

DICHAEA VIRIDULA (ORCHIDACEAE: ZYGOPETALINAE),
A NEW SPECIES IN THE *D. TENUIFOLIA* COMPLEX

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Abstract. The taxonomic status of *Dichaea tenuifolia* Schltr. is revised, the species is lectotypified and *D. undulifolia* Dodson from Ecuador is reduced in synonymy under the former taxon. Populations of Costa Rican *Dichaea* with thin-textured leaves and smooth ovary, previously included under *D. tenuifolia*, are recognized as a distinct species, hereafter described and illustrated as *D. viridula* Pupulin. *Dichaea viridula* may be distinguished from its closest relative, *D. tenuifolia*, by the shorter inflorescence, the flowers approximately half in size, the elliptic-lanceolate sepals (vs. narrowly oblong-ligulate), the petals only slightly narrowed at the base, the thick margins of the lip claw, the much shorter apical lobe of the lip, the green sepals and petals, and the white lip.

Keywords: Orchidaceae, *Dichaea*, *D. tenuifolia*, *D. undulifolia*, *D. viridula*, Costa Rica, Colombia, Ecuador.

Characteristics of the capsule and ovary indumenta have been widely used as an important feature to define species-groups within the orchid genus *Dichaea* Lindl. (Cogniaux, 1906; Schlechter, 1914, 1915; Kränzlin, 1923; Folsom, 1987). In *Dichaea* Sect. *Dichaea*, characterized by plants with pendent, leafy stems provided with persistent blades, non-articulate with the subtending, leaf-bearing sheaths, and eventually withering in place, the normal condition of ovary vestiture is muricate. The trichomes on the resulting capsule may be rather short and stiff, or comparatively long, sometimes recurved at apex. Species of Sect. *Dichaea* with a glabrous ovary are rather uncommon, and Cogniaux (1906) proposed Sect. *Dichaeastrum* to group two Brazilian species with persistent leaves and smooth fruit, described by Barbosa Rodrigues (1877) from the high basin of the Amazon River. Folsom (1987) recognized the existence of several complexes of species within Sect. *Dichaea*, based on morphological similarities and geographic distribution. Among them, he considered *D. tenuifolia* Schltr. and *D. tuerckheimii* Schltr. as

a small complex deserving sectional status on the basis of the smaller plant habit, the thin substance of the leaves, the different structure of the lip, and the characteristically smooth ovaries. However, besides the leaves lacking an abscission layer and the glabrous ovary, the similarities between these two taxa are rather superficial. According to Schlechter's description, *D. tenuifolia* has oblong-ligulate leaves to 13 × 3.5 mm in size; the inflorescence is provided with an ovate bract that is shorter than the pedicellate ovary; the sepals are 10 mm long; the lip has a triangular-semilunate (i.e., anchor-shaped) blade from an oblong claw abruptly narrowing at the base, provided with a small oblong callus in the middle; and the column has a bilobed, papillose-puberulent infrastigmatic ligule (Schlechter, 1920: 203; Mansfeld, 1929: pl. 72, n. 280). On the other side, the oblong-ovate leaves of *D. tuerckheimii*, probably the smallest plant of the genus, do not exceed 4 mm in length; the outer floral bract is longer than pedicel plus ovary; the sepals are about 4.5 mm long; the lip is ovate from a short claw, provided with two globose calli near the base; and the

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proximal lobe of the stigmatic cavity is rounded and glabrous. Moreover, the anther is dorsal in *D. tuerckheimii*, whereas it is terminal or slightly incumbent in the other species of the genus. Nevertheless, whilst *D. tuerckheimii* is a well-sampled species, recorded from Guatemala to Panama (Ames & Correll, 1953; Dix & Dix, 2000; McLeish *et al.*, 1995; Hamer, 1992, 2001; Dressler, 1980, 1993; Pupulin 2002), *D. tenuifolia* is a poorly known taxon.

Dichaea tenuifolia was described from a plant collected in 1879 by Consul F. Lehmann (No. 134) on the Cordillera de Pasto, Department of Cauca, Colombia, at 2000 m elevation (Schlechter, 1920). As it is usual in Schlechter's descriptions, no reference was made in the protologue to the flower color. The holotype was destroyed in Berlin in 1943, and the only material eligible for lectotypification is the drawing published by Mansfeld in 1929, ostensibly based on Schlechter's own sketches of the holotype. Perhaps the most obvious distinctive features of *D. tenuifolia* are the thin texture and the undulate margins of the leaves (from which the specific epithet), as well as the presence of a narrow, oblong callus in the middle of the claw, a character rather uncommon in the genus. Kränzlin (1923) included *D. tenuifolia* in his monograph of monandrous-pseudomonopodial orchids, but without having direct knowledge of the type specimen.

Besides the Colombian type of *D. tenuifolia*, South American plants of *Dichaea* with thin-textured, undulate leaves are known from the wet forests of Ecuador, where they have been found at 800-1400 m elevation on both sides of the Andes from Carchi to Zamora-Chinchipec (Dodson & Dodson, 1989; Dodson & Escobar 1993; Dodson, pers. comm.). Calaway H. Dodson (in Dodson & Dodson 1989) described *D. undulifolia* from a plant collected in northern Ecuador, near the Colombian border (the holotype: *Dodson et al. 16871*, RPSC, not seen, drawing of the holotype in Dodson & Dodson 1989!), citing another collection from the province of Esmeraldas (*Dodson et al. 17151*, RPSC, QCNE, not seen). The illustration of the type specimen is somewhat difficult to interpret, the frontal view of the flower showing the basal lobe of the stigma provided with two lateral projections, whereas the protologue states it has an upcurved infrastigmatic ligule that is

barbate at the apex. Nevertheless, a photograph of *D. undulifolia* based on a specimen from southern Ecuadorian Cordillera del Condor (A. Hirtz *et al. 5333*, RPSC, in Dodson & Escobar, 1993) shows floral characters almost indistinguishable from those stated by Schlechter in his protologue of *D. tenuifolia*, such as the narrowly oblong sepals, the petals narrowed at the base, the lip provided with an oblong hypochile and the epichile with obtuse, retrorse lateral lobes, and the characteristic, bilobed infrastigmatic ligule. According to the photograph, as well as the prologue of *D. undulifolia*, the sepals and petals are greenish-brown with small purple spots, and the lip is white with an overlay of purple. Also the inflorescence length, as well as measurements of floral segments, agree with those provided by Schlechter for his *D. tenuifolia*. On this basis, and in accordance with C.H. Dodson (pers. comm.), I propose the following taxonomy for *D. tenuifolia*:

Dichaea tenuifolia Schltr., Repert. Sp. Nov. Regni Veg. Beih. 7: 203. 1920. TYPE: COLOMBIA. Cauca: Cordillera de Pasto, 2000 m, July 1879, *F. Lehmann 134* (holotype, B, destroyed; Lectotype, designated here, drawing of the holotype in Mansfeld, 1929: pl. 72, n. 280). Synonym: *Dichaea undulifolia* Dodson, Icon. Pl. Trop. Ser. 2, 5: Pl. 444. 1989, *syn. nov.* TYPE: ECUADOR. Imbabura, Lita to Ibarra, Cachaco to Santa Rosa de Cachaco, km 8, 1150 m, 19 January 1987, *Dodson et al. 16871* (holotype, RPSC).

In Dodson and Escobar (1993), under figure number 324, another specimen is illustrated and referred to *D. tenuifolia*. Although in vegetative habit it closely resembles Schlechter's concept, the elliptic sepals and petals, the acute, spreading, glabrous infrastigmatic ligule, as well as the general measurements of floral segments, may prove it represent a distinct, undescribed species.

In Central America, A.R. Endrés illustrated a *Dichaea* species collected around 1867-1868 along the Caribbean drainage of Cordillera de Tilarán in central Costa Rica with thin, undulate leaves (*Endrés Dichaea No. 11, W-Rchb Orch-38598!* and *W-Rchb Orch-36722!*), for

which he proposed the unpublished name *Dichaea undulata*. Two other collections of the same taxon were recorded from Costa Rica by Pupulin (2002, based on *Bartolini 4*, CR!) and Dressler (2003, based on *Stevens 14247*, MO, not seen). In his field guide to the orchids of Costa Rica and Panama, Dressler (1993: 227) also included the latter country into the distribution range of *D. tenuifolia*, but later on he limited the species distribution to Costa Rica and Colombia (Dressler, 2003: 79).

On the basis of Schlecher's original protologue, populations of undulate-leaved *Dichaea* from Costa Rica were subsumed under a broad concept of *D. tenuifolia* (Dressler, 1993, 2003; Pupulin 2002), but in his recent treatment of this taxon for the *Manual de plantas de Costa Rica*, Dressler (2003) noted that Costa Rican specimens differ from the Colombian type in flower size and in the shape of the lip. New collections made along the Caribbean watershed of the Cordillera de Talamanca in Costa Rica offered us the opportunity to study critical details of flower morphology, often lost in pressed specimens, and to compare them with material from South American Andes. As a result of these comparisons, populations from Costa Rica are described here as a species new to science:

Dichaea viridula Pupulin, *sp. nov.* TYPE: COSTA RICA. Cartago: Paraíso, Orosi, Tapantí, Parque Nacional Tapantí, El Mirador, 9°44'13.5" N 83°46'49.6" W, 1376 m, epífita en sitio sombreado en ramitas jóvenes de *Oreomunnea* (Juglandaceae), 24 Agosto 2004, D. Bogarín 925, H. León-Páez & E. Hoppe (Holotype, USJ-Spirit). Fig. 1.

Species Dichaeae tenuifoliae Schltr. similis, inflorescentiae brevis, floribus dimidio minoribus, sepalis elliptico-lanceolatis, basi petalorum parum angustata, unguis labelli marginibus incrassatis, labelli lobulo intermedio duplo majore, sepalis petalisque viridulis immaculatis labello niveo recedit.

Plant epiphytic, cespitose, pendent, to 40 cm long. *Roots* filiform. *Stem* compressed, covered by the slightly inflated leaf sheaths, rarely branching toward the apex. *Leaves* numerous, distichous, not articulated, delicately membranous, smooth, deflexed, 7–12 mm long, 3.5–6.5 mm wide, ovate-lanceolate to oblong, obtusely

acute, the apex aristulate, dark green, obscurely 7–9 veined, the margins neatly undulated; sheaths 4–5 mm long, somewhat inflated, margins slightly undulated. *Inflorescence* axillary, single-flowered, produced above the foliage; peduncle terete, glabrous, green, 7–9 mm long. *Floral bracts* in pair, the outer one orbicular, cucullate, acute to apiculate, the inner one linear, acute, shorter than pedicellate ovary. *Ovary* pedicellate, terete, glabrous, to 3 mm long including the pedicel. *Flowers* small, subglobose, membranous, glabrous, the sepals and petals pale green, the lip and the column white. *Dorsal sepal* elliptic-lanceolate, acute-acuminate, cucullate, 6 mm long, 2 mm wide, 3-veined. *Lateral sepals* obliquely elliptic, concave, 6 mm long, 2.5 mm wide, 3-veined. *Petals* elliptic-lanceolate, narrower than sepals, abruptly acuminate, 3 mm long, 1.5 mm wide, abaxially carinate along the mid-nerve, 3-veined. *Lip* cupped, the hypochile subrhomboid, from a cuneate base, provided with 2 small, rounded, tumid, lateral lobes and a low, smooth, rounded, ridge-like longitudinal callus; the epichile hastate 3-lobed, with obtusely falcate, retrorse lateral lobes, the apical lobe triangular-cuspidate, the margins slightly incrassate; 5.5 mm long, 2 mm wide across the hypochile, 5.5 mm wide across the spread lateral lobes. *Column* suberect, semiterete, 2.7 mm long, slightly recurved at the triangular apex, slightly dilated on each side of stigma, the margins of clinandrium incurved; stigma sub-orbicular, the lower margin provided with a subcuneate, upcurved, apically bilobed, puberulent ligule. *Anther* terminal to sub-ventral, the anther cap obovate-rheniform, membranous, 2-celled. *Pollinia* 4, triangular-obovate, compressed, on a spatulate stipe; viscidium linear-oblong, white. *Fruit* an elliptic, glabrous capsule, 12 mm long, 5 mm wide.

Paratypes: COSTA RICA. Alajuela: San Ramón, Camino a San Carlos, Quebrada Verde, [ca. 900 m], Fl. October-December. A.R. *Endrés Dichaea* No. 11 (W-Rchb Orch-38508, drawings). Cartago: Orosi, Tapantí National Park, Oropendola trail, 1160 m, epiphytic on trunks in shade, lower montane wet forest, secondary vegetation, 25 May 2003, F. Pupulin 4652 (USJ, sterile, drawings). Same locality, 29 December 2004, M. Blanco et al. 2637, fruiting (USJ-Spirit). San José: Bajo de la Hondura, 12 de marzo 1912, H. Bertolini 4 (sterile, CR).

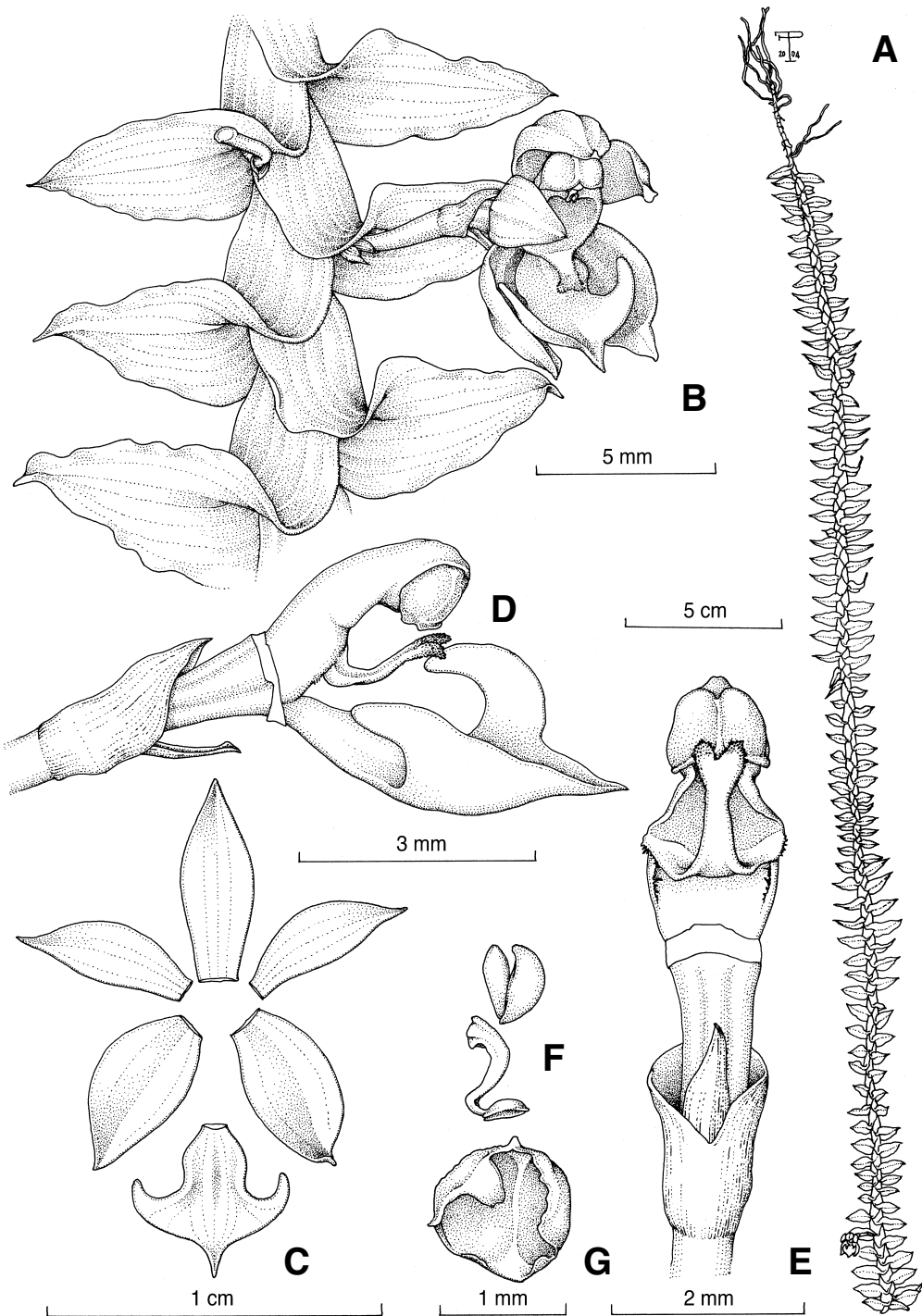


FIGURE 1. *Dichaea viridula* Pupulin. A, Habit; B, Habit detail and flower; C, Dissected perianth; D, Column and lip, lateral view; E, Column, ventral view; F, Pollinarium (two pollinia removed); G, Anther cap. Illustration vouchers: A–B, *Bogarín 925, León-Páez & Hoppe* (USJ-Spirit); C–G, *Pupulin 4652* (USJ).

Without locality, A.R. *Endrés Dichaea* No. 26 (W-Rchb Orch-36722, drawings).

Etymology: From the Latin *viridulus*, greenish, in allusion to the color of the sepals and petals.

Distribution: Known only from Costa Rica.

Ecology: Epiphytic in deep shade in wet premontane forest at 700-1400 m elevation, restricted to the Caribbean drainage of Cordillera de Tilarán and Cordillera de Talamanca in central Costa Rica. Flowering was recorded in May, August, October, and December, and likely the plants flower year round. Plants in fruit were observed in December and January.

Among Mesoamerican species of *Dichaea*

Section *Dichaea*, *D. viridula* may be easily recognized by the plant habit, characterized by leaves very thin-textured, with the margins neatly undulate; leaf venation is strongly apparent also in the loose leaf-sheaths. Another distinctive feature is the bilobed, barbate, upcurved infrastigmatic ligule, shared in the region only by the distantly related *D. oxyglossa* Schltr. *Dichaea viridula* differs from South American *D. tenuifolia* by the shorter inflorescence, the flowers approximately half in size, the elliptic-lanceolate sepals (vs. narrowly oblong-ligulate), the petals only slightly narrowed at the base, the thick margins of the lip claw, the much shorter apical lobe of the lip, the green sepals and petals, and the white lip.

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