submediterranean species (Düll, 1984b), which was collected for the first time in the South of England (Amberley, Wild Brooks, Sussex) by W.E. Nicholson at the beginning of the 20th century. For a long time this taxon was considered to be an endemic to British Isles. *Didymodon nicholsonii* has been known from Canada and U.S.A. in America and from Belgium, Crete (Greece), France, Germany, Ireland, the Netherlands, Portugal, Spain, Turkey and United Kingdom in Europe (Hill *et al.*, 1992; Düll, 1992, 1995). Afghanistan, Algeria, Italy, mainland Greece and islands of Lesbos and Karpathos are now added to its range. Unfortunately the exact data of the Algerian locality are unknown, although, according to Jelenc (1955), the collector of the sample, A. Roussel worked in the surroundings of Argel. The record of this moss in Afghanistan represents the second in an Asian country, since, until now, it had only been cited in Turkey (Düll, 1992).

This species grows usually on calcareous rocks and banks, in shaded and wet habitats, next to streams and rivers, also on sheltered soils and more rarely on artificial walls, at 0–890 m elevation.

DISCUSSION

Didymodon nicholsonii is mainly characterized by its bi- to tetrastatose laminal margin, with 2–3(4) rows of cells at the upper middle of leaf, the costa ending below the apex or percurrent, thickened in the apex and in transverse section at leaf base with 2(3) layers of guide cells, with (2)3–6(7) cells in each one of them and without ventral stereids.

This species may be confused with *D. luridus* Hornsch. and *D. vinealis* (Brid.) R. H. Zander but especially, and according to the specimens examined, it is confused with *D. rigidulus* Hedw. *Didymodon nicholsonii* is distinguished from the first by the stratification of the margin (unistratose in *D. luridus*) and by the papillosity of the laminal cells (smooth in *D. luridus*). *Didymodon rigidulus* and only sometimes *D. vinealis*, share with *D. nicholsonii* the bistratose margin, but *D. nicholsonii* differs from them because the upper middle of the leaf has 2-4 layers in 2-3(4) longitudinal rows of cells. Also *D. rigidulus* is distinguished by the costa structure (with one layer of guide cells and ventral stereids at leaf base) and by the generally excurrent costa.

Different structures of asexual reproduction, such as multicellular gemmae in the axils of upper leaves (Smith, 1978), gemmae in the leaf apex on the ventral surface of the costa and rhizoidal tubers (Arts, 1987), have been described in some samples from British Isles and Belgium, but they have not been seen in the studied material.

Acknowledgements. We would like to thank the curators of the herbaria and the collectors who sent us material on loan. This work has been carried out with financial support from MCYT of Spain (Projects BOS2001-0276 and BOS2000-0296-C03-01) and "Fundación Séneca" of Murcia (PI-15/00762/FS/01).

REFERENCES

- ARTS T., 1987 – *Didymodon nicholsonii* Culm. (Pottiaceae) with gemmae and rhizoidal tubers recorded for Belgium. *Bulletin de la Société Royale de Botanique de Belgique* 120: 3-6.
- CORLEY M.F.V., NEWTON M.E. & EDWARDS S.R., 1987 – *Didymodon nicholsonii* Culm. with sporophytes in England. *Journal of Bryology* 14: 653-657.
- DÜLL R., 1984a – Taxonomy and distribution of some critical taxa of the genus *Didymodon* in Europe. *Journal of the Hattori Botanical Laboratory* 55: 259-266.
- DÜLL R., 1984b – Distribution of the European and Macaronesian Mosses (Bryophytina), Part. I. *Bryologische Beiträge* 4: 1-113.
- DÜLL R., 1992 – Distribution of the European and Macaronesian Mosses (Bryophytina), Annotation and progress. *Bryologische Beiträge* 8/9: 1-223.
- DÜLL R., 1995 – Moose Griechenlands. *Bryologische Beiträge* 10: 1-229.
- DÜLL-HERMANN I. & DÜLL R., 1985 – A taxonomical reinvestigacion of eight critical European taxa of the genus *Didymodon*. *Abstracta Botanica* 9 (Suppl. 2): 33-44.
- FROEHLICH J., 1964 – Bryophyten aus Afghanistan und Nordwest-Pakistan. *Annalen des Naturhistorischen Museums in Wien* 67: 149-158.
- HILL M.O., PRESTON C.D. & SMITH A.J.E., 1992 – *Atlas of the Bryophytes of Britain and Ireland, vol. 2. Mosses (except Diplolepidae)*. Colchester. Harley Books.
- JELENC F., 1955 – *Muscinées de l'Afrique du Nord (Algérie, Tunisie, Maroc, Sahara)*. Oran, L. Fouque, 152 p. [extrait de *Bulletin de la Société de Géographie et d'Archéologie de la Province d'Oran* 1949-1953, tomes 72-76].
- KUČERA J., 2000 – Illustrierter Bestimmungsschlüssel zu den mitteleuropäischen Arten der Gattung *Didymodon*. *Meylania* 19: 2-49.
- KUČERA J., 2002 – Illustrerad bestämningssnyckel till *Didymodon* i norra Europa. *Myrinia* 12: 1-40.
- SMITH A.J.E., 1978 – *The moss flora of Britain and Ireland*. Cambridge, Cambridge University Press, 706 pp.
- ZANDER R.H., 1981 – *Didymodon* (Pottiaceae) in Mexico and California: Taxonomy and nomenclature of discontinuous and nondiscontinuous taxa. *Cryptogamie, Bryologie-Lichénologie* 2: 379-422.