New distribution data on *Didymodon anserinocapitatus* (X. J. Li) R. H. Zander, *D. maschalogena* (Renaud & Cardot) Broth. and *D. sicculus* M. J. Cano *et al.* (Bryophyta, Pottiaceae)

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**Abstract** – *Didymodon anserinocapitatus* (X. J. Li) R. H. Zander and *D. maschalogena* (Renaud & Cardot) Broth. are reported as new to Central Asia and SW Asia, respectively. The distribution area of *D. sicculus* M. J. Cano *et al.* is extended to Algeria. The Azores, the Canary Islands, Israel, Turkey and Yemen. The current worldwide range is mapped.

*Didymodon* / *Pottiaceae* / *Distribution* / Mediterranean Region / Asia / Macaronesia

**Resumen** – Se citan por primera vez *Didymodon anserinocapitatus* (X. J. Li) R. H. Zander y *D. maschalogena* (Renaud & Cardot) Broth. en Asia Central y el SO asiático respectivamente. El área de distribución de *D. sicculus* M. J. Cano *et al.* es ampliada, ya que se cita por primera vez en Argelia. Islas Azores, Islas Canarias, Israel, Turquía y Yemen. Se presentan los mapas de distribución mundial conocida de cada una de las tres especies.

*Didymodon* / *Pottiaceae* / Distribución / Región Mediterránea / Asia / Macaronesia

**INTRODUCTION**

The genus *Didymodon* belongs to the family Pottiaceae, subfamily Merceyoideae, tribe Barbuleae and is represented by approximately 122 species (Zander, 1993), which are distributed throughout the world.

While studying the material of the genus *Didymodon* for a taxonomical revision of this genus in the Mediterranean Region, Macaronesia, Central and Southwestern Asia, we have identified a specimen of *D. anserinocapitatus* and another of *D. maschalogena*.

*Didymodon anserinocapitatus* is an extremely rare taxon, which is only known from nine localities worldwide. *Didymodon maschalogena*, although collected in several continents, it is only known from very few localities.

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In addition, several samples from different countries of the study area were identified as *Didymodon cineculus*, which was only known from some dry areas of the Mediterranean Region.

**MATERIAL AND METHODS**

To confirm the identification of the taxa we studied the type material of each of them. Also all available collections of the genus *Didymodon* deposited in the following institutional and personal herbaria have been revised: B, BC, BCB, BM, BR, C, CAI, CANM, CLU, COI, E, FCO, FH, FI, G, GB, GDA, GJO, GZU, H, HBG, IRAN, JE, L, LE, LISU, M, MA, MGC, MO, MUB, NMW, NY, O, PAMP, PC, PO, RO, S, SALA, SANT, SINU, SOM, TFC, VAL, VIT, W, WU, Z, herbarium T. L. Blockeel, herbarium P. Boudier, herbarium A. Cogoni, herbarium W. Frey, herbarium J. Martinez-Abaigar, herbarium R. Oliva, herbarium R. B. Pierrot, herbarium R. Düll, herbarium M. Saboljivac, herbarium R. Skrzypeczak, herbarium C. C. Townsend.

**RESULTS**


**Type:** [China] “Tibet, Nan Xian, in riparis, 3200 m” 25.07.1975, *M. Zang 1704* (holotype: KUN; isotype: NY!).

**New locality:** KAZAKHSTAN: Inter deversoria Belyye Vody et Antonovka inter Chimkent et Aulele Atd [Taraz], 18.05.1896, *V. F. Brotherus s.n.* (H).

**Diagnostic characters and differentiation.** This species is mainly characterized by unistratose lamina, green-yellowish with KOH; apex strongly thickened in an elliptic point, multistratose, very fragile, absent in the mature leaves; costa excurrent, swollen as a propagulum in the excurrenty, ventral cells of the costa in the upper middle of the leaf quadrate, smooth or papillose; in transverse section at leaf base with two layers of guide cells; upper and middle laminal cells quadrate to shortly rectangular, 4-8 μm wide, with 1-2 simple, low papillae per cell; sometimes these apparently absent. A complete description and illustrations are provided in Zander & Weber (1997).

Compared to other species of *Didymodon*, only *Didymodon johansenii* (R. S. Williams) H. A. Crum has very fragile and strongly thickened leaf apices. However, this species is distinguished mainly by the size of the upper laminal cells (13-15 μm wide) and guide cells in only a single layer (Zander & Weber, 1997).

**Distribution.** *Didymodon anserinocapitatus* was described by Li (1981) from Tibet province, China, and until now it has only been collected outside this area in the Rocky Mountains, in the states of New Mexico and Colorado (U.S.A.) (Zander & Weber, 1997), Yenisey River, in the South Siberia (Russia) (Otnyukova & Zander, 1998) and from Mongol Altai (Mongolia) (Tsegmed, 2001) (Fig. 1).
New distribution data on \textit{Didymodon anserinocapitatus} 93

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{map.png}
\caption{Present known distribution of \textit{Didymodon anserinocapitatus} in the world.}
\end{figure}

\textbf{Type}: [India] “Sikkim, Darjeeling” 1901, G. A. Miller s.n. (lectotype: PC!, designated by Frahm \textit{et al.} (1996)).


\textbf{Diagnostic characters and differentiation}. – This species is mainly characterized by catenate leaves, incurved when dry, keeled in the upper part, decurrent at base; lamina unistratose, yellow with KOH; ventral cells of the costa in the upper middle of the leaf elongated, smooth or papillose; upper and middle laminal cells rounded, ovoid or oblong, arranged in longitudinal rows, with one low, simple papillae or, more rarely, smooth; gemmae multicellular, of 2-8 cells, borne in the axils of the leaves, abundant, generally spherical, sometimes elliptical, 20-35(45) \textmu m in diameter, brown, smooth. A complete description and illustrations are provided in Zander (1994).

\textit{Didymodon maschalogena} belongs to section \textit{Fallices} (De Not.) R. H. Zander of the genus \textit{Didymodon}, which is distinguished mainly by having elongated adaxial superficial cells of the costa in the upper half of the leaf. This species is hardly confused with other species of this section, since it is the only taxon that has gemmae in the leaf axils. In the literature it is commonly cited as \textit{D. michiganensis} (Steere) K. Saito.

\textbf{Distribution}. – This species is known from different areas of the world, although it has been reported from a very few scattered localities in North America, Africa.

**Type:** “Spain, Alicante, Calpe, salinas El Saladar, UTM: BC 4481” 15.03.1993, M. J. Cano & R. M. Ros s.n. (holotype: MUB 55101).


**Diagnostic characters and differentiation.** — *Didymodon sicculus* is characterized by unistratose lamina, sometimes irregularly bistratose in the upper third, green-yellowish with KOH; apex acute to rounded; margins entire or papillose-crenulate, recurved, sometimes very lightly, from base to 3/4 of the leaf, unistratose; rarely irregularly bistratose in the upper third; costa ending below the apex, percurrent or shortly excurrent, ventral cells of the costa in the upper middle of the leaf subquadrate to rectangular, smooth or papillose; upper and middle laminal cells rounded, subquadrate or shortly rectangular, with 1-2(3) simple papillae per cell. A complete description and illustrations are provided in Cano et al. (1996a).

*Didymodon sicculus* is often confused with *D. tophaceus* (Brid.) Lisa but the last species can be well distinguished by its elongated adaxial superficial cells.
of the costa in the upper half of the leaf. Furthermore, the habitat of both taxa is very different. *D. sicculus* is a terricolous, xerophilous moss, which grows on basic and acid soil (saline, gypsiferous, clayey, sandy, loamy or nitrified) generally open, ledge of rocks with accumulated soil while *D. tophaceus* grows on calcareous rocks with seeping water or in very humid places. *Didymodon lavifolius* is another species that can also be confused with *D. sicculus*, although the former is differentiated by smooth upper laminal cells and the red colour of the lamina with KOH.

This species was described by Cano *et al.* (1996a) from specimens from southeast Spain and subsequently it has been found in other places from Spain (Cano *et al.*, 1996b; García-Zamora *et al.*, 1998; Sánchez-Moya & Cano, 1999; Rams *et al.*, 2000).

**Distribution.** — *Didymodon sicculus* has recently been cited from several areas in the Mediterranean basin: Balearic Islands (Cano *et al.*, 2001), Morocco (Cano *et al.*, 2002), Greece (Blockeel *et al.*, 2002), Italy (Aleffi *et al.*, 2003) and south of France (Jiménez & Skrzypczak, in press). It should now be added to the bryofloras of Algeria, The Azores, The Canary Islands, Israel, Turkey and Yemen (Fig. 3).

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**REFERENCES**


