

FIVE NEW SPECIES OF *CAUCAEA* (ORCHIDACEAE) FROM COLOMBIA AND ECUADOR

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Abstract. Five new species of *Caucaea* Schltr. (*C. caucana* Szlach. & Kolan., *C. pichincae* Szlach. & Kolan., *C. dodsoniana* Szlach. & Kolan., *C. pseudoandigena* Szlach. & Kolan., *C. duquei* Szlach. & Kolan.) are described and illustrated. The taxonomic affinities of the new entities are discussed, and information about their habitat and ecology is provided. A key for identification of *Caucaea* species known from Colombia and Ecuador is provided.

Key words: biodiversity, *Caucaea*, distribution, Neotropics, Oncidiinae, taxonomy

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INTRODUCTION

The systematics of the orchid genus *Oncidium* Sw. and its relatives has been discussed for over 170 years. More than 1100 specific epithets have been applied to this taxon since its description by Swartz (1800). The great phenotypic variation observed within oncidoid orchids and the superficial uniformity of their floral morphology have provoked lively discussion of the taxonomy of *Oncidium* and the need to delimit smaller, morphologically clearly defined taxa. Preliminary studies on infrageneric classification were made by Lindley (Lindley & Paxton 1850–1851; Lindley 1855), who recognized 14 sections within *Oncidium*, but the first comprehensive infrageneric classification of the genus was proposed by Kraenzlin (1922), who recognized 18 sections within the genus. Some of them were later elevated to generic rank: for example, *Oncidium* sect. *Heterantha* Kraenzl. to *Heteranthocidium* Szlach., Mytnik & Romowicz, or *Oncidium* sect. *Teretifolia* Lindl. to *Cohniella* Pfitzer. One of Kraenzlin's sections whose taxonomic status has been recently studied is *Oncidium* sect. *Cucullata* Kraenzl., typified by *O. cucullatum* Lindl., distinguished according to Kraenzlin by the coriaceous

leaves, partially connate lateral sepals, tepals being smaller than the lip, and entire lip isthmus margin. A revision of this group was published by Stacy (1975), who also suggested its distinctiveness from *Oncidium s.str.* Molecular studies (Williams *et al.* 2001) revealed the close relation of the section's representatives with the genus *Caucaea* Schltr., which for a long time was recognized as a monospecific taxon containing only *C. radiata* (Lindl.) Mansf.; the authors proposed synonymization of the two genera under the name *Caucaea*, but this concept was rejected by Dodson and Luer (2005). Studies of gynostemium morphology (Szlachetko & Mytnik-Ejsmont 2009) confirmed the similarity in construction of the reproductive structures between *C. radiata* and representatives of *Oncidium* sect. *Cucullata*. Subsequent genetic analysis of Oncidiinae by Neubig *et al.* (2012) confirmed the phylogenetic distance of *Caucaea* (sensu Williams *et al.* 2001) from *Oncidium*. Those studies indicated the close relation of the genus with taxa of the *Cyrtochilum* complex [*Siederella* Szlach., Mytnik, Górniak & Romowicz, *Cyrtochilum loxense* (Lindl.) Kraenzl.] and *Miltoniopsis* God.-Leb.

As currently recognized, *Caucaea* includes species characterized by ovoid to cylindrical-ovoid

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pseudobulbs enclathed basally with 1–3 foliaceous bracts and (1)2 conduplicate leaves at the top. Their resupinate flowers are arranged into often fractiflex, 1- to many-flowered inflorescences. The floral bracts are shorter than the pedicels and the ovaries. The lateral sepals are partially to completely fused and both the dorsal sepal and petals are free. The lip is panduriform or deeply 3-lobed, with a basal callus consisting most often of 2–3 ridges. The gynostemium is slightly arched and rather stout, with the column part 2–3 times as long as the anther, winged and enlarged at the base. No column foot is observed. The subapical to ventral anther is incumbent, operculate, ellipsoid, obscurely 2-chambered. Two obliquely obovoid, slightly dorsiventrally compressed, hard, apically unequally cleft pollinia are produced. The apical clinandrium forms a narrow collar surrounding the anther base. The rather large stigma is transversely elliptic to elliptic, and deeply concave. The rostellum is suberect, ligulate, and its remnant is centrally bilobulate, slightly concave between the acute lobules, and canaliculate on the dorsal surface.

Plants of *Caucaea* are usually found growing as epiphytes in cool, wet montane forest or high-montane Andean cloud forest, most often above 2500 m a.s.l. *Caucaea* contains *ca* 20 species distributed from Colombia and Venezuela south to Peru, with the greatest diversity observed in Ecuador.

Recent studies of Oncidiinae revealed the existence of five distinctive species, three from Ecuador and two from Colombia, which are described here as new and placed within a key for identification of *Caucaea* reported from both countries. Previously seven species of the genus were found in Colombia (Ortiz Valdivieso & Uribe Vélez 2007) and 16 in Ecuador (Stacy 1975; Königer 2003).

TAXONOMIC TREATMENT

Caucaea caucana Szlach. & Kolan., *sp. nov.*

Fig. 1

Species similar to *C. cucullata* (Lindl.) N. H. Williams & M. W. Chase, but with smaller flowers,

suborbicular-ovate petals, an inconspicuous lip isthmus, shortly bifid lip middle lobe and glabrous lip callus.

HOLOTYPE: COLOMBIA. Cauca: Macizo Colombiano; páramo de Las papas, entre El Bosquerón y La Hoyola. Camino San Agustín-Valencia, Alt. 3200–3510 m, 7–27 Sep. 1958, *Idrobo, Pinto & Bischler 3036* (MO).

Pseudobulb 5.5 cm long, 2 cm wide, ovoid, bilaterally compressed, bifoliate, subtended by foliaceous sheaths. Leaves up to 13 cm long, 3 cm wide, ligulate, lanceolate to elliptic-lanceolate, obtuse. Inflorescence 40 cm long, paniculate, several-flowered. Tepals green with rose spots, lip lilac with violet spots. Floral bract *ca* 3 mm long, triangular-ovate, acute. Pedicel and ovary 23 mm long. Dorsal sepal 14 mm long, 5 mm wide, thick, oblong-elliptic, obtuse, 5-veined. Petals 12 mm long, 7 mm wide, ovate-suborbicular

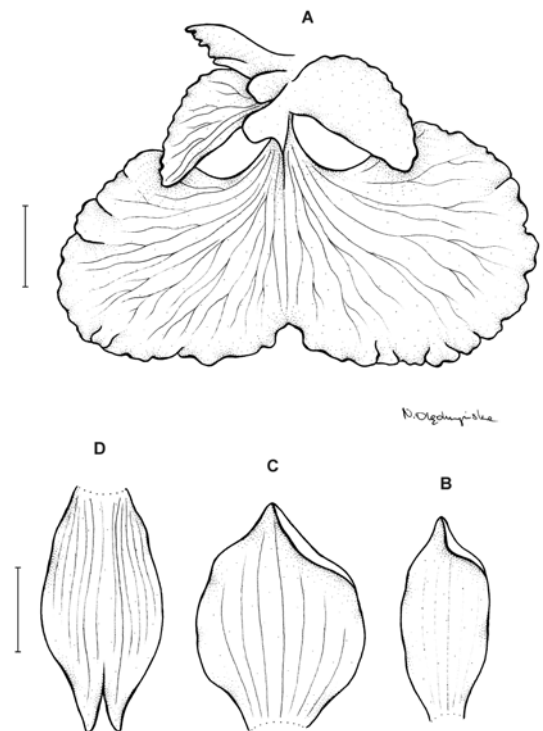


Fig. 1. *Caucaea caucana* Szlach. & Kolan., *sp. nov.* – dissected perianth. A – lip and gynostemium, B – dorsal sepal, C – petal, D – lateral sepals. Scale bars = 5 mm. Drawn by N. Ołędzińska from the holotype.

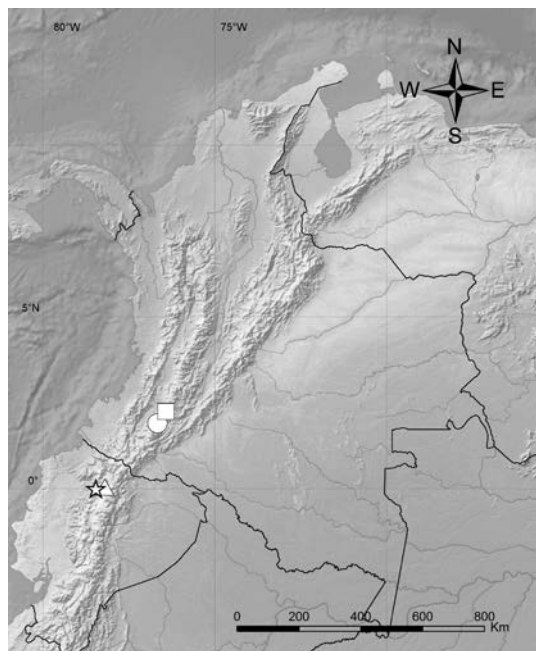


Fig. 2. Distribution of new *Caucaea* Schltr. species: *C. caucana* Szlach. & Kolan. (○), *C. pichincae* Szlach. & Kolan. (△), *C. dodsoniana* Szlach. & Kolan. (☆) and *C. duquei* Szlach. & Kolan. (□).

above a narrow base, obtuse, 7-veined, somewhat oblique. Lateral sepals 15 mm long, together 7 mm wide, connate for *ca* 3/4 of their length, free apices subobtuse, each sepal 6-veined. Lip 20 mm long, 23 mm wide, fleshy, deeply 3-lobed; lateral lobes 9 mm long, 6 mm wide, dolabriform, margins crenulate, apex obtuse; isthmus inconspicuous; middle lobe 15 mm long, transversely elliptic-reniform, subcordate at base, apex shortly bifid, margins undulate; callus a short, obtuse ridge. Gynostemium 7 mm long, somewhat sigmoid, clinandrium slightly dentate.

ETYMOLOGY. In reference to the place of origin of the type specimen.

HABITAT, ECOLOGY AND DISTRIBUTION. Known only from the Colombian Andes (Fig. 2). Growing epiphytically at 3000–3510 m a.s.l. Flowering in September.

NOTES. This species resembles *C. cucullata* (Lindl.) N. H. Williams & M. W. Chase but its flowers are smaller (dorsal sepal 14 vs 20 mm

long, petals 12 vs 19 mm long), the petals are suborbicular-ovate above a narrow base (vs petals ovate-lanceolate), the lip isthmus is inconspicuous (vs prominent), the lip middle lobe is shortly bifid (vs deeply bifid) and the lip callus is glabrous (vs hairy at base). Unlike in *C. olivacea* (Kunth) N. H. Williams & M. W. Chase, the lip callus of the new species constitutes *ca* 1/5 of the lip length (vs 1/3 of lip length), it is not hairy in the basal part, the lip middle lobe is not deeply bifid nor deeply cordate at the base, and the lip isthmus is inconspicuous.

Caucaea pichincae* Szlach. & Kolan., *sp. nov.

Fig. 3

Species similar to *C. cucullata* (Lindl.) N. H. Williams & M. W. Chase but with an ovate-elliptic, obtuse dorsal sepal, and glabrous callus in the form of two parallel ridges.

HOLOTYPE: ECUADOR. Pichincha: Tabacundo. Quebrada Chimburlo, km 47. Canal de riego principal.

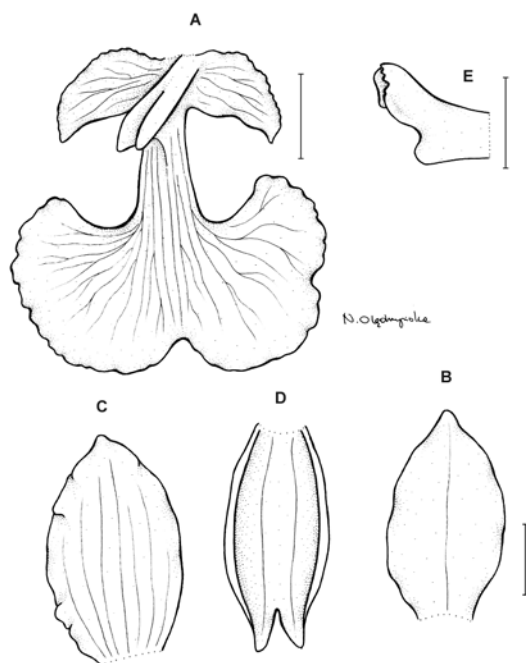


Fig. 3. *Caucaea pichincae* Szlach. & Kolan., *sp. nov.* – dissected perianth. A – lip, B – dorsal sepal, C – petal, D – lateral sepals, E – gynostemium. Scale bars = 5 mm. Drawn by N. Ołędryńska from the holotype.

00°07'N 78°08'W, Alt. 3000 m, 12 Aug., *Cuamacás & Gudiño 667* (MO).

Pseudobulb 7 cm long, 1.8 cm wide, cylindrical-ovoid, bilaterally compressed, bifoliate. Leaves up to 42 cm long, 2.7 cm wide, linear-lanceolate, subobtuse. Inflorescence *ca* 100 cm long, racemose, branching, laxly several-flowered. Flowers rose-colored with purple spots. Floral bract 3 mm long, ovate-triangular, acute. Pedicel and ovary 27 mm long. Dorsal sepal 15 mm long, 6.5 mm wide, ovate-elliptic, obtuse, 1-veined. Petals 15 mm long, 8 mm wide, thick, elliptic, obtuse, somewhat oblique, margins minutely undulate, 7-veined. Lateral sepals 15 mm long, 7.5 mm wide together, connate almost to the obtuse apices, synsepal concave. Lip *ca* 20 mm long, 17 mm wide across lateral lobes, 20 mm wide across middle lobe, rather thin, deeply 3-lobed; lateral lobes *ca* 3.5 mm wide, dolabriform, margins minutely crenate, apex subacute; isthmus prominent, *ca* 7 mm long, narrow; middle lobe 12 mm long, cordate at base, flabellate, shortly bifid, margins undulate; callus consisting of two parallel keel-like ridges which extend to *ca* 1/3 of lip length. Gynostemium 7 mm long, apically bent back, clinandrium somewhat dentate.

ETYMOLOGY. In reference to the place of origin of the type specimen.

HABITAT, ECOLOGY AND DISTRIBUTION. Known only from Ecuador (Fig. 2). Growing at *ca* 3000 m a.s.l. Flowering in August.

NOTES. This species resembles *C. cucullata* (Lindl.) N. H. Williams & M. W. Chase, from which it differs by the ovate-elliptic, obtuse dorsal sepal (vs oblong-lanceolate, acute), and glabrous callus (vs hairy at base) in the form of two parallel ridges (vs one or three keel-like ridge(s)).

Caucaea dodsoniana Szlach. & Kolan., *sp. nov.*

Fig. 4

Species similar to *C. olivacea* (Kunth) N. H. Williams & M. W. Chase and *C. cucullata* (Lindl.) N. H. Williams & M. W. Chase, but with a glabrous callus, obliquely ovate-dolabriform lip lateral lobes and relatively broad lip isthmus.

HOLOTYPE: ECUADOR. Pichincha: Quito. Reserva Geobotánica del Pululahua. Sendero El Hospital-Manca Quito. 00°05'N, 78°30'W, Alt. 3100–3200 m, 7 Feb. 1992, *Cerón & Reyna 18184* (MO).

Pseudobulb 6 cm long, 2.3 cm wide, ovoid, bilaterally compressed, bifoliate. Leaves up to 40 cm long, 3 cm wide, lanceolate, acute. Inflorescence *ca* 95 cm long, paniculate, sublaxly many-flowered. Flowers lilac with darker spots. Floral bract 4 mm long, triangular-ovate, acute. Pedicel and ovary 25 mm long. Dorsal sepal 14 mm long, 6.8 mm wide, elliptic, obtuse, 9-veined, apex recurved. Petals 13 mm long, 9 mm wide, obliquely broadly ovate, subobtuse, 9-veined, apex recurved. Lateral sepals 15 mm long, together 8 mm wide, connate almost to the subacute, diverging apices, elliptic in general outline. Lip *ca* 20 mm long, 14 mm wide across lateral lobes, 23 mm wide across middle

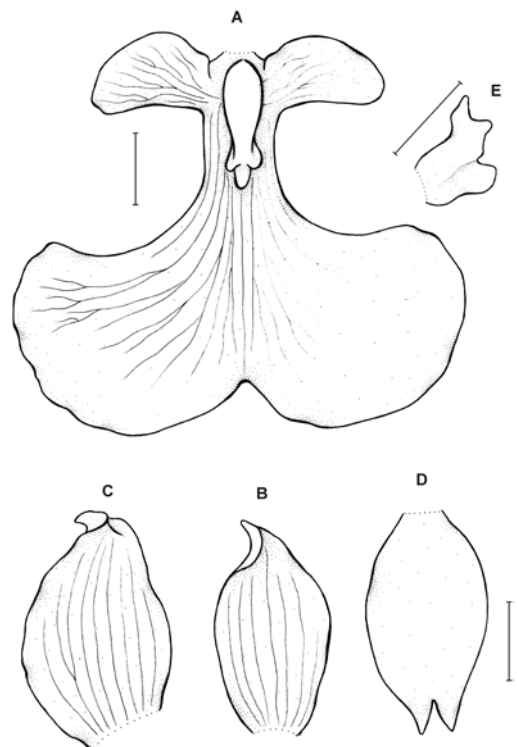


Fig. 4. *Caucaea dodsoniana* Szlach. & Kolan., *sp. nov.* – dissected perianth. A – lip, B – dorsal sepal, C – petal, D – lateral sepals, E – gynostemium. Scale bars = 5 mm. Drawn by N. Olędryńska from the holotype.

lobe, deeply 3-lobed; lateral lobes 5 mm wide, obliquely ovate-dolabriform, rounded; isthmus 4.3 mm long, 3.5 mm wide; middle lobe *ca* 10 mm long, cuneate-flabellate, shortly bifid at apex, margins slightly undulate; callus an ovate pad with a pair of small, rounded appendices in apical part. Gynostemium 5 mm long, robust, apical part bent back, clinandrium entire.

ETYMOLOGY. Dedicated to Calaway H. Dodson, eminent American orchidologist.

HABITAT, ECOLOGY AND DISTRIBUTION. Known only from Ecuador (Fig. 2). Growing epiphytically at *ca* 3100–3200 m a.s.l. Flowering in February.

NOTES. In the form of the lip callus this species resembles *C. olivacea* (Kunth) N. H. Williams & M. W. Chase, but the callus of the new species is glabrous (vs hairy in basal part) and its lip lateral lobes are obliquely ovate-dolabriform (vs obliquely ovate), the lip isthmus is relatively broad (vs narrow), and the lip middle lobe base is cuneate (vs deeply cordate). In *C. cucullata* (Lindl.) N. H. Williams & M. W. Chase the lip lateral lobes are subquadrate and the middle lobe is deeply cordate at the base. The callus of this species consists of three keel-like ridges.

***Caucaea pseudoandigena* Szlach. & Kolan., sp. nov.**

Fig. 5

Species similar to *C. andigena* (Linden & Rchb. f.) N. H. Williams & M. W. Chase, but with an oblong-elliptic dorsal sepal, shortly connate lateral sepals, ovate-subrectangular petals, a larger lip and a deeply bifid, basally cordate lip middle lobe.

HOLOTYPE: [ECUADOR]. Cultivated in Loja, 15 Oct. 1982, *Heiser s.n.* (MO).

Pseudobulb 4.5 cm long, 0.8 cm wide, cylindrical, bilaterally compressed, bifoliate. Leaves up to 14 cm long, 1 cm wide, linear-lanceolate, attenuate towards obtuse apex. Inflorescence 35 cm long, racemose, laxly few-flowered. Floral bract *ca* 2 mm long, obscure. Pedicel and ovary 13 mm long. Dorsal sepal 8.5 mm long, 5 mm wide, oblong-elliptic, apiculate, obtuse, 7-veined. Petals 8.5 mm long, 5.5 mm wide, ovate-subrectangular, apiculate, primarily 5-veined. Lateral

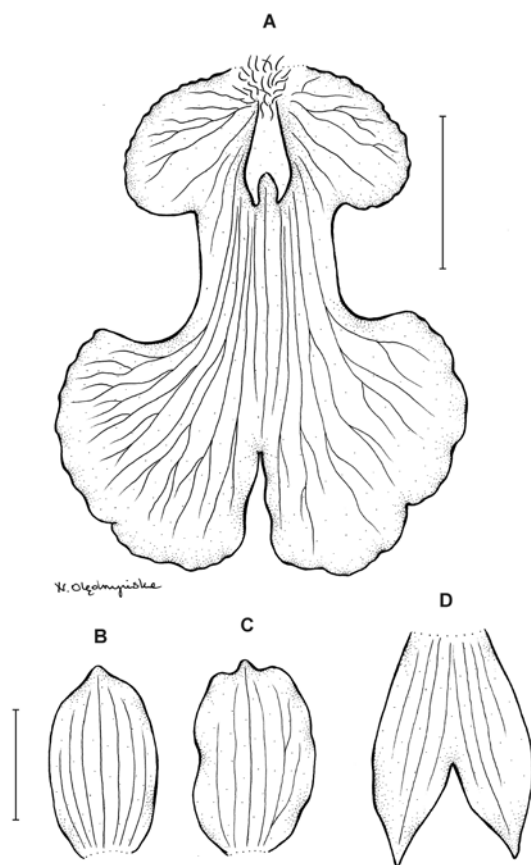


Fig. 5. *Caucaea pseudoandigena* Szlach. & Kolan., sp. nov. – dissected perianth. A – lip, B – dorsal sepal, C – petal, D – lateral sepals. Scale bars = 5 mm. Drawn by N. Ołędryńska from the holotype.

sepals 11 mm long, 2.8 mm wide, connate to about the middle, free apices acute, diverging, each sepal 4-veined. Lip *ca* 16 mm long, 16 mm wide across middle lobe, 8 mm wide across lateral lobes, deeply 3-lobed, lateral lobes 4.5 mm long, obliquely broadly ovate, rounded, margin somewhat crenulate; isthmus prominent, *ca* 3.5 mm long, 4.5 mm wide; middle lobe 9.5 mm long, deeply bifid, reniform in outline, margins undulate; callus pliers-shaped, hairy at base.

ETYMOLOGY. In reference to the similarity to *C. andigena*.

HABITAT, ECOLOGY AND DISTRIBUTION. Place of collection not stated, probably Ecuador. Epiphytic

plant, habitat unknown. In cultivation, flowering in October.

NOTES. This species resembles *C. andigena* (Linden & Rchb. f.) N. H. Williams & M. W. Chase but it is easily distinguished from this species by the tepals and lip form. Unlike in *C. andigena*, the lateral sepals are connate to about the middle (vs free only at apices), the dorsal sepal is oblong-elliptic (vs elliptic-oblong) and the petals are ovate-subrectangular (vs elliptic-oblong). The lip of the new species is about twice longer than the tepals (vs lip slightly longer than tepals in *C. andigena*) and the lip middle lobe is deeply bifid and cordate at the base (vs shortly bifid, truncate at base).

***Caucaea duquei* Szlach. & Kolan., sp. nov.**

Fig. 6

Species similar to *C. olivacea* (Kunth) N. H. Williams & M. W. Chase but with a short, cup-like lip callus and lateral sepals connate to ca 2/3 of their length.

HOLOTYPE: COLOMBIA. Cauca: Zona sur del Parque Nacional de Puracé, Macizo Colombiano, margen izquierdo Río Caqueta, camino a la laguna “Santiago”, sector Valencia, Alt. 3200 m, 21 Sep. 1967, *Duque 620* (COL).

Pseudobulb 7 cm long, 1 cm wide, ovoid-cylindric, bilaterally compressed, bifoliate. Leaves up to 30 cm long and 2 cm wide, narrowly lanceolate, acute. Inflorescence over 120 cm long, racemose, rather laxly many-flowered. Floral bract 4 mm long, ovate, subobtusate. Pedicel 22 mm long, ovary 10 mm long. Tepals very thick, stiff, greyish-green, lip violet-purple. Dorsal sepal 16 mm long, 7 mm wide, concave, oblong ovate, obtuse, apex slightly recurved. Petals 14 mm long, 8 mm wide, concave in central part, ovate-elliptic, acuminate. Lateral sepals 18 mm long, 4 mm wide, connate to ca 2/3 of their length, free apices obtuse, somewhat diverging, each sepal 6-veined. Lip ca 28 mm long, 30 mm wide across middle lobe, deeply 3-lobed above base; lateral lobes 9 mm long, dolabriform, margins undulate, apex rounded; isthmus short, ca 5 mm long, narrow; middle lobe 18 mm long, reniform,

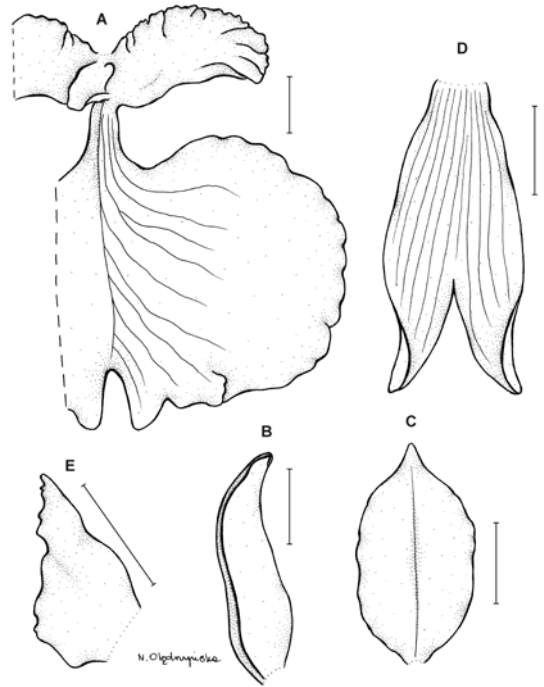


Fig. 6. *Caucaea duquei* Szlach. & Kolan., sp. nov. – dissected perianth. A – lip, B – dorsal sepal, C – petal, D – lateral sepals, E – gynostemium. Scale bars = 5 mm. Drawn by N. Ołędzzyńska from the holotype.

shortly bifid, margins undulate; callus in form of concave, cup-like thickening in basal 1/7 of lip. Gynostemium 8.5 mm long, erect, rather robust, clinnadium narrow, almost entire.

ETYMOLOGY. Dedicated to Andrés Duque, collector of the type specimen.

HABITAT, ECOLOGY AND DISTRIBUTION. Known so far only from the Colombian Andes (Fig. 2). Growing epiphytically at ca 3200 m a.s.l. Flowering in September.

NOTES. This species resembles *C. olivacea* (Kunth) N. H. Williams & M. W. Chase, from which it differs by the lateral sepals connate to ca 2/3 of their length (vs lateral sepals connate into cymbiform, bifid lamina) and the form of the lip callus. In the new species the callus consists of a glabrous, cup-like thickening in the basal 1/7 of the lip, while in *C. olivacea* it is a keel-like process with a small obtuse lobe on each side and it extends to ca 1/5 of the lip length.

KEY TO *CAUCAEA* SPECIES KNOWN
FROM COLOMBIA AND ECUADOR

1. Lip triangular-ovate in outline, up to *ca* 5 mm long *C. radiata* (Lindl.) Mansf.
 1* Lip distinctly 3-lobed, more than 10 mm long ... 2
 2. Lip disc papillate in center
 C. kennedyi (Stacy) N. H. Williams & M. W. Chase
 2* Lip disc not papillate 3
 3* Lateral sepals connate up to about the middle ... 4
 3. Lateral sepals connate almost to their apices (at least 2/3 of their length) 12
 4. Base of lip middle lobe deeply cordate
 C. spathulata N. H. Williams & M. W. Chase
 4* Base of lip middle lobe not cordate 5
 5. Isthmus between lip lobes long, almost equaling lateral lobe length
 C. pseudoandigena Szlach. & Kolan.
 5* Isthmus between lip lobes reduced 6
 6. Lip base truncate to subcordate 7
 6* Lip base cuneate 10
 7. Lip middle lobe transversely elliptic to cordate-reniform
 C. nubigena (Lindl.) N. H. Williams & M. W. Chase
 7* Lip middle lobe cuneate-flabellate 8
 8. Lip callus rectangular
 C. tarquiensis (Stacy) N. H. Williams & M. W. Chase
 8* Lip callus composed of 3 ridges 9
 9. Lip lateral lobes overlapping middle lobe
 C. macrotyle (Königer & J. Portilla) Königer
 9* Lip lateral lobes not overlapping middle lobe
 C. alticola (Stacy) N. H. Williams & M. W. Chase
 10. Lip lateral lobes truncate
 C. erosilabia (Stacy) N. H. Williams & M. W. Chase
 10* Lip lateral lobes rounded 11
 11. Lip about equally long and wide
 C. tunguraguensis (Stacy) N. H. Williams & M. W. Chase
 11* Lip wider than long
 C. chimborazoensis (Stacy) N. H. Williams & M. W. Chase
 12. Lip callus glabrous 13
 12* Lip callus hairy in basal part 18
 13. Lip isthmus reduced 14
 13* Lip isthmus conspicuous 15
 14. Tepals dorsally papillate
 C. azuayensis (Kraenzl.) N. H. Williams & M. W. Chase
 14* Tepals glabrous
 C. aequinoctialis (Stacy) N. H. Williams & M. W. Chase
 15. Lip isthmus very long, *ca* 1/4–1/3 of total lip length 16
 15* Lip isthmus short, less than 1/5 of total lip length 17
 16. Lip callus in form of 2 parallel ridges
 C. pichincha Szlach. & Kolan.
 16* Lip callus consisting of a broad ridge with a pair of small appendices in its apical part
 C. dodsoniana Szlach. & Kolan.
 17. Lip callus cup-like
 C. duquei Szlach. & Kolan.
 17* Lip callus a single, short ridge
 C. caucana Szlach. & Kolan.
 18. Inflorescence erect 19
 18* Inflorescence arcuate 20
 19. Lip callus short, *ca* 1/5 of lip length
 C. olivacea (Kunth) N. H. Williams & M. W. Chase
 19* Lip callus long, *ca* 1/3 of lip length
 C. cucullata (Lindl.) N. H. Williams & M. W. Chase
 20. Lip callus consisting of parallel ridges ... 21
 20* Lip callus tuberculate 24
 21. Lip callus compressed
 C. rhodosticta (Kraenzl.) N. H. Williams & M. W. Chase
 21* Lip callus not compressed 22
 22. Callus middle ridge shorter than lateral ones ...
 23
 22* Callus middle ridge as long as lateral ones ...
 C. tripterygia (Rchb. f.) N. H. Williams & M. W. Chase
 23. Callus concave
 C. dayana (Rchb. f.) N. H. Williams & M. W. Chase
 23* Callus convex
 C. phalaenopsis (Lindl. & Rchb. f.) N. H. Williams & M. W. Chase
 24. Lip lateral lobes subquadrate, reduced
 C. mimetica (Stacy) N. H. Williams & M. W. Chase
 24* Lip lateral lobes semicircular, well-developed 25
 25. Gynostemium slender, clinandrium short
 C. andigena (Linden & Rchb. f.) N. H. Williams & M. W. Chase
 25* Gynostemium stout, clinandrium high
 C. sanguinolenta (Lindl.) N. H. Williams & M. W. Chase

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