

A NEW SPECIES OF *DIOSCOREA* (DIOSCOREACEAE) FROM THE ANDES OF VENEZUELA

L.J. Dorr

National Museum of Natural History
Dept. Biology (Botany), MRC—166
Smithsonian Institution, P.O. Box 37012
Washington, DC 20013–7012, U.S.A.
dorr.laurence@nmnh.si.edu

Basil Stergios

Universidad Nacional Experimental
de los Llanos Occidentales
"Ezequiel Zamora" (UNELLEZ)
Mesa de Cavacas, Guanare
Estado Portuguesa 3323, VENEZUELA
basilven@cantv.net

ABSTRACT

A new species of *Dioscorea*, *D. lisae* Dorr & Stergios, is described and illustrated. Relationships, distinguishing characters, and sex distribution are discussed. Information also is provided on the ecology and geographical distribution of this new species.

KEY WORDS: Dioscoreaceae, *Dioscorea*, Venezuela, Andes

RESUMEN

Se describe y se ilustra una nueva especie de *Dioscorea*, *D. lisae* Dorr & Stergios. Se discuten las relaciones, caracteres particulares y la distribución del sexo. Además, se presenta información de la ecología y distribución geográfica de esta especie nueva.

PALABRAS CLAVES: Dioscoreaceae, *Dioscorea*, Venezuela, Andes

Four species of *Dioscorea* L. (Dioscoreaceae) have been collected in Guaramacal National Park, which protects an area of ca. 200 km² of montane forest, cloud forest, and páramo near the northern end of the Cordillera de Mérida in Portuguesa and Trujillo states, Venezuela (Dorr et al. 2000). Two of the species, *D. lehmannii* Uline and *D. meridensis* Kunth, are well-circumscribed although infrequently collected and with wide ranges in the Andes, extending south to Ecuador and Peru. When we published a catalogue of the vascular plants of Guaramacal, we had not yet identified two of the four species, and we listed them as *Dioscorea* sp. A and *Dioscorea* sp. B (Dorr et al. 2000). The latter appears to be *D. coriacea* Humb. & Bonpl. ex Willd., a variable species with a number of synonyms and an extensive range in the Andes (Colombia and Venezuela to Bolivia). The former, however, cannot be associated with any known species and is described here as new.

Dioscorea lisae Dorr & Stergios, sp. nov. (**Figs. 1–2**). TYPE: VENEZUELA. TRUJILLO: Mpio. Boconó, Parque Nacional Guaramacal, road from Boconó to Guaramacal, SE of Boconó, N slope of mountain, 09°13'N, 070°12'W, 2000 m, 13 Jul 1995 (♂, ♀, fls), Dorr & Barnett 8057 (HOLOTYPE: PORT; ISOTYPES: MEXU, US).

Species *Dioscorea coriacea* affinis, a qua imprimis differt tereticaulibus, pedicellis longioribus et foliis 5–7-nervis.

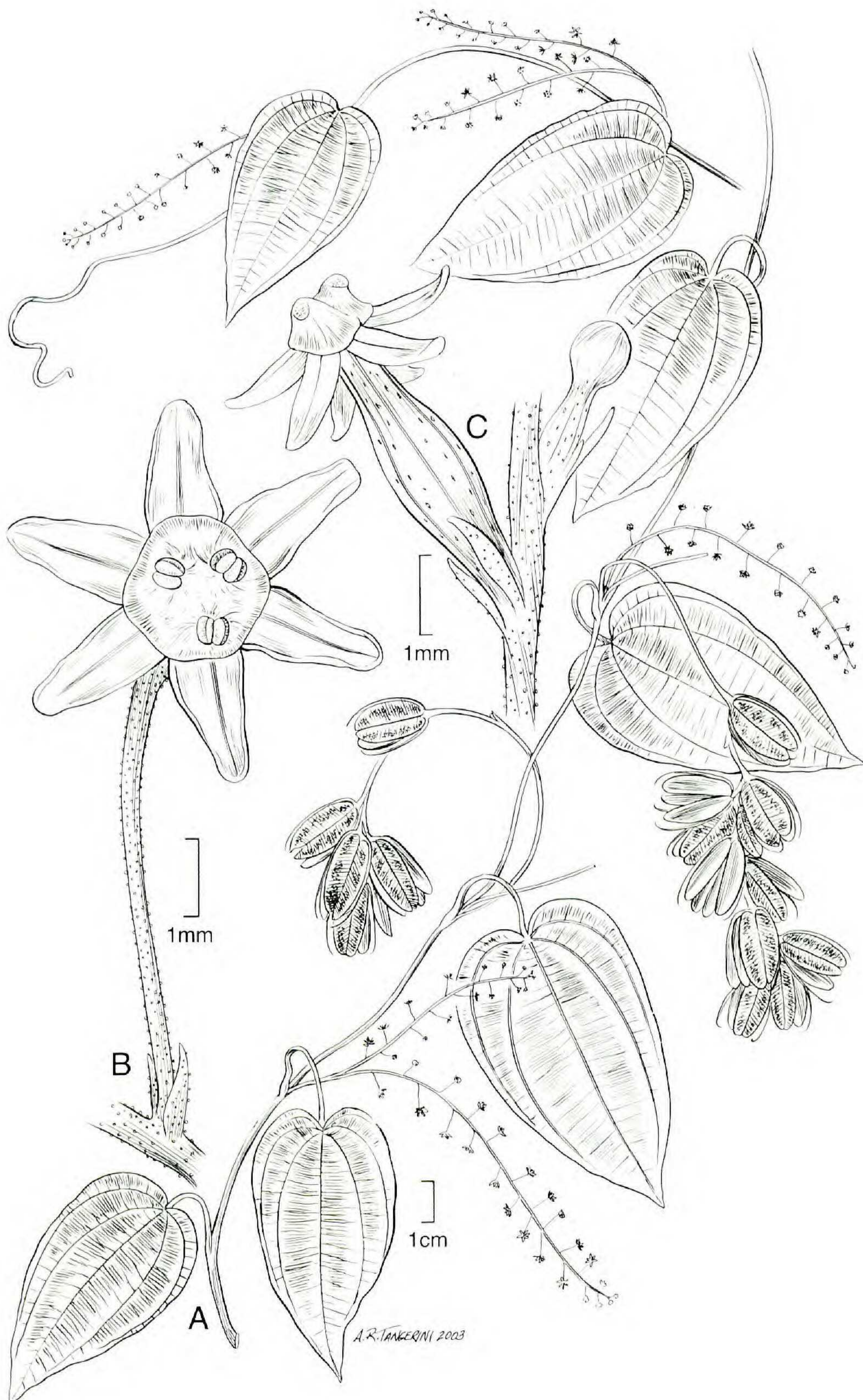


FIG. 1. *Dioscorea liseae* Dorr & Stergios. A. Habit (of a plant with mixed inflorescences, either male inflorescences or male inflorescences arising from the axils of infructescences). B. Staminate flower. C. Pistillate flower. (A, Dorr et al. 8921, US; B, Dorr & Barnett 8057, PORT; C, Dorr & Barnett 8057, MEXU).

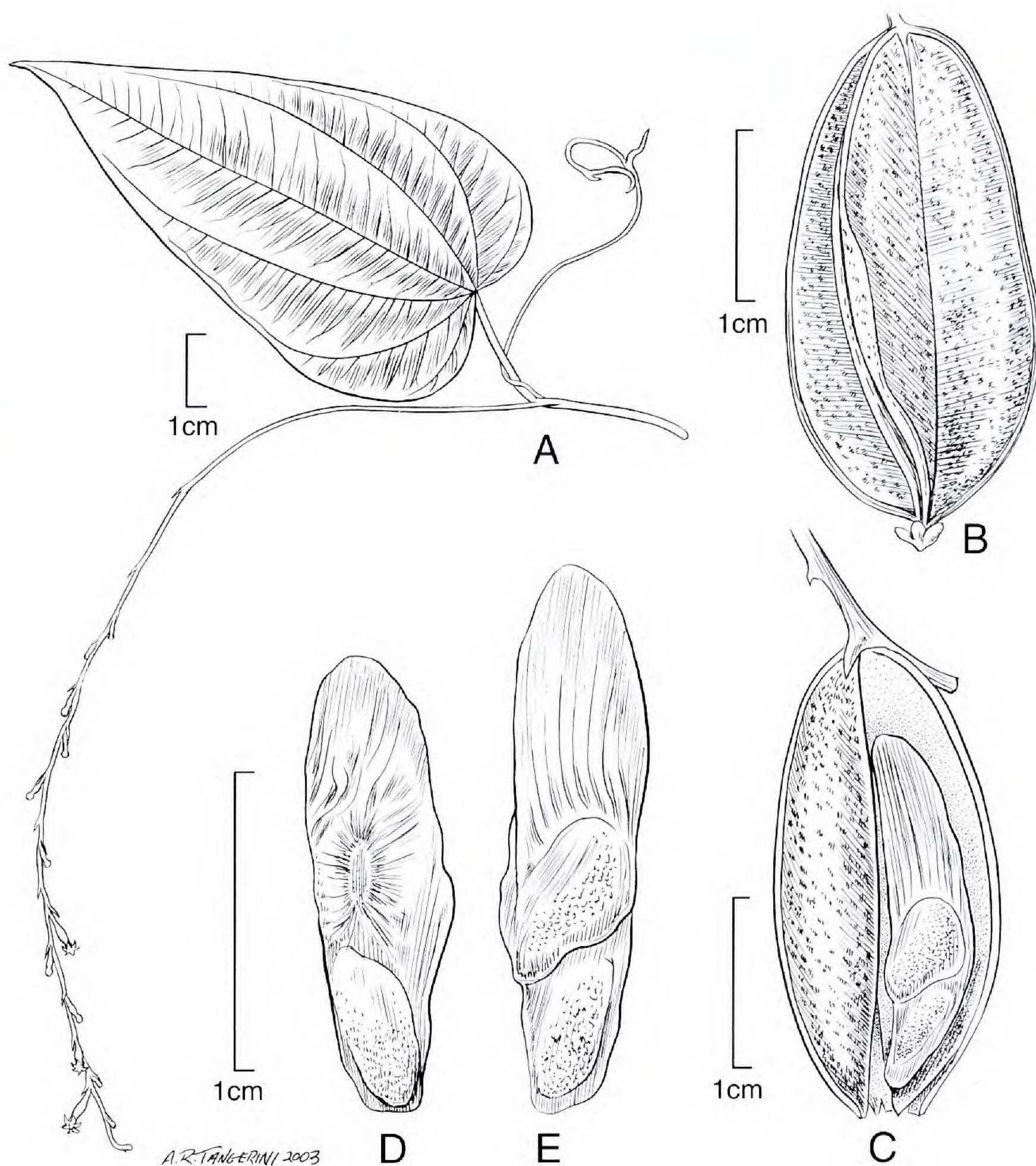


FIG. 2. *Dioscorea lisa* Dorr & Stergios. A. Female inflorescence. B. Capsule. C. Capsule, part of fruit wall removed to show orientation of seeds and seed wings. D, E. Seeds. (A, Dorr et al. 8057, US; B–E, Stergios et al. 17034, US).

Herbaceous twining vines; dioecious (or monoecious, with staminate inflorescences found on pistillate plants in fruit). Stems delicate, terete, twisting to the right (dextrorse), glabrous. Leaves alternate, entire. Leaf blades ovate-lanceolate, 7–11 × 3.2–5 cm, 5–7-nerved, the base cordate to truncate, the apex acuminate to long-acuminate, glabrous, membranous; petioles 1.5–3.5 cm long, glabrous, faintly glandular-dotted below. Staminate inflorescences paniculate, pendent, 8–13 cm long, with 1–4 racemose branches, flowers solitary, the rachis minutely papillate, delicate; each flower subtended by a pair of unequal, acicular bracteoles, ca. 1–1.25 mm long; pedicels 5–8 mm long, minutely papillate to

smooth. Staminate flowers greenish-red (*Licata & Cuello 217*) to purple (*van der Werff & Ortega 6066*), rotate at anthesis, the tepals equal, distinct, 1.25–1.5 × 0.75 mm, lanceolate, glabrous; stamens 3, borne on a flattened, annular disc, filaments very short, ca. 0.25 mm tall, thickened, anther cells ovoid, free (or connivent), introrsely dehiscent; staminodia absent. Pistillate inflorescences spicate, pendent, to 14 cm long, solitary; each flower subtended by a pair of unequal, acicular bracteoles ca. 1.5–1.75 mm long. Pistillate flowers with tepals equal, distinct, ca. 1–1.25 × 0.5 mm, lanceolate, glabrous; styles 3, fused at the base and free towards the apical stigmatic surfaces; staminodia absent. Capsules 2–3 × 1.2–1.4 cm, elliptic, the apex and base rounded, flattened, green (drying light brown) with dark, elliptic maculations, glabrous; seeds 2 per locule, ca. 0.5 × 0.5 cm, irregularly lenticular to ovate-lenticular, compressed, winged dorsally, the wing to 1 cm long, membranous.

PARATYPES. **VENEZUELA.** **Trujillo:** Mpio. Boconó, Parque Nacional Guaramacal, vertiente norte, subiendo por la Laguna Negra, 2620 m, Jun 2002 (♂ fls, fr), *Cuello 2433* (PORT); Parque Nacional Guaramacal, road from Boconó to Guaramacal, SE of Boconó and just above park headquarters, N slope of mountain, 09° 13'N, 070° 12'W, 5 Jul 1995 (♂ fls), *Dorr et al. 7981* (NY, PORT, US); Parque Nacional Guaramacal, road from Boconó to Guaramacal, SE of Boconó, N slope of mountain (09° 13'N, 070° 12'W), 29 Oct 1998 (♂, ♀, fls), *Dorr et al. 8381* (PORT, US); Parque Nacional Guaramacal, trail from El Cafenol (E of Mosquey) to Fila Los Recostaderos, 1790–2200 m, 12 Jun 2001 (♂, ♀, fls), *Dorr et al. 8896* (PORT, US), *Ibid* (♂ fls, fr), *Dorr et al. 8921* (PORT, US); Parque Nacional Guaramacal, en la vertiente norte, 09° 25'7"N, 070° 13'34"W, 1950 m, 4 Jun 1995 (♂ fls), *Licata & Cuello 217* (PORT-unicate); Parque Nacional Guaramacal, sector vertiente sur, carretera al caserío Guaramacal, 2000–2750 m, Feb 1997 (fr), *Stergios et al. 17034* (PORT, US); entre Boconó y Guaramacal, 2100–2300 m, 4 Sep 1966 (♂ fls), *Steyermark & Rabe 97309* (US, VEN); near Boconó, Páramo de Guaramacal, 09° 14'N, 070° 11'W, 2600–3100 m, 22 Nov 1984 (♂ fls), *van der Werff & Ortega 6066* (MO, PORT).

Distribution and ecology.—*Dioscorea lisae* is presently known only from the Ramal de Guaramacal in Trujillo state, Venezuela. This ridge is a 40 km long offshoot of the more extensive Cordillera de Mérida, which extends 325 km from Táchira to Lara. All but one of the collections we examined are from the north slope (mostly Qda. Segovia) of the Cerro de Guaramacal; the sole exception is a collection from the south slope (Qda. Jirajara) of the same mountain. *Dioscorea lisae* has been collected in montane and upper-montane forest; 1790–2750 (–3100) m. Flowering June, July, September, and November; fruiting February.

The US sheet of *Steyermark & Rabe 97309* is mislabeled with a locality in Táchira and the date 27 August 1966. Bono (1996: 526) also reported this collection (as *Dioscorea coriacea*) from Táchira, which suggests other duplicates may be mislabeled. Steyermark's field notes are unambiguous about the fact that he and Marvin Rabe collected a *Dioscorea* in Guaramacal on 4 September 1966 and that the collection was numbered 97309. Since all of the data on the labels used by Steyermark are printed save for the collection number and determination, which are typed, it is easy to imagine a typist grabbing one or more labels from the wrong stack when preparing the distribution of duplicate sheets.

Etymology.—The epithet honors Lisa Ceryle Barnett, botanist, science administrator, and wife of LJD. She has participated in many collecting trips to Guaramacal as well as numerous other expeditions by foot, mule, horse, or jeep to remote forests and páramos in the Venezuelan Andes.

DISCUSSION

Following the classification of Knuth (1924), *Dioscorea lisae* belongs in subg. *Helmia* (Knuth) Benth.; the ovules are attached near the distal (styler) end of the ovary and the wing is developed unilaterally toward the proximal end (i.e., toward the base of the capsule). Several characters, including the presence in male flowers of a large glandular disc (not always readily apparent) and racemose male inflorescence branches with solitary flowers that have 3 anthers and lack staminodia, suggest a placement in sect. *Cycladenium* Uline of Knuth's (1924) scheme. In Huber's (1998) classification, *D. lisae* keys to sect. *Trigonobasis* Uline of Mexico and Central America, which he also associates with sect. *Cycladenium*.

Dioscorea lisae differs from other species in sect. *Cycladenium* in that its male flowers have very long pedicels, which greatly exceed the bracteoles in length, and its female flowers produce relatively large capsules, which have rounded (versus acute) apices and bases. As noted above, at least one of the specimens (*Steyermark & Rabe 97309*) we refer to *D. lisae* was misidentified earlier as *D. coriacea*, but *D. lisae* differs from that species in a number of morphological characters summarized in Table 1.

Dioscorea lisae apparently is not strictly dioecious. One of our collections (*Dorr et al. 8921, US*) has fruit and male inflorescences and it would appear that the sexes are separated temporally. In this case the male inflorescences evidently arise well after the female inflorescences have produced flowers and set fruit. Condon and Gilbert (1988, 1990) discuss what might be an analogous situation in the Cucurbitaceae. The genera *Gurania* (Schltdl.) Cogn. and *Psiguria* Arn., both neotropical vines that were long thought to be dioecious, are actually monoecious and only temporally dioecious. They documented that these genera have size-related and intra-seasonal sex changes. They also discovered strongly male-biased sex ratios. Our limited sample size (ten collections) hints at a male-biased sex ratio in *D. lisae*; nine collections have male flowers and six have female flowers and/or fruit. Nonetheless, the exact nature of sex expression in this species and factors controlling the same are not at all clear and will not be resolved with herbarium specimens alone.

While *Dioscorea* is almost universally considered to be dioecious, there are a number of other reports, usually dismissed, that this is not true of all species. Burkill (1960: 327) summarized the prevailing view by stating categorically "to date we do not have a single proved case of the two sexes being fertile on the one individual: what we have is records of imperfect male organs and imperfect

TABLE 1. Selected morphological characters distinguishing *Dioscorea lisae* and *D. coriacea*.

	<i>D. lisae</i>	<i>D. coriacea</i>
stems	terete	angular
leaves	5–7-nerved	7–9-nerved
pedicel length	5–8 mm	2–4 mm
capsule size	2–3 × 1.2–1.4 cm	1–2 × 0.5–0.8(–1.2) cm
capsule apex	rounded	acute

female organs intruded into what may be fertile individuals of the other sex.” Al-Shehbaz and Schubert (1989: 67) referred to the reports of such deviation as “abnormally-monoecious”; Huber (1998: 220) cited a “a few reports of monoecy, most of them referring to American species ...”; and Caddick et al. (2002: 109) wrote that plants of *Dioscorea* are “dioecious but vestigial male/female parts [are] usually present.” Xifreda (1982a, b; 1983; 1984), studying Argentinian species of *Dioscorea*, described *D. furcata* Griseb., *D. hieronymi* Uline ex R. Knuth, *D. megalantha* Griseb., *D. stenopetala* Hauman (all sect. *Cycladenium*), *D. demourae* Uline ex R. Knuth, *D. haumanii* Xifreda (both sect. *Monadelpha* Uline), and *D. pilcomayensis* Hauman (sect. *Centrostemon* Griseb.) as monoecious. She also observed infraspecific variation in male flowers of several species, notably *D. megalantha*; in some collections the glandular disc is not readily apparent or is incompletely developed, while in others it is fully accrescent. She attributed this anomaly to collections being made at different stages in floral development. Hammel (2000), relying upon his field knowledge of populations of *D. lepida* C.V. Morton (sect. *Trigonobasis*), recently reported that this Central American species is monoecious and that it flowers precociously with staminate flowers, then produces pistillate flowers toward the apex of an inflorescence and even some hermaphroditic flowers. Plants of *D. lepida* observed in a later flowering or fruiting stage consequently show little or no evidence of the staminate inflorescences. Given the evidence presented here and by Hammel (2000), it seems clear that careful field observations need to be coupled with herbarium, laboratory, and greenhouse studies to clarify what could be a wide range of different floral sex strategies in *Dioscorea*.

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