521. TRICHOCENTRUM DIANTHUM
Orchidaceae

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Summary. *Trichocentrum dianthum* Pupulin & Mora-Retana (*Orchidaceae*), a small epiphyte endemic to southern Costa Rica, is described and illustrated. Notes on its ecology, pollination, and cultural requirements are provided.

Many different kinds of pollination systems are known among the orchids of the neotropical subtribe Oncidiinae. Most of the genera related to *Oncidium* do not offer any rewards to pollinators, perhaps with the exception of oil-secreting species of *Ornithocephalus*, *Sigmatostalix* and a few *Oncidium* species, and nectariferous members of *Comparettia*, *Scelochilus* and related genera of the so-called *Rodriguezia* clade. While for many genera of the Oncidiinae a deceit pollination mechanism, based on mimicry of nectar-producing species of the Malpighiaceae (Nierenberg, 1972, Powell *et al.*, 2003), has been hypothesized, a wide range of other syndromes has also been recognized in the subtribe. These vary from flower models with a rather open nectary or elaiophores (*Leochilus*, *Goniochilus*, *Ionopsis*), to mimics of spiders aimed to achieve pollination by spider-hunter wasps of the genera *Pepsis* and *Campsomeris*, to systems based on pseudoantagonism with territorial bees (*Oncidium*) and pseudocopulation by Hymenoptera (*Tolumnia henekenii*) and Diptera (the genera *Trichoceros*, *Telipogon* and *Stellilabium*). The euglossine-syndrome, well documented as one of the most important pollination strategies in neotropical orchids, is relatively infrequent among the Oncidiinae.

Members of the genus *Trichocentrum*, however, are pollinated by fragrance-collecting male bees of the genera *Eulaema* and *Euglossa* (van der Pijl & Dodson, 1966). Flower morphology of *Trichocentrum* is also unique in the subtribe. Species of *Trichocentrum sensu stricto* present a non-functional spur involving only labellar tissue, a feature common in vandoid genera, mainly in the Angraecinae and Aerangidinae and their neotropical relatives, *Campylocentrum* and *Dendrophylax*, but rather exceptional in the Maxillarieae. The labellar spur of *Trichocentrum* seems to have evolved independently from the spurs of other genera in the Oncidiinae, and phylogenies based on DNA data sets offer strong support to a different origin of the *Trichocentrum* nectary, grouping *Trichocentrum* and all the other

Trichocentrum dianthum FRANCO PUPULIN

'spurred' Oncidiinae into two distinct clades (Chase & Palmer, 1992; Williams *et al.*, 2001).

Since its description in 1837 by Eduard Friedrich Poeppig and Stephan Ladislaus Endlicher, *Trichocentrum* was easily recognised on the basis of floral and nectar morphology. As originally circumscribed, the genus *Trichocentrum sensu stricto* includes today some 27 species, distributed from southern Mexico to Brazil and Bolivia, with the centre of distribution in the South American Andes. The generic name is derived from the Greek words *trichos*, hair, and *kentron*, spur, in allusion to the slender spur of the type species, *T. pulchrum*, and its close relatives. Actually, spur morphology in *Trichocentrum* is rather variable, and Pupulin (1995) utilized the shape of the nectary, together with other morphological features, to suggest the existence of several natural groups within the genus.

Although the flowers of *Trichocentrum* species vary greatly in size, from the large *T. tigrinum* reaching sometimes 10 cm across, to the small *T. caloceras*, less than 2 cm wide, the structure of the perianth is basically similar. Sepals and petals are subsimilar and usually spreading (somewhat campanulate in some species), and the larger lip extends backward into a tubular or many-lobed spur. At the base of the lip, just in front to the entrance of the spur, is a callus, mostly formed by two or more low keels, but in some species more elaborate, designed to orientate the pollinator in the right way to ensure contact with the ventral viscidium. The short column, without a foot, is connate with the basal margins of the lip, with which it forms a short tunnel before the entrance of the false nectary.

The taxonomy of the genus was revised by Pupulin (1995), who presented a theoretical reconstruction of the evolution of the spur in the subtribe Oncidiinae. Seven informal groups were recognized, some of which have since received formal recognition (the sect. *Saccatae* by Senghas in 1995 and the sect. *Lobulatae* by Pupulin in 2001) on the basis of gross floral and micro-morphological traits, consistent with the geographical distribution of the different taxa.

Dressler (1981) suggested a close relationship between *Trichocentrum* and the 'rat-tail' *Oncidium* of sect. *Cebolleta* (or the genus *Cohniella*) and the 'mule-ear' species of sect. *Plurituberculata* (or the genus *Lophiaris*), mainly based on vegetative architecture, i.e. the reduced pseudobulb and the fleshy, coriaceous leaves. This suggestion received partial support by DNA analysis carried out by Williams and co-workers (Williams *et al.*, 2001), who formally

adopted a wider circumscription of *Trichocentrum* to include the sections *Cebolleta* and *Plurituberculata* of the genus *Oncidium*.

The species of *Trichocentrum s.s.* are usually restricted in their distribution. With the exception of *T. capistratum*, which ranges from Mexico to Venezuela and Colombia, and the widespread Andean *T. pulchrum*, most of the species are endemic to a single country, often to a single specialized habitat. They are usually found in shaded spots in lowland to mid-altitude forests, but *T. tigrinum* also grows in open woodlands in coastal Ecuador and Peru.

Three species of *Trichocentrum*, all from South America, have already been featured in *Curtis's Botanical Magazine*. The first, in 1842, was the Brazilian *T. fuscum*, painted by Walter Hood Fitch (plate 3969). The same artist painted, in 1868, *T. albo-coccineum* (under the name of *T. albopurpureum*) (plate 5688). In 1894, Matilda Smith painted a pale, nearly concolorous form of *T. tigrinum* (plate 7380).

Trichocentrum dianthum was described in 1994, based on a plant collected in 1988 by Jorge 'Coqui' Cambronero at Las Nubes de Quizarrá, on the Pacific watershed of the Talamanca chain, in southern Costa Rica. At the type locality, which was a patch of primary forest facing a little tributary of the Río General, *T. dianthum* grows with *Lacaena spectabilis, Kefersteinia costaricensis, K. lactea, Restrepia muscifera, Macroclinium generalense* and *Trichocentrum capistratum*. Other plants of the species were collected at El Alto de San Juan, at about 1000 m elevation along the road connecting the valley of El General with the Costa Rican Pacific coast. Here *T. dianthum* was growing on short *Citrus* trees in a pasture, where it is established on shady, small branches with a thick layer of moss. *Trichocentrum dianthum* grows sympatrically with *T. caloceras, T. capistratum* and *T. pfavii*, which seem to prefer somewhat different microhabitats. *Trichocentrum caloceras* and *T. capistratum* grow high in the canopy where light is stronger, whereas *T. dianthum* and *T. pfavii* grow lower on the trunks in deeper shade where roots are immersed in moss. Alvaro Herrera collected a specimen of *T. dianthum* at about 2000 m on the slopes of Cerro Vueltas, one of the highest mountains of the Talamanca range, an elevation unusually high for *Trichocentrum* species in Mesoamerica.

Trichocentrum dianthum is extremely rare, with few known localities, and is probably extinct at the type locality owing to deforestation. Both the areas of Las Nubes de Quizarrá and San Juan are

characterized by a warm and very moist climate, with a moderate dry season. Rainfall is particularly heavy during the months of October and November, when plants of *T. dianthum* mature their new growths. By the end of December, when the dry season begins, the inflorescence arises and flowers open nearly continuously from February until April. Cultivated plants flowers sometimes as early as December.

Together with *T. pfavii*, described by Reichenbach *fil.* in 1881, and its sister species *T. estrellense*, *T. dianthum* forms part of a small group of species characterised by the presence of two tooth-like, lateral lobes at the base of the lip. In vegetative and floral morphology, these species are more similar to one another than to any other taxon in the genus. Besides the presence of short, erect lobes at the base of the lip, they have papillose-hirsute internal spur walls, a character unrecorded in the Oncidiinae that may have a special significance in the pollination of the taxa of the *T. pfavii* group. Both *T. dianthum* and *T. estrellense* emit during the day a subtle to strong scent, probably associated with the euglossine pollination syndrome. It is likely that this group originated in Central America, the distribution of its species probably being limited to Costa Rica and western Panama.

CULTIVATION. Despite its rather fleshy leaves, *T. dianthum*, unlike *T. tigrinum*, does not come from dry areas. It inhabits moist to wet forests, and plants grow on branches covered by thick layers of moss in shady spots, often in gallery forests along creeks, where air movement is good. *T. dianthum* is a real miniature, with showy and colourful flowers, a perfect candidate for miniature growers. Owing to its rarity in nature, plants of *T. dianthum* have probably never reached the commercial market, but attempts to propagate it artificially would be well worthwhile.

The temperature requirements of this species will be met by the warmest corner of the intermediate house. Humidity must be high all year round, combined with good ventilation and drainage for the roots. Plants may be grown successfully both on slabs (of cork or hard wood) and in pots. Because the rather thin roots dry out quickly after watering, plants on slabs benefit from some moss or sphagnum around the roots. Pots must be rather small and with perfect drainage. Plants grown in pots prefer a medium to fine mixture, allowing the thin roots to have constant humidity. Like most of *Trichocentrum* species, *T. dianthum* is easy to grow if humidity

is coupled with good ventilation. The thick leaves tend to rot if water lodges near the axis with the small pseudobulb, and this is especially common with plants grown in pots, where the leaves cannot hang down as they do in their natural, epiphytic habitat.

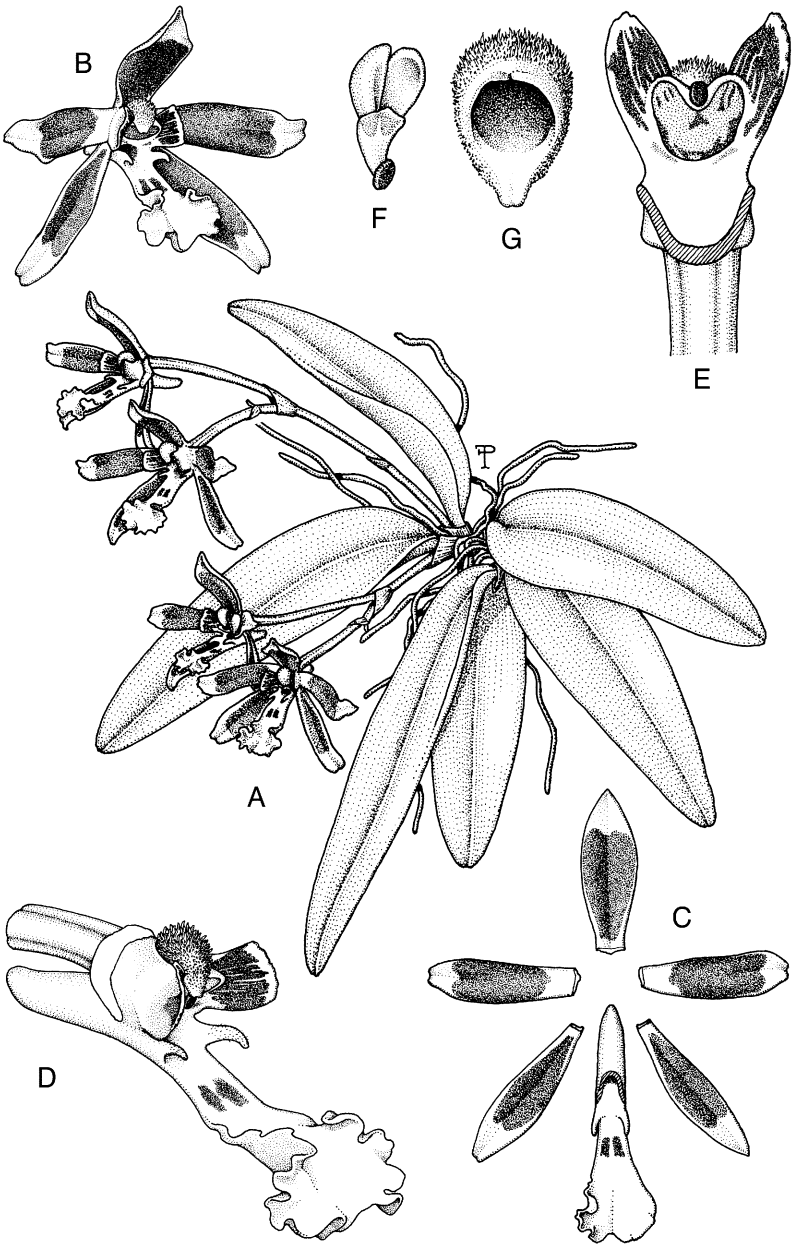
Trichocentrum dianthum is very floriferous, and it is not at all exceptional to find a single pseudobulb producing up to three inflorescences, each one bearing three to four flowers. Plants may flower with as few as two leaves, but I recommend not dividing the plants until they are very large, since stronger specimens are easier to maintain and flower regularly.

Trichocentrum dianthum Pupulin & Mora-Retana in Selbyana 15: 90 (1994). Pupulin in Lindleyana 10: 194–195 (1995); Pupulin in Caesiana 8: 7–11 (1997). **Type**: Costa Rica. San José: Perez Zeledon, Las Nubes de Quizarrà, 1000 m, epiphytic on short trees along a little river, 1988, flowered in cultivation in March 1989, *J. Cambronero s.n.* (USJ, holotype).

DESCRIPTION. *A pendent epiphyte*, with an abbreviated rhizome. *Roots* filiform, glabrous, with green apex. *Pseudobulbs* minute, caespitose, rounded, to 5 mm long, unifoliate. *Leaf* oblong-elliptic to obovate-oblong, acute to minutely retuse, sessile, from a conduplicate base, to 9.7 cm × 3 cm. *Inflorescences* up to four, lateral, basal, erect, two-flowered; peduncle terete, green, 3.5–4 cm long; *bracts* conspicuous, ovate, concave, spreading, brownish, to 5 mm long. *Ovary* linear-clavate, 2.3 cm long including the pedicel. *Flowers* spreading, with yellow sepals and petals covered by a very large brown blotch; lip white, marked with two rose-purple blotches near the base. *Dorsal sepal* erect, elliptic-oblanceolate, obtuse to subacute, carinate, to 16.5 mm × 6.3 mm. *Lateral sepals* spreading, obliquely oblanceolate, carinate, to 17 mm × 4 mm. *Petals* linear-oblong, acute, subcarinate, to 16.5 mm × 5 mm. *Lip* spathulate, adnate to the base of the column, 25 mm × 9.2 mm near the apex, with two narrow, falcate, lateral lobes at the base, the mid-lobe rounded in front and with crisped margins, producing at the base an elongate, slender, conical spur, *c.* 11 mm long. *Column* short, stout, footless, to 5 mm long, with a pair of fleshy, erect, subquadrate wings, brown-striped. *Anthercap* white, cucullate, hirsute. *Pollinia* 2, pyriform, complanate, on a short, triangular stipe; viscidium peltate, brown.

DISTRIBUTION. Endemic to Costa Rica, in the northern part of the Río General valley in the watershed of the Fila Costera and slopes of the Cordillera de Talamanca, and to the high western intermontane valleys of the Cerro Vueltas, in southern Costa Rica (Pupulin & Mora-Retana, 1994).

HABITAT. In rainforest along creeks and on *Citrus* trees, in thick moss on tree branches, at 1000 to 2000 m.



Trichocentrum dianthum. A, habit, ×3/4; B, flower, ×1.5; C, dissected perianth, ×1.5; D, column and lip, three quarter view, ×3; E, column, ventral view, ×5; F, pollinarium, ×8; G, anther cap, ×8. All drawn from *Cambronero s.n.* (USJ) by Franco Pupulin.

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