

***Didymodon sicculus* sp. nov. (Bryopsida, Pottiaceae) from the Iberian Peninsula**

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**Abstract.** *Didymodon sicculus* sp. nov. is described and illustrated from southeastern Spain where it occurs on saline and gypsiferous soils. The new species is similar in habit to *D. luridus* Spreng., but differs in having leaves with smaller upper cells, rectangular basal cells, margins recurved from near the apex to the base, and quite papillose laminal cells.

For the last several years, we have been studying the bryophyte flora and vegetation of southeastern Spain, and many samples of a taxon macroscopically similar to *Didymodon luridus* Spreng. were collected in the provinces of Alicante and Almería. We have concluded that these samples correspond to an undescribed taxon.

**DIDYMONDON SICCULUS** Cano, Ros, García-Zamora, & J. Guerra sp. nov. (FIG. 1–20)

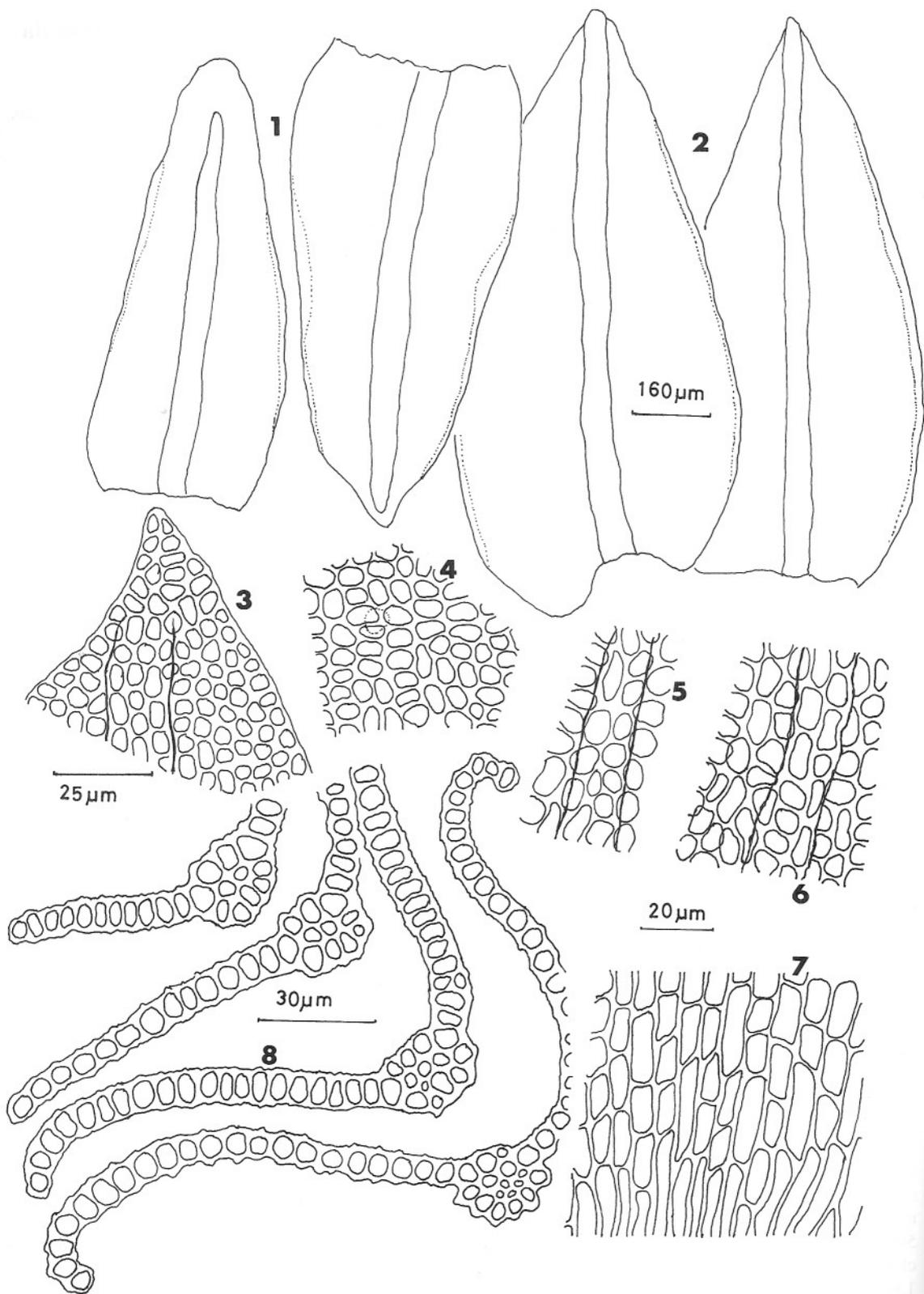
Species dignoscenda phyllidiis papillosis, quorum apicales cellulae sunt 6–14  $\mu\text{m}$  latae, parietibus incrassatae atque nonumquam bistratae, cellulae autem basilares, longe rectangularae.

Plants olive-green or brownish, forming small turfs; stems erect, simple, not tristichous, sometimes branched, up to 2 mm high; rounded in transverse section, hyalodermis absent, sclerodermis and central strand scarcely differentiated; leaves more or less imbricate when dry, erect-patent when moist, concave, ovate, 0.7–1.2 mm long, 0.3–0.6 mm wide; lower leaves shorter than upper; apex rounded to acute; margins entire, papillose-crenulate, usually recurved up to  $\frac{3}{4}$  of leaf length, base slightly decurrent; costa stout, 50–60  $\mu\text{m}$  wide at leaf base, ending in or below apex, sometimes shortly excurrent, strongly papillose at back; costa in transverse section with 2–5 guide cells in one layer, one band of ventral and one of dorsal non-stereid-cells, and occasionally a group of stereids dorsal to the guide cells; ventral cells of the costa quadrate, sometimes short-rectangular at middle part of leaf; lamina cells papillose, with 1(–2) papillae per cell, ventral part of the leaves less papillose than the dorsal; upper and median cells  $\pm$  rounded to irregularly quadrate, occasionally bistratose, with thick-walls; basal cells rectangular, up to 50  $\mu\text{m}$  long, papillose and with thick-walls; perichaetial leaves longer than vegetative leaves, 1.0–1.6 mm long, 0.4–0.6 mm wide, often with rounded apex and evanescent costa. Probably dioicous; male plants and sporophytes unknown. The epithet *sic-*

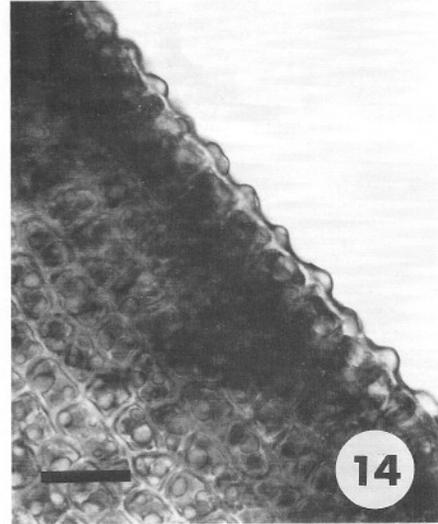
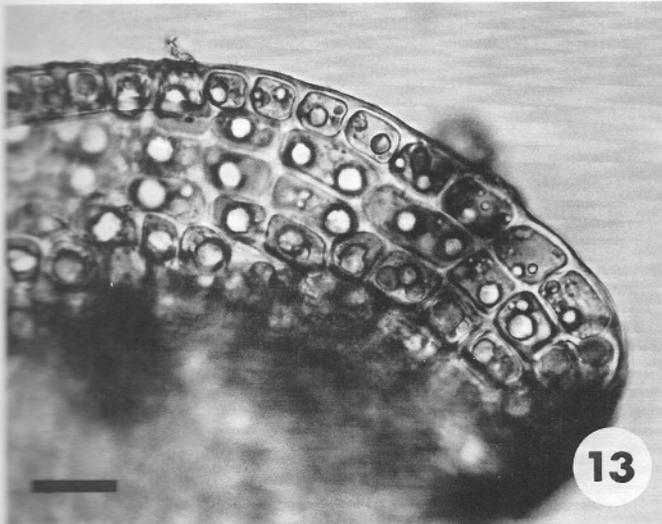
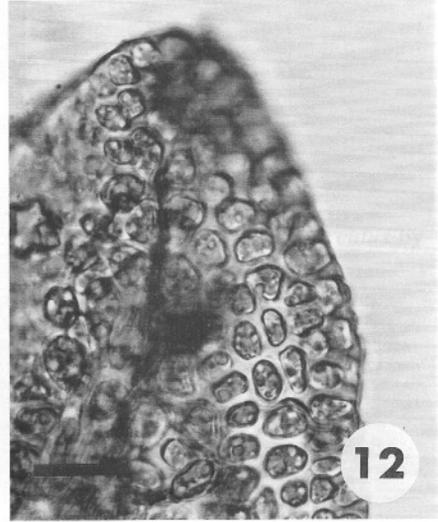
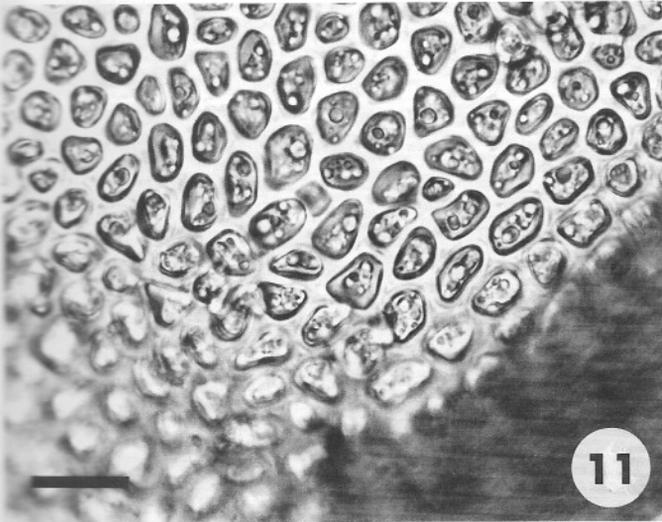
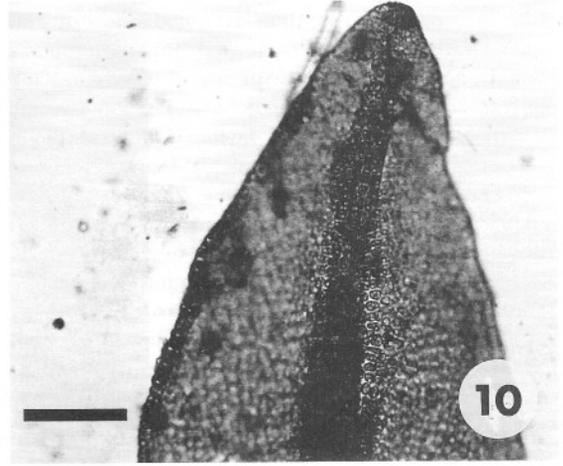
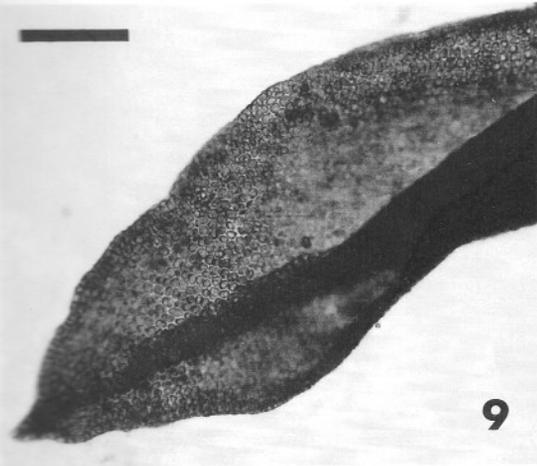
*culus* comes from the latin *siccus* and indicates that the plants grow in dry habitats.

**TYPE:** SPAIN. ALICANTE. Calpe, salinas El Saladar, UTM: BC 4481, *Cano & Ros*, 15.III.1993, MUB 5510, holotype, SPAIN. ALICANTE. Sierra de la Solana, near Balseret (Bañeres), UTM: XH 9890, 760 m, *Cano* (MUB 5543); Sierra de Aitana, Barranco del Arc (Sella), YH 4078, 500 m, *Cano* (MUB 5540 and 5542); Peñon de Ifach (Calpe), BC 4580, 100 m, *Cano & Ros* (MUB 5545); near L'Olla (Altea), YH 5969, 50 m, *Cano* (MUB 5539); Cabo Azul (Campello), YH 2755, 0 m, *Cano & Ros* (MUB 5544); near La Font (San Juan de Alicante), YH 2554, 10 m, *Cano & Ros* (MUB 5546); Cerro de la Sal, near Caserío Los Purgateros, XH 7350, 750 m, *Cano & Guerra* (MUB 5551); Laguna del Hondo, Azarbe del Riacho (Crevillente), XH 9528, *Cano & Ros* (MUB 5547); Laguna del Hondo, XH 9730, 15 m, *Cano* (MUB 5550); Laguna del Hondo, Vereda de Sendres (Elche), XH 9829, 0 m, *Cano & Ros* (MUB 5549); Laguna del Hondo, XH 9927, 0 m, *Cano & Ros* (MUB 5548); Lagunas de Santa Pola, Elche-Guardamar del Segura road (Elche), YH 0428, 5 m, *Cano & Ros* (MUB 5541); Lagunas de Santa Pola, north road of lagoon (Elche), YH 0429, 0 m, *Cano & Ros* (MUB 5558); Torre de la Horadada, Las Villas (Pilar de la Horadada), XG 9692, 0 m, *Cano* (MUB 5538). ALMERIA. Sierra del Cabo de Gata, Barranco Pollatos (Níjar), WF 7567, 100 m, *García-Zamora & Ros* (MUB 5641); Sierra del Cabo de Gata, Playa de los Genoveses (Níjar), WF 7866, 0 m, *García-Zamora & Ros* (MUB 5642); Sierra Alhambilla, Las Palomas (Tabernas), 1200 m, WF 6295, *García-Zamora & Ros* (MUB 5643).—All paratypes.

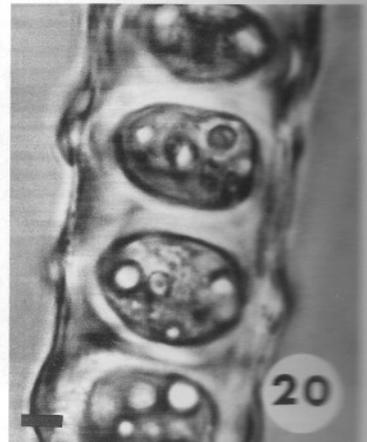
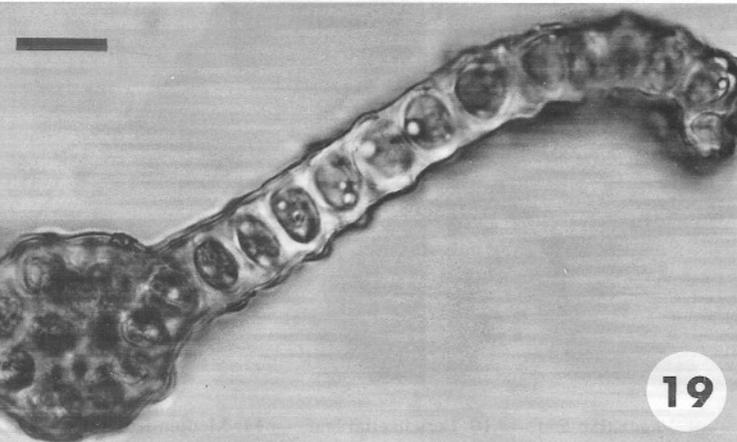
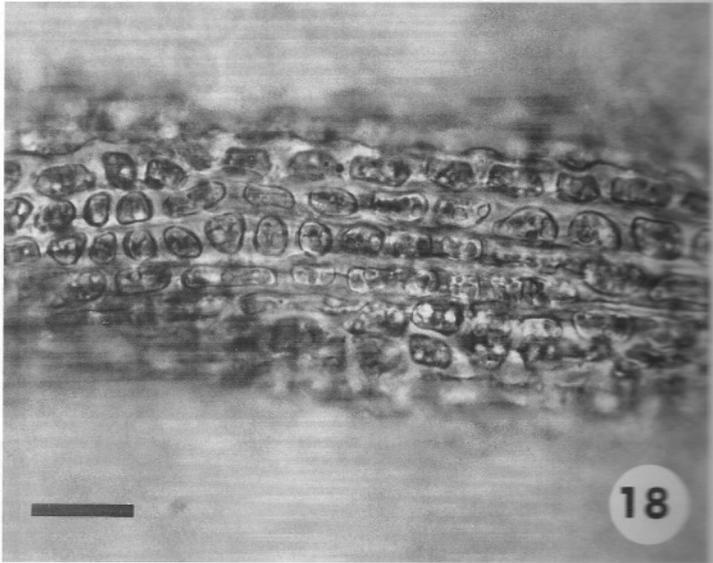
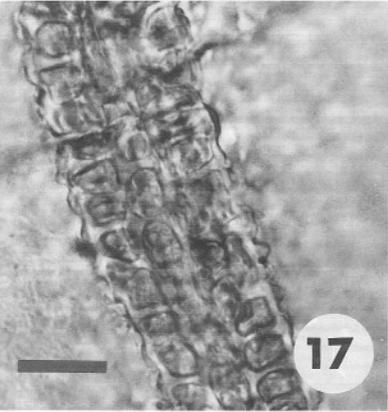
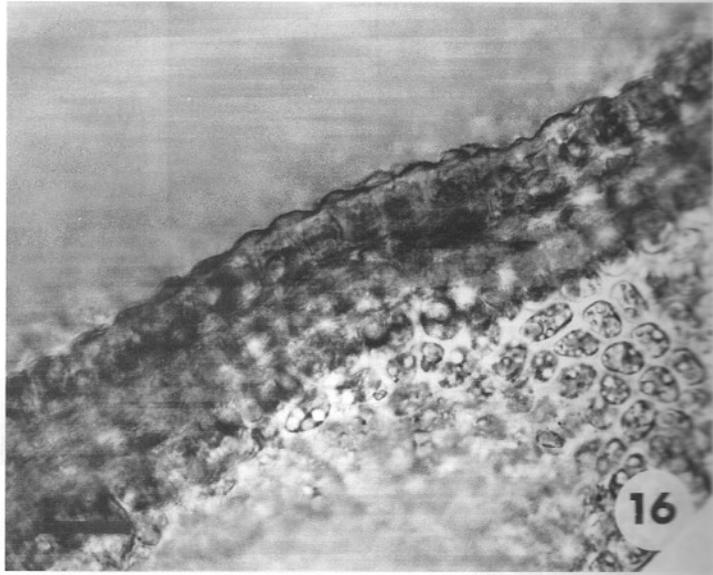
**Habitat.**—*Didymodon sicculus* occurs on dry, loamy, saline, or gypsiferous soils, in markedly xerophytic communities of the order Tortulo-Aloinetalia bifrontis (Ros & Guerra 1987), associated with other pottiaceous genera such as *Acaulon*, *Aloina*, *Crossidium*, and *Pterygoneurum*. This species has been collected in communities of the Pottio-Riccione crustatae and the Aloino-Crossidion crassinervis alliance. The former includes associations developed on dry saline or temporarily flooded soils (some of the characteristic species of this alliance are *Pottia pallida*, *Riccia crustata*, and *Tortula vahliana*). The second includes communities occurring on clay, loamy-limestone, and gypsiferous soils (characteristic species are *Acaulon dertosense*, *Crossidium*



FIGURES 1-8. *Didymodon sicculus*. — 1. Perichaetial leaves. — 2. Vegetative leaves. — 3. Leaf apex. — 4. Upper lamina cells. — 5. Adaxial surface of upper part of costa. — 6. Adaxial surface of median part of costa. — 7. Basal cells of leaf. — 8. Leaf transverse sections. All from holotype.



FIGURES 9-14. *Didymodon sicculus*. — 9. Vegetative leaf. — 10. Perichaetial leaf. — 11. Median leaf cells. — 12. Apex of perichaetial leaf. — 13. Marginal basal leaf cells. — 14. Median leaf cells towards margin. All from holotype. Scales: 9, 10 = 160  $\mu$ m; 11-14 = 20  $\mu$ m.



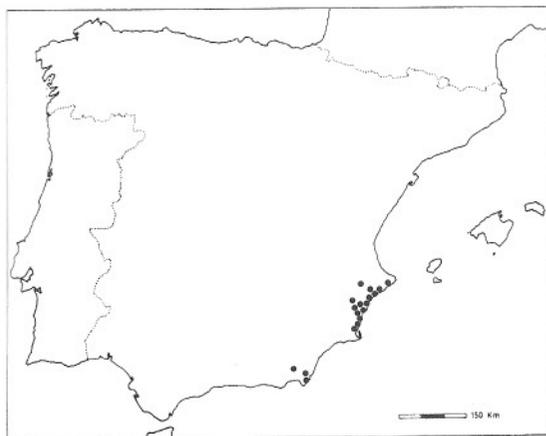


FIGURE 21. Distribution of *Didymodon sicculus* on the Iberian Peninsula.

*crassinerve*, *Dicranella howei*, and *Pottia davalliana*).

The new taxon is distinguished by leaves with papillose cells; thick-walled upper laminal cells (6–14  $\mu\text{m}$  wide), occasionally bistratose leaves, rectangular basal cells and leaf margins recurved from near the apex to the base (Table 1). This set of characters is not present in *D. luridus* (Demaret & Castagne 1964; Smith 1978; and Nyholm 1975). Nevertheless, some of the characters of *Didymodon sicculus* can be found in *Didymodon tophaceus* (Brid.) Lisa, although in the latter species adaxial cells of the costa are long-rectangular, basal leaf cells longer than 50  $\mu\text{m}$ , and the leaves notably decurrent. *Didymodon sicculus* may be related to *D. tophaceus*; i.e. however, the habitat of the latter species is different. It occurs on vertical calcareous rock faces where water seeps or in humid places, while *D. sicculus* is a terricolous species that occurs in dry habitats. According to Zander (in litt.) "... there are actually two taxa that have been called *D.*

*luridus*, one being related to *D. vinealis* (Brid.) Zand. but having very short leaves [treated by Zander as *D. vinealis* var. *luridus* (Spreng.) Zand.], and another being related to *D. tophaceus* but having quadrate ventral costal cells and growing in dry habitats", which we interpret as *D. sicculus*.

Another taxon with intermediate characters between *D. luridus* and *D. tophaceus*, therefore related to *D. sicculus*, is *Barbula trifaria* (Hedw.) Mitt. var. *desertorum* (Froehl.) Agnew. It is known from Iraq, Saudi Arabia, and Yemen Arab Republic (Frey & Kürschner 1991) on sandy soils, and can be distinguished from the other three by short, shortly acuminate leaves with bistratose apices (Agnew & Vondráček 1975). The American species, *Didymodon brachyphyllus* (Sull.) Zand. (illustrated in Zander 1994), is also similar to *D. sicculus*, but the former can be differentiated by its shorter leaf basal cells (4–14(–20)  $\mu\text{m}$ ), that are usually transversely elongated, acute leaf apices, and upper laminal cells and abaxial costal cells conspicuously papillose. The recently described *Didymodon nevadensis* Zand. (Zander *et al.* 1995) from southern Nevada (U.S.A.) occurs also on gypsum soils, but can be differentiated from *D. sicculus* by cucullate leaf apices, the presence of a costal pad, and asexual reproduction by tubers.

#### ACKNOWLEDGMENTS

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TABLE 1. Comparison of *Didymodon luridus* and *D. sicculus*.

	<i>Didymodon luridus</i>	<i>Didymodon sicculus</i>
Papillae on laminal cells	absent	1(–2) per cell
Upper laminal cells	very thick-walled, 4–10 $\mu\text{m}$ wide, unistratose	thick-walled, 6–14 $\mu\text{m}$ wide, occasionally bistratose
Basal laminal cells	quadrate or short-rectangular, up to 22 $\mu\text{m}$ long	long-rectangular, papillose, up to 50 $\mu\text{m}$ long
Leaf apex	acute	acute-rounded
Leaf margins	recurved up to $\frac{1}{2}$ of leaf length	recurved up to $\frac{3}{4}$ of the leaf length

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FIGURES 15–20. *Didymodon sicculus*. — 15. Recurved margin of median part of leaf. — 16. Abaxial surface of costa at median part of leaf. — 17. Abaxial surface of costa in leaf apex. — 18. Adaxial surface of costa in median part of leaf. — 19. Leaf transverse section. — 20. Detail of lamina cells of leaf in transverse section. All from holotype. Scales: 15–19 = 20  $\mu\text{m}$ ; 20 = 2  $\mu\text{m}$ .

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