

Notes on the genus *Dicliptera* (Acanthaceae) in Bolivia

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Abstract.—Taxonomic notes on *Dicliptera* are presented in preparation for the authors' forthcoming annotated and illustrated checklist of Bolivian Acanthaceae. Two new species (*D. palmariensis* and *D. purpurascens*) are described and illustrated. Intraspecific variation of *D. squarrosa* is discussed. A key to all of the recognized species of *Dicliptera* from Bolivia is also provided.

Dicliptera is one of the most difficult genera taxonomically in the Acanthaceae. Like *Dyschoriste* the genus often lacks clear-cut characters to distinguish among species. Most authors have depended on bract characters to differentiate among species but in fact the bracts are quite variable within most species so this character needs to be used with caution and in conjunction with other characters such as corolla size, which is often useful. We have taken a broad view of each species both in this paper and in our planned treatment of Bolivian Acanthaceae. By doing this it seems that the species we recognize make some geographical and ecological sense, although the variation found in almost every case is quite extreme. This applies both to local endemic species such as *Dicliptera cochabambensis* Lindau and to the more widespread species such as *D. squarrosa* Nees and *D. jujuyensis* Lindau.

Seven species of *Dicliptera* are presently recognized in Bolivia. Two are new, one of which (*D. palmariensis*) is endemic to Bolivia. Of the other five, one (*D. cochabambensis*) is endemic to Bolivia, two extend to northern Argentina (*D. jujuyensis* and *D. scutellata* Griseb.) and two (*D. sexangularis* (L.) Juss. and *D. squarrosa* Nees) are widespread in South America. The seven

species can be separated by the following key.

Key to Species of *Dicliptera* in Bolivia

1. Inflorescence of naked spikes forming a panicle of spikes; bracts minute, oblanceolate, < 5 mm long *D. sexangularis*
1. Inflorescence varied but if paniculate, leafy; bracts usually > 8 mm long, not oblanceolate 2
2. Cymule bracts ovate, elliptic or obovate, scarcely broader than long, not leaf-like; corolla deep pink 3
2. Cymule bracts linear to linear-(ob-)lanceolate, sometimes with a leaf-like apex, always much broader than long; corolla red, orange or yellow 4
3. Cymule bracts ovate, 6–15 mm wide; leaves pubescent below *D. scutellata*
3. Cymule bracts elliptic to obovate, 3–6 mm wide; leaves almost glabrous below *D. cochabambensis*
4. Cymule bracts usually leafy at the apex; flowers usually in dense, sessile clusters or heads in the leaf axils *D. squarrosa*
4. Cymule bracts not leafy at the apex; flowers in pedunculate, axillary cymes, often forming a leafy panicle 5
5. Cymule bracts narrowly linear-elliptic, broadest in the middle; leaves softly pubescent above *D. palmariensis*
5. Cymule bracts linear-lanceolate, broad-

- est at the base; leaves soon glabrescent above 6
6. Inflorescence branches leafless, usually short; bracts linear-oblong, acute; corolla lobes almost half as long as the tube *D. jujuyensis*
6. Inflorescence branches often with subtending leaves, often well-developed; bracts lanceolate, finely acuminate; corolla lobes less than one fourth as long as the tube *D. purpurascens*

***Dicliptera palmariensis* Wassh. & J. R. I.**

Wood, sp. nov.

Fig. 1 A–H

Quoad formam bractearum cymulorum *Diclipteram garciae* Leonard tangit, ob folia pilis lanatis induta, bracteas acutas, non apiculatas ab ea removendum.

Ascending or weakly erect, much-branched, probably perennial herb to 0.75 m; stems dark purplish-green, obscurely ridged with paler vertical lines along the depressions, densely pilose with long, patent, straggly, multicellular trichomes; leaves petiolate, the petioles 0.3–1.6 cm long, pilose, the blades ovate or elliptic, acute at apex, narrowed to the base and $\pm$ attenuate on the petiole, 3–9 cm long, 1–4 cm wide, both surfaces pilose with large-celled trichomes, especially on the veins, cystoliths abundant above, the margin entire or obscurely repand, ciliate; inflorescence of pedunculate cymes in the axils of the upper leaves, the cymes typically few-flowered and the flowers often aborting, the inflorescence thus rather lax and open; peduncles 1–10 cm long, subtending bracts leaf-like, shortly petiolate, the petioles 3–5 mm long, the blades lanceolate or lanceolate-elliptic, acute, 0.7–2 cm long; cymules pedicellate, the pedicels ca. 0.5 mm long; cymule bracts slightly unequal, 8–15 mm long, 3 mm wide, narrowly oblong-elliptic, acute at both ends, pilose, the base often pale; inner bracts 6–10 mm long, lanceolate, ciliate on the upper margins; bracteoles lanceolate, ca. 4 mm long; calyx 2.5–3 mm long, 5-lobed to just above the base, the lobes

equal, ca. 2 mm long, lanceolate, acute, ciliate; corolla red, 25–28 mm long, cylindrical from a slightly bulbous base, gradually widened to ca. 3 mm, pilose without, 2-lipped, the lips ca. 3 mm long; anthers equaling the corolla; filaments 14 mm long, sparsely pilose, inserted ca. 14 mm above the base of the corolla, anther thecae at different heights, glabrous, ca. 1.25 mm long; ovary pubescent; style ca. 25 mm long, with a few scattered trichomes; capsule 6 mm long, obovoid, pubescent, 2-seeded; seeds with a few, short trichomes, lenticular, ca. 2.25 mm wide.

Type.—BOLIVIA: Tiraque, 1–2 km above El Palmar along the old road from the Chaparé to Cochabamba, 900 m, 6 Jul 1997, *J. R. I. Wood 12403* (holotype K!; isotypes LPB, US!).

Additional specimens.—BOLIVIA: Tiraque, 1–2 km above El Palmar along the old road from the Chaparé to Cochabamba, 1200 m, 6 Jun 1998, *J. R. I. Wood 13674* (K, LPB, US); El Palmar, 155 km along old road from Cochabamba to Villa Tunari [17°5'S, 62°31'W], 750 m, 4 Sep 1996, *Kessler et al. 8115* (GOET, LPB, US).

The only possible Bolivian species *D. palmariensis* could be confused with is *D. purpurascens* but it can readily be distinguished by its diffuse ascending habit, very pubescent indumentum, pedunculate cymes, smaller corollas and above all by the shorter, narrowly oblong-elliptic bracts, broadest in the middle and narrowed to both an acute apex and base. However, there are two collections from San Martín Department in Central Peru (*Schunke 3349* and *4370*, both at K and F), which are in many ways intermediate between *D. palmariensis* and *D. purpurascens*. The bracts are similar in shape to those of *D. palmariensis* but the apex is acuminate and apiculate and the specimens lack the distinct pilose indumentum of *D. palmariensis*. Given the wide variation found in many species of *Dicliptera* these specimens might suggest *D. palmariensis* should be included in a very variable *D. purpurascens* but they are far re-

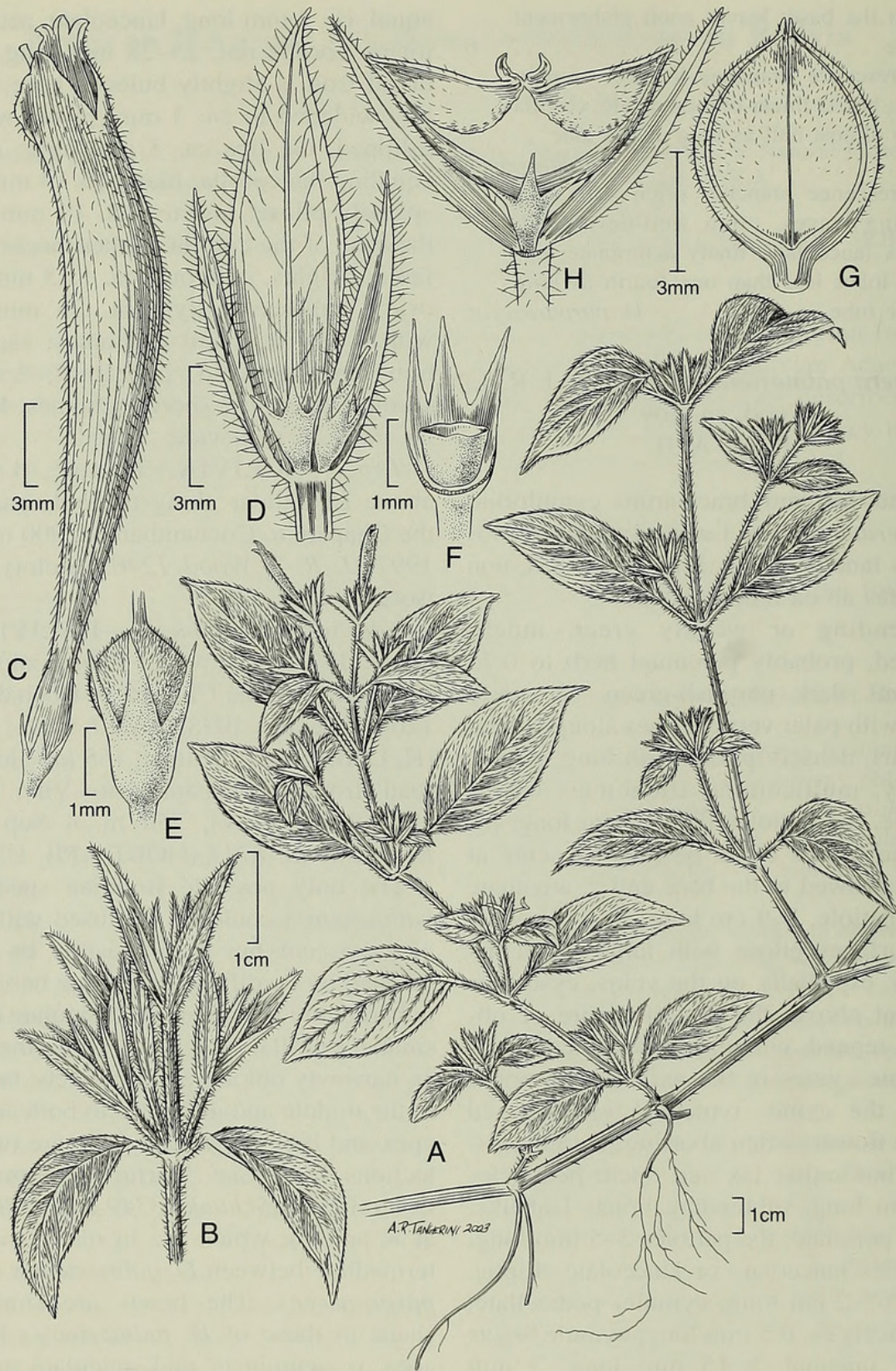


Fig. 1. A–H, *Dicliptera palmariensis* (J. R. I. Wood 12403). A, Habit; B, Pedunculate cymes; C, Calyx and corolla; D, Inner bract, bracteoles, calyx and aborted flower; E, Calyx and pistil; F, Calyx lobes and nectar disk; G, capsule; H, Capsule dehiscent.

moved geographically from *D. palmariensis* and are not exactly intermediate between the two recognized species. It seems best, therefore, to recognize the two species particularly as there are no intermediates in Bolivia.

Dicliptera purpurascens Wassh. & J. R. I.
Wood, sp. nov.
Fig. 2 A–F

Species nova plerumque purpurascens bracteis longis (usque 2.5 mm) lanceolatis, long-acuminatis bene distincta.

Annual or short-lived perennial herb, 0.5–2.5 m high, usually erect in open situations but commonly ascending or even decumbent in moister, shady conditions; stems stout, somewhat woody below, strongly angled, usually purplish, scurfy-pubescent, much branched; leaves petiolate, the petioles 0.5–4 cm long, scurfy-pubescent, the blades equal or nearly so, ovate or ovate-elliptic, 4–15 cm long, 2–7 cm wide, acute or shortly acuminate at apex, tapering at the base, entire, often purplish, darker green above than below, glabrous except for the usually ciliolate margins and a few scattered, usually multicellular trichomes, especially on the veins, cystoliths scattered on both surfaces; inflorescence of shortly pedunculate or subsessile, axillary and terminal cymes, these becoming very dense on older plants with 1–3 cymes arising from each axil, commonly purplish and glandular-pilose but sometimes greenish and very thinly pilose; peduncles 0–3 cm long, scurfy-pubescent; subtending bracts leaf-like, petiolate, the petioles 0–3 mm long, the blades typically narrowly oblong-elliptic, to 3 cm long; cymules pedicellate, the pedicels 0–4 mm long; cymule bracts slightly unequal, 20–25 mm long, 2–5 mm wide, lanceolate, long-acuminate; inner bracts linear-acuminate, 12–15 mm long; bracteoles similar but only to 10 mm long; calyx 3–4 mm long, 5-lobed to just above the base, the lobes subulate, minutely ciliolate; corolla orange-red, 34–40 mm long,

cylindrical from a slightly bulbous base, gradually widened to 3–4 mm, sparsely pilose and minutely gland-dotted without, 2-lipped, the lips ca. 4 mm long; anthers equaling the corolla; filaments 17 mm long, sparsely pilose, inserted ca. 13 mm above base of corolla, anther thecae at different heights, glabrous, ca. 1.5 mm long; ovary pubescent; style ca. 29 mm long, glabrous; stigma globose; capsule 7 mm long, 4 mm wide, obovoid, pubescent, 2-seeded; seeds papillose, lenticular, ca. 1.25 mm wide.

Type.—BOLIVIA: Carrasco, ca. 5 km E of Valle de Sajta on main road from Chimore to Santa Cruz, 240 m, 29 May 1996, Wasshausen, Brummitt, Wood & Ritter 2067 (holotype US!; isotypes K!, LPB).

Habitat and distribution.—*Dicliptera purpurascens* is locally frequent in moist lowland rain forest between 200 and 600 m in Bolivia and Peru. It is essentially a plant of the SW basin of the Amazon River with an outlying population in a very moist area of the Andean foothills in Bolivia. It has not yet been found in Brazil but is likely to occur in Acre as well. This disjunct distribution is shared with a number of other Acanthaceae species, notably *Pachystachys spicata* (Ruiz & Pavon) Wassh., *Ruellia inflata* Rich., *R. yurimaguensis* Lindau, *Justicia megalantha* Wassh. & J. R. I. Wood (in press), *J. pilosa* (Ruiz & Pavon) Lindau and *J. riedeliana* (Nees) V. A. W. Graham and appears to be a common pattern.

Additional specimens.—BOLIVIA: Santa Cruz, Ichilo, by track from Escuela Ichilo to Campamento Ichilo on E side of Río Ichilo, Amboró Park, 400 m, 27 Jul 1999, J. R. I. Wood 14943 (K, LPB); Cochabamba, Carrasco, Valle de Sajta, 1 Jul 1988, Hensen 6 (BOL, US); km 228, Santa Cruz road, Río Murillo, Valle de Sajta, 212 m, 18 Jul 1990, Sigle 510 (US); Experimental Station, Valle de Sajta, 280 m, 11 Aug 1990, I. Vargas 673 (LPB, USZ); Valle de Sajta, ca. 235 km NW of Santa Cruz, 400 m, J. R. I. Wood 10072 (K, LPB, US); 0.5 km E of Valle de Sajta, 250 m, 29 May 1996, J. R. I. Wood 11178 (K, LPB); 12 de Julio,



Fig. 2. A–F, *Dicliptera purpurascens* (Wasshausen 2067). A, Habit; B, Pedunculate cymes; C, Inner bracts, bracteoles, calyx and pistil; D, Calyx and pistil; E, Corolla; F, Nectar disk, pistil and calyx lobes.

ca. 9 km S of Israel, on E side of Río Sajta, 400 m, 24 Jul 1999, *J. R. I. Wood* 14893 (K, LPB); Zona del Arroyo de 6 de Agosto, Cerro de la Concordia, E bank of Río Ichua, 600 m, 27 Jul 1999, *J. R. I. Wood* 14935 (K, LPB); Pando, Abuná, Nacebe, Río Ortón, 11 Oct 1989, *Beck et al.* 19283 (LPB, US); *Gentry et al.* 77583 (MO, US). PERU; Cuzco, Convención, along Río Pichari, 2 km E of Colonización Pichari, 620 m, 13 Jun 1975, *Wasshausen & Encarnación* 544 (K, US); Paucartambo, Kosñipata District, along trail behind and W of Pilcopata, 580 m, 26 Jun 1975, *Wasshausen & Encarnación* 583 (K, US); Quispicanthis, 3 km E of Quincimil, 960 m, 7 Oct 1976, *Wasshausen & Encarnación* 735 (US); Madre de Dios, Manu, Adan Rajo, km 225, Shintuya-Pilcopata, 520 m, 26 Jun 1975, *Wasshausen & Encarnación* 575 (K, US); Talmamanu, Chiliñas, km 18 on Iberia-Iñapari road, 1 Jun 1978, *Encarnación* 1169 (K, US); near Shintuya, along Alto Río Madre de Dios, 450 m, 13 Oct 1979, *Gentry et al.* 26736 (MO, US); Manu, Parque Nacional de Manu, Est. Cocha Cashu [11°50'S, 71°25'W], 350 m, 4 Aug 1984, *Foster* 9746 (MO, US); Explorer's Inn, near confluence of Río Tambopata and Río La Torre, 29 km SW of Puerto Maldonado [12°50'S, 69°20'W], 9 Jul 1987, *Smith, Smith & Condon* 938 (K, US); Río Tambopata [12°48'S, 69°17'W], 200 m, 9 Jul, 1998, *Michelangeli* 477 (US); Ayacucho, La Mar, on trail between Santa Rosa and Sanabamba along Río Santa Rosa, 700 m, 9 Jun 1975, *Wasshausen & Encarnación* 531 (K, US).

There is considerable variation in the indumentum and color of *Dicliptera purpurascens*. The purple colored form is the only form found in central Bolivia in the Departments of Cochabamba and Santa Cruz while only green forms are known from Pando. Both forms occur in Peru but the purple one is a good deal more common. All plants from Bolivia are densely glandular-pilose. In Peru plants are more commonly glandular-pilose but thinly pilose forms also occur.

Dicliptera purpurascens is obviously related to *D. palmariensis* but the two species are immediately distinguished by the different bracts.

Dicliptera squarrosa Nees

Dicliptera squarrosa Nees, in Mart., Fl. Bras. 9:161. 1847. Type: Brazil, Minas Gerais, *Reidel* 34 (lectotype, here chosen, GZU!; isolectotype NY!); sin loc., *Schüch* s.n. (syntype W, not seen).

Dicliptera sericea Nees, in Mart., Fl. Bras. 9:162. 1847. Type: Brazil, São Paulo, Sorocoba, *Riedel & Lund* 1984 (lectotype, here chosen, LE!; isolectotype NY!).

Dicliptera pohliana Nees, in Mart., Fl. Bras. 9:162. 1847. Type: Brazil, Minas Gerais, Tazenda de Roma, *Pohl* 2973 (lectotype, here chosen, W!).

Dicliptera tweediana Nees, in DC., Prodr. 11:482. 1847. Type: Uruguay, Porto Alegre, *Sellow* 13 (d585) (syntype B, destroyed); ibid, *Sellow* 16 (d531) (syntype B, destroyed); Argentina, Buenos Aires, *Twee-die* s.n. (syntype K!).

Dicliptera niederleiniana Lindau, Bot. Jahrb. 19, Beibl. 48:18. 1894. Type: Argentina, Entre Ríos, Primer Misionero de Hernandez, *Puck & Fernandez* 42 (holotype B, destroyed ?).

Dicliptera imminuta Rizzini, Arquiv. Jard. Bot. Rio de Janeiro, 8:348. 1948. Type: Brazil, Santa Catarina, *Reitz*, C861 (holotype RB).

Dicliptera rauhii Wassh., Beitr. Biol. Pflanzen 63:425. 1988. Type: Peru, Cuzco, prov. Urubamba, Machu Picchu, *Rauh & Hirsch* P804 (holotype HEID!).

Dicliptera squarrosa is an exceptionally widespread species extending from Brazil south of the Amazon region westward to the eastern slopes of the Andes in Bolivia and then southward to Uruguay and central Argentina. Its occurrence further north is uncertain although we feel that *Dicliptera rauhii* Wassh. from Peru belongs to this species and probably also several species described by Leonard from Colombia. *D.*

squarrosa is very variable with a welter of different forms throughout its range all intergrading with each other and forming no discrete units except perhaps at a very local level. We can make out the following rather imprecise geographical forms:

Form 1.—Plants from Argentina, Uruguay and Paraguay corresponding to the types of *D. tweediana* and *D. pohliana* have glabrous, narrowly lanceolate, obtuse leaves and relatively few-flowered axillary cymes, which become congested above into a terminal thyrses. This form does not occur in Bolivia but some Argentinian plants, especially from the Tucuman region have broader leaves which approach form 4 (below) found in Bolivia although the leaves always appear to be glabrous.

Form 2.—Fig. 3 A–G. Some populations in the Río Unduavi Valley along the road from La Paz to Sud Yungas appear very distinct. These plants have subglabrous leaves and a relatively long inflorescence of axillary cymes forming many distinct pseudoverticels, which are not confluent above. The corollas are yellow and the cymule bracts are oblong, gray-pubescent and ciliate-margined with distinct squarrose tips. Collections corresponding to this form include: BOLIVIA: La Paz, Nor Yungas, on N side of Río Unduavi valley, on road to Sud Yungas, 2200–2400 m, 9 Jul 1974, *Wood* 8596 (K, LPB, US); *ibid*, 2400 m, 1 Jul 1995, *Wood* 9952 (K, LPB); ca. 2 km above El Velo de la Novia on the Sud Yungas road, 2400 m, 14 Jun 1998, *Wood* 13716 (K, LPB); Sud Yungas, km 66 on Sud Yungas road to Puente Villa ca. 50 m from El Castillo, 1830 m, 12 Jun 1996, *Wasshausen & Brummitt* 2123 (CAS, GOET, K, LPB, US).

However, forms similar to form 2 but with reddish-orange corollas and bracts with few or no cilia occur elsewhere in the La Paz region and also in Peru. All these forms are difficult to distinguish from *Dicliptera scandens* Leonard from Colombia except that they bear no field notes to suggest they are scandent. Even *D. scandens*

itself is not always scandent. Collections which conform to this more broadly-defined form 2 include: BOLIVIA: La Paz, Tamayo, on descent into Río Yuyo, ca. 60 km S of Apolo on road to Charazani, 1150 m, 12 Jun 2000, *Wood & Wendleberger* 16438 (K, LPB); Murillo, 29.3 km NE of the summit along Zongo Valley, 2200–2300 m, *Solomon, Luteyn & Dorr* 19068 (LPB, MO, US); Zongo Valley, 1900 m, 28 Jun 1997, *Wood* 12349 (K, LPB); Sud Yungas, ca. 15 km from Huancané on road to San Isidro, 2300 m, 1 Jul 1995, *Wood* 9964 (K, LPB, US); 2 km E of Puente Villa, 1200 m, 12 Jun 1996, *Wasshausen & Brummitt* 2124 (K, LPB, US); Inquisivi, *Lewis* 39127 (LPB, MO, US); Cochabamba, Ayopaya, 1 km above Independencia, 2500 m, 13 May 2000, *Wood & Zaraté* 16339 (K, LPB); Cochabamba, Ayopaya, 4 km S of Saila Pata, *Kessler* 12364 (LPB, US). PERU: La Merced-Oxapampa, 2300 m, 17 Aug 1976, *Palmer* 44 (K); San Martín, Zepalacio near Moyobamba, 1200–1600 m, Mar 1934, *Klug* 3601 (F, K).

Form 3.—In the northern Bolivian Andes, mostly at lower altitudes and particularly in areas of high rainfall, there is another form. This also has glabrous leaves but the bracts are relatively broad, leaf-like and mucronate, usually elliptic or obovate, never ciliate or squarrose but commonly pubescent to subglabrous. The axillary cymes are relatively few-flowered. Specimens that conform to this form include: BOLIVIA: Pando, W bank of Río Madeira, 3 km above Riberão, 27 Jul 1968, *Prance et al.* 6539 (K, NY, US); Beni, Ballivian, 10 km S of Rurrenabaque, 250 m, 29 Jul 1998, *Wasshausen & Wood* 2162 (US, LPB); La Paz, Caranavi, 2 km up road behind Caranavi, 640 m, 10 Jun 1996, *Wasshausen et al.* 2118 (K, LPB, US); Sud Yungas, Santa Ana de Alto Beni, 580 m, 20 Aug 1963, *Holliday* 26 (K); 7.5 km N of end of Road to San José, 26.5 km along road to La Asunta, 1040 m, 5 Aug 1991, *Acevedo et al.* 4451 (K, US); stream at bottom of ascent to Huancané, ca. 5 km from



Fig. 3. A–G, *Dicliptera squarrosa* Form 2 (Wasshausen 2133). A, Habit; B, Inflorescence; C, Cymes; D, Corolla; E, Inner bract, bracteoles and pistil; F, Inner bract, bracteoles, calyx lobes and pistil; G, Nectar disk, pistil and calyx lobes.

Puente Villa, 1200–1300 m, 10 Jul 1994, *Wood 8616* (K, LPB); 0.5 km from Puente Villa along Río Unduavi, 1200 m, 14 Jun 1996, *Wasshausen & Brummitt 2130* (K, LPB, US); 1 km above Puente Villa market in side valley, 1100 m, 14 Jun 1998, *Wood 13709* (K, LPB); Cochabamba, Chaparé, 15 km W of Villa Tunari along road to Cochabamba, 800 m, 19 Jun 1994, *Wood 8528* (K, LPB); Carrasco, 6 km W from main road at Bulo Bulu, 500 m, 2 Nov 1997, *Wood 12784* (K, LPB); Santa Cruz, Ichilo, 4 km S of Huaytu towards San Rafael de Amboró, 500 m, 21 May 1995, *Wood 9838* (K, LPB).

This form occurs over quite a wide area and is not uniform in the size or shape or indumentum of the bracts. The obovate bracts of *Holliday 26*, for example, are very different from the long, elliptic to subrhomboid bracts of *Wasshausen et al. 2118*. Similarly the pilose bracts of *Prance et al. 6539* are rather different from the subglabrous to thinly pubescent bracts more commonly seen. The common elements are the nearly glabrous, distinct and few-flowered pseudovercils and large bracts.

Form 4.—This form is characterized by its pubescent leaves and distinct inflorescence. The flowers are mainly in the uppermost leaf axils and the uppermost verticils support many-flowered cymes, which are confluent into a dense, terminal thyrse. This is essentially a plant of bushy stream gullies in the Tucuman-Bolivian forest area extending from around Pojo in the Siberia area south to Tarija, where it perhaps intergrades with *Form 1*, which differs in little more than the glabrous leaves. It also extends east into the Chuiquitania plains where it intergrades with *Form 5*. It is also similar to some plants from Peru including *Dicliptera rauhii* and two collections from the Macchu Pichu area [*Ugent 5339* (K) and *Stafford 790* (K)], which seem to differ only in having glabrous leaves. Specimens that conform to this form include: BOLIVIA: Cochabamba, Carrasco, on ascent from Pojo to Siberia, 2300 m, 2 Feb 1996, *Wood*

& Ritter 10515 (K, LPB); Santa Cruz, Vallegrande, 35 km SE of Vallegrande on road to Masicuri, 1750 m, 24 May 1996, *Wasshausen, Brummitt & Wood 2039* (K, LPB, US); Florida, 2 km W of Samaipata, 1600 m, 15 May 1994, *Wood 8639* (K, LPB, US); La Yunga de Mairana, 2300 m, 18 Sep 1994, *Wood 8674* (K, LPB, US); ca. 5 km above Bermejo towards Samaipata, 1100 m, 17 Jul 1995, *Wood 9995* (K, LPB, US); Ichilo, Río Surutú, 400 m, 2 Aug 1994, *J. Steinbach 6312* (US); Guarayos, ca. 5 km from Ascension on road to Perseverancia, 300 m, 19 Jul 1995, *Wood 9999* (K, LPB, US); Chavez, between Perseverancia and El Arroyan, 300 m, 22 Jul 1995, *Wood 10048* (K, LPB, US); Chuquisaca, Azurduy, 4 km N of Mollini, Sopachuy-Azurduy road, 2000 m, 15 Feb 1999, *Wood & Serrano 14510* (K, LPB, US); Boeto, 10 km N of Villa Serrano, 2300 m, 16 Apr 1995, *Wood 9753* (K, LPB); 1 km below Nuevo Mundo towards Río Grande, 2100 m, 17 Mar 1996, *Wood 10867* (K, LPB, US); Tomina, gorge of Río Sillani, 3 km W of Padilla, 2200 m, 13 Feb 1994, *Wood 7946* (K, LPB); 10 km W of Padilla, 2300 m, 9 Apr 1994, *Wood 8218* (K, LPB, US); on ridge between Padilla and Monteagudo, 2500 m, 10 Apr 1994, *Wood 8229* (K, LPB); Río Limon Valley, ca. 5 km above Thiu Mayo, 1300 m, 15 Jun 1997, *Wood 12305* (K, LPB, US); Siles, 12 km E of Monteagudo towards Camiri, 1300 m, 14 Apr 1995, *Wood 9685* (K, LPB); Calvo, Río Taperillas valley between Monteagudo and Muyu Pampa, 1300 m, 14 Apr 1995, *Wood 9722* (K, LPB, US); Serrania Inca Huasi, 8 km from Muyu Pampa towards Lagunillas, 1500 m, 8 Mar 1998, *Wood, Goyder & Serrano 13255* (K, LPB, US); Tarija, Los Pinos near Tarija, 2200 m, 11 Mar 1904, *Fiebrig 3133* (K).

Form 5.—This form is essentially the same as the previous form except that the flowers are clearly in axillary pseudovercils rather than in a terminal thyrse and so somewhat intermediate with *Form 3*. It is apparently local in relatively open grassy habitats in the Santa Cruz region. It is not

clear whether it is simply an adaptation to open situations or differs genetically in some way. Specimens that conform to this form include: BOLIVIA: Santa Cruz, Ichilo, km 27 on old road to Cochabamba up side road to Los Espejillos, 500 m, 20 Jul 1994, *Wood 8621* (K, LPB); Chavez, San Javier, 500 m, 23 Jul 1995, *Wood 10062* (K, LPB); 15–20 km W of Concepción on road to San Javier, 500 m, 4 Aug 1997, *Wood 12540* (K, LPB).

Form 6.—This form appears to be restricted to the Tarija area. It is characterized by having some inflorescences borne on long, axillary peduncles. The specimen that

conforms to this form: BOLIVIA: Tarija, O'Connor, 5–6 km W of Entre Rios, 3 Jun 2000, *Wood 16384* (K, LPB).

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