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# Three new taxa in Cyrtopodium (Orchidaceae) from central and southeastern Brazil

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Batista, J. A. N. & L. B. Bianchetti (Embrapa Recursos Genéticos e Biotecnologia, Parque Estação Biológica, P.O. Box 02372, Brasília, DF 70770-901, Brazil; emails: janb@cenargen.embrapa.br; bianchet@cenargen.embrapa.br). Three new taxa in *Cyrtopodium* (Orchidaceae) from central and southeastern Brazil. Brittonia 56: 260–274. 2004.—**Cyrtopodium brunneum, C. lamellaticallosum** and **C. poecilum** var. **roseum**, from the *cerrado* and *campo rupestre* vegetation of central and southeastern Brazil are described and illustrated. Although the description of *Cyrtopodium gonzalezii* indicated that it is a distinct species, the holotype is referrable to *C. brandonianum*. The undescribed plants are now described here as **C. brunneum**. *Cyrtopodium gonzalezii* is placed in the synonym of *C. brandonianum*.

**Key words:** Orchidaceae, *Cyrtopodium*, cerrado vegetation, Brazil.

*Cyrtopodium* is a neotropical genus with about 42 species ranging from southern Florida to northern Argentina. The center of diversity of the genus is in the Brazilian cerrado, where at least 25 species occur. In recent years, several new species have been described in the genus (Batista & Bianchetti, 2001; Bianchetti & Batista, 2000; Menezes, 2000), most from central Brazil. Based on our further exploration of the region and examination of herbarium specimens of the genus, we describe two new species, *C. brunneum* and *C. lamellaticallosum*, and a new variety, *C. poecilum* var. *roseum*, below.

Traditionally, the taxonomy of *Cyrtopodium* has been based almost completely on reproductive characters, with the vegetative parts, particularly the leaves, being neglected. This is because botanical studies of the genus have relied almost entirely on dried specimens collected mainly during the flowering season, when most *Cyrtopodium* species do not have fully developed leaves. The examination of live plants throughout the developmental cycle has allowed characterization of the vegetative parts of most species and, in many cases, the species can be identified vegetatively. Based on this characterization, we found that the holotype of *C. gonzalezii* L. C. Menezes is unambiguously *C. brandonianum* Barb.Rodr., although the description does indicate that it is a new species, here described as *C. brunneum*.

**Cyrtopodium brunneum** J. A. N. Bat. & Bianchetti, sp. nov. (Figs. 1 & 2)

TYPE: BRAZIL. Distrito Federal, Brasília, Plano Piloto, final da Asa Norte, área entre o Parque Ecológico Norte e o Parque Nacional de Brasília, local do futuro Setor Noroeste, 8 Sep 2001 (fl), *J. A. N. Batista 1242* (HOLOTYPE: CEN; ISOTYPES: AMES, BHCB, ESA, HB, HUEFS, HUFU, K, MBM, MO, NY, RB, SP, SPF, UB, UEC).

*Cyrtopodium gonzalezii* L. C. Menezes, Bol. CAOB 6(1): 9. 1995. pro parte, excluding type.

*Cyrtopodio tristi* Rchb. f. & Warm. similis sed inflorescentia semper simplici, floribus minoribus, sepalis oblongo-lanceolatis vel paulo lanceolato-ovatis, labelli lobis lateralibus falcatis differt; etiam *C. dusenii* Schltr. similis sed foliis sub anthesi redactis, inflorescentia semper simplici, floribus majoribus, sepalis et petalis atrobrunneis differt.

Terrestrial herb. *Roots* many, whitish, glabrous. *Pseudobulbs* completely buried,

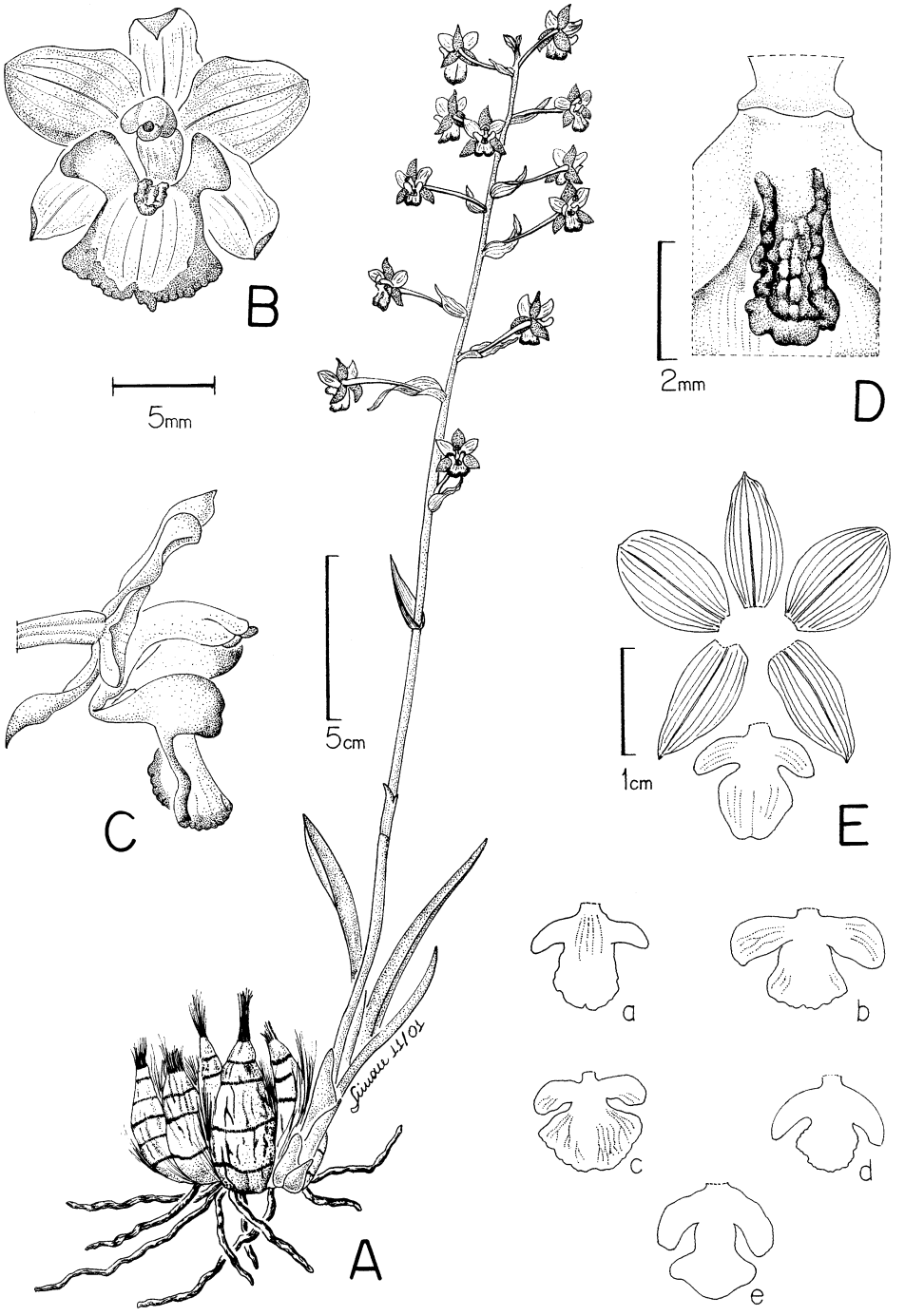


FIG. 1. *Cyrtopodium brunneum*. **A.** Habit at anthesis. **B.** Flower. **C.** Side view of flower. **D.** Callus. **E.** Perianth. **a–e.** Variations in lip morphology, each one from a different individual of the same population. A–D drawn from *Batista 1242*, E and a–e drawn from *Batista 208* by Simone C. Souza e Silva.

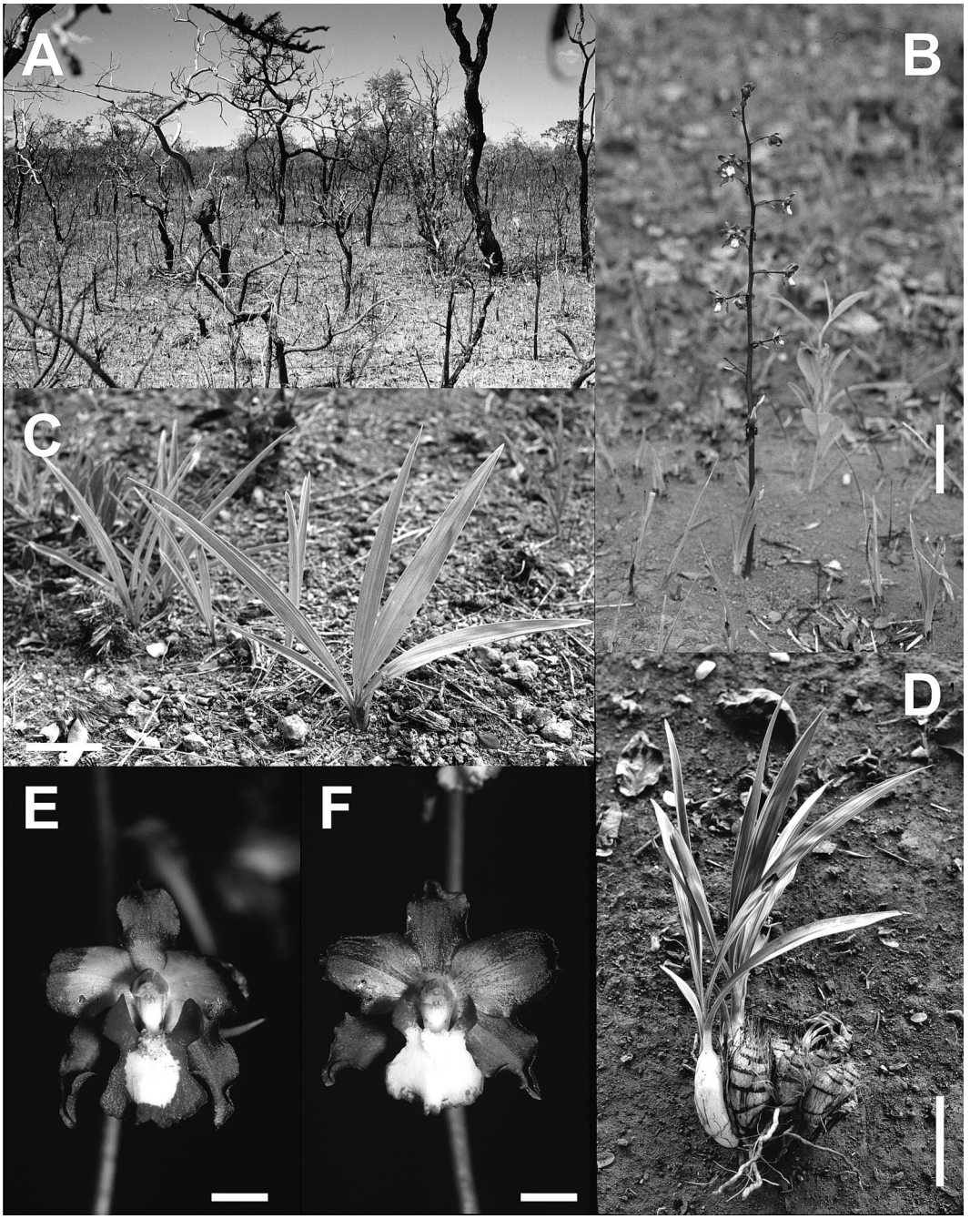


FIG. 2. *Cyrtopodium brunneum*. **A.** Habitat at the time of flowering. Burnt cerrado at the type locality, about 2 weeks after fire, with the vegetation beginning to regrow, at the beginning of September. **B.** Inflorescence. Note the poorly developed leaves at anthesis. **C.** Fully developed leaves, in December, about 2 months after flowering. The surrounding vegetation has been removed to expose the plants. **D.** Uprooted mature plant (January), showing the fully developed leaves and underground pseudobulbs. **E** and **F.** Flowers, each from a different specimen. Scale bars = 5 cm (B–D) and 5 mm (E, F).

ovoid, leafless from the second year onwards, externally white, (3–)4–6(–7) × (1–)1.5–2.5 cm. *Leaves* at flowering 3–6, little developed, 7–15 cm long, when fully developed 5–8, spreading, coriaceous, lanceolate, the lowermost 1–2 leaves sheath-like, the uppermost 4–7 leaves 13–33 × 1–2.6 cm, articulate 1–2 cm from the surface of the soil, the apex acuminate. *Inflorescence* lateral, erect, racemose, lax, 26–56 cm, brownish to dark brown; peduncle 11–26 cm, the 2 sheath-like bracts strongly adpressed, 1.7–3.5 cm long; rachis 12–26 cm long; floral bracts oblong-lanceolate, 1–3 × 0.5–0.9 cm, greenish brown, acute to acuminate, the margins undulate, incurved; ovary with pedicel 1.4–3.9 cm long, dark brown. *Flowers* 9–15(–20) per inflorescence, sweet-scented. *Sepals* oblong-lanceolate to slightly lanceolate-ovate, light to dark brownish or brownish green, lighter at the base, frequently with dark-brown spots, the apex apiculate, the margin undulate; dorsal sepal (8–)11–13(–15) × 4–5(–6) mm; lateral sepals slightly oblique, (8–)11–13(–15) × 4–6(–7) mm. *Petals* concave, broadly elliptic to somewhat broadly lanceolate, (8–)9–12(–13) × 6–8 mm, the lower half greenish to light-brownish, occasionally with few to many small brown dots, the upper half dark-brown, color transition usually sharply delimited, the apex obtuse to rounded, slightly apiculate, the margins slightly undulate. *Lip* 3-lobed, (7–)9–11(–12) mm long, 10–12(–14) mm wide between the apices of the side lobes when spread, the base shortly unguiculate, 1 mm long, yellowish; lateral lobes erect, parallel, oblong-falcate, (3–)4–5(–6) × 2–3(–4) mm, reddish to reddish purple, the apex obtuse, the base unconstricted, the margins entire, smooth; callus verrucose, slightly sulcate, extending from the base of the central lobe to the column foot, white, occasionally reddish white; isthmus separating the lateral lobes from the central lobe usually prominent, sometimes elongated, 1–2(–3) mm long; central lobe variable, obcordate to obovate-oblong to somewhat reniform, 5–7 × (5–)6–8(–10) mm, yellow with red to reddish-purple margins, occasionally with a few red dots at the base, the yellow becoming fainter towards aging, the apex with a protruding fold, retuse when flattened, the margin smooth, occasionally slightly verrucose at the apex. *Column* erect, slightly arcuate, trigonous, 6–7(–8) mm long, yellow at the base, reddish white at the middle, and greenish purple towards the apex; column foot (2.5–)3–4 mm long, yellow at the base, white at the middle with small numerous red dots that merge towards the apex. *Anther* ca. 2–2.5 × 1.5 mm, yellowish, apex green; pollinia 2, waxy, sulcate, ca. 1 × 0.5–0.6 mm, yellow; stipe triangular, hyaline, ca. 1 × 1 mm at base. *Fruit* deflexed, green, oblong to elongate, sulcate, ca. 6–8.5 × 1–1.5 cm when young, including the pedicel.

*Etymology*.—Named after the dark brown color of the sepals and petals.

Additional specimens examined. BRAZIL. **Distrito Federal**: Brasília, Vila Maury, 6 Sep 1960 (fl), *Andrade 412 & Emmerich 404* (HB, R); Brasília, Lago Norte, 8 Oct 1990 (fl), *Batista 122* (CEN), 1 Oct 1991 (fl), *Batista 208* (CEN), 7 Sep 1992 (fl), *Batista 325* (CEN); Guará, Reserva Ecológica do Guará, 13 Sep 1992 (fl), *Batista 330* (CEN); Brasília, area between Parque Ecológico Norte and Parque Nacional de Brasília, 7 Oct 1994 (fl), *Batista 421* (CEN), 11 Dec 1994 (veg), *Batista 434* (CEN); Brasília, Lago Norte, 17 Feb 1995 (veg), *Batista 521* (CEN), QL 15, near Clube do Congresso, 17 Feb 1995 (veg), *Batista 523* (CEN); Núcleo Bandeirante, Santuário Ecológico do Riacho Fundo, 14 Sep 1995 (fl), *Batista & Bianchetti 576* (CEN); Brasília, area between Parque Ecológico Norte and Parque Nacional de Brasília, 28 Sep 1998 (fl), *Batista 792* (CEN, HB, MBM, SP), 30 Dec 2000 (veg), *Batista 1112* (CEN); Brasília, area between Lago Norte and EPIA, 6 Jan 2001 (veg), *Batista 1126* (CEN); Brasília, Lago Sul, condomínio Prive Morada Sul II, above QI-28, close to Paranoá dam, (fl. in cult.) 22 Sep 2001, *Batista et al. 1184* (CEN); Gama, BR-060, near the GDF check point and the access to Santo Antônio do Descoberto, 2 Oct 2001 (fl), *Batista & Oliveira-Neto 1252* (CEN); Brasília, Plano Piloto, Asa Norte, 713–714 N, area of University of Brasília, between Parque Olhos D'Água and the CAESB sewage treatment plant, 7 Oct 2001 (fl), *Batista 1254* (CEN); Brasília, Setor de Mansões do Lago Norte, 17 Sep 1990 (fl), *Bianchetti & Batista 953* (CEN), trecho 2, 20 Oct 1991 (fl), *Bianchetti & Batista 1176* (CEN), near MI-7, 6 Oct 1991 (fl), *Bianchetti & Batista 1168* (CEN); Guará, Reserva Ecológica do Guará, 26 Aug 1990 (fl), *Bianchetti & Batista 950* (CEN); Brasília, Plano Piloto, 10 Nov 1961 (fl), *Heringer 8756* (HB, UB); Brasília, Estação Florestal Cabeça do Veado, 8 Oct 1965 (fl), *Heringer 10616* (HB, UB); Santa Maria, near the microwave towers, 28 Oct 1972 (fl), *Heringer 12206* (HB, UB); ca. 20 km S of Brasília, on rd. to Goiânia, near Rio Melchior, 1125 m, 25 Sep 1965 (fl), *Irwin et al. 8652* (UB); Brasília, confluence of Rio Torto with Lake Paranoá, 975 m, 9 Oct 1965 (fl), *Irwin et al. 9086*

(HB); Guará, Reserva Ecológica do Guará, 15°50′S, 47°57′W, 1050 m, 20 Sep 1994 (fl), *Oliveira 2* (UB). **Goiás**: Chapada dos Veadeiros, ca. 26 km N from Alto Paraíso, GO-118, 11 Oct 1999 (fl), *Batista 945* (CEN); ca. 8 km from Niquelândia, Tocantins Niquel Company, 14°23′48″S, 48°25′59″W, 17 Sep 1996 (fl), *Fonseca et al. 1154* (IBGE); Municipality of Mineiros, BR-364, near Córrego Alegre, 20 Sep 1974 (fl), *Hatschbach & Kummrow 35014* (MBM); Goiânia, 30 Nov 1963 (fl), *Heringer 9289* (HB); Municipality of Luziânia, 16 Sep 1974 (fl), *Heringer 13971* (HB, UB); 12 km NW of Veadeiros, on rd. to Cavalcante, 1200 m, 21 Oct 1965 (fl), *Irwin et al. 9444* (HB, UB); Aparecida de Goiânia/Hidrolândia, 10 Aug 2002 (fl), *Pastore 32* (CEN). **Mato Grosso**: 84 km from Alto Araguaia, towards Rondonópolis, BR-364, Sep-Nov 1983 (fl), *Hutchison 8550* (UEC). **Minas Gerais**: Uberlândia, Estação Ecológica do Panga, 24 Sep 1992 (fl), *Araujo et al. 276* (HUFU); Morro Pelado, near Campanha, Aug 1896 (fl), *Brandão in CGGMG 1719* (R) (p.p., with *C. cristatum*); Municipality of Carmo do Rio Claro, Serra da Tormenta, 3 Nov 1990 (fl), *Campos s.n.* (CEN, HRCB); Serra do Cipó, 23 Aug 1958 (fl), *Heringer 6438* (HB) (p.p., with *C. parviflorum*); Felixlândia, Três Marias basin, 23 Aug 1958 (fl), *Heringer 6438* (UB), 2 Oct 1959 (fl), *Heringer 6438* (UB), margins of Rio Paraopeba, 11 Oct 1959 (fl), *Heringer 6438* (UB); Santana do Riacho, Km 107 on the Belo Horizonte to Conceição do Mato Dentro rd., 4 Oct 1981 (fl), *Pirani et al. in CFSC 7472* (SP, SPF).

Pabst was probably the first orchid taxonomist to examine material of *C. brunneum*, but misidentified it first as *C. falcilobum* Hoehne & Schltr. (now a synonym of *C. parviflorum* Lindl.) and later as *C. poecilum* Rchb. f. & Warm. f. *minor* Hoehne (now a synonym of *C. fowliei* L. C. Menezes). He was apparently also the first taxonomist to suspect that the specimens might represent a new species. In his personal files at the Herbarium Bradeanum, there is a card with a sketch of *C. brunneum* indicated at the side as *C.* aff. *parviflorum* and at the top as *Cyrtopodium heringeri*, but he never published a valid description of this species. More recently, Menezes described this species as *Cyrtopodium gonzalezii* L. C. Menezes (Menezes, 1995), but unfortunately designated a holotype that is *Cyrtopodium brandonianum* Barb.Rodr. This situation leaves the new species without valid publication.

The holotype of *C. gonzalezii* at the University of Brasília herbarium is a single, sterile specimen. However, on the basis of its vegetative characteristics this specimen is *C. brandonianum*. The holotype has small, narrow, buried pseudobulbs and linear, erect, very narrow leaves. Compared with the 25 *Cyrtopodium* species known from the cerrado, the buried pseudobulb characteristic excludes several species with exposed pseudobulbs, such as *C. aliciae* Linden & Rolfe, *C. cardiochilum* Lindl., *C. cipoense* L. C. Menezes, *C. cristatum* Lindl., *C. eugenii* Rchb. f., *C. hatschbachii* Pabst, *C. lissochiloides* Hoehne & Schltr., *C. palmifrons* Rchb. f. & Warm., *C. paludicolum* Hoehne, *C. parviflorum* Lindl., *C. saintlegerianum* Rchb. f., *C. virescens* Rchb. f. & Warm., and *C. vernum* Rchb. f. & Warm.

According to the protologue of *C. gonzalezii* (Menezes, 1995) and to Menezes herself (L. C. Menezes, pers. comm.), the holotype was collected on the peninsula do Lago Norte, a district of Brasília where we have collected intensively during the past 12 years. Six species of *Cyrtopodium* are known from this district: *C. blanchetii* Rchb. f., *C. brandonianum* Barb.Rodr., *C. brunneum*, *C. caiapoense* L. C. Menezes, *C. poecilum* Rchb. f. & Warm., and *C. virescens* Rchb. f. & Warm. This further excludes from the comparison those species that do not occur in the Distrito Federal, such as *C. braemii* L. C. Menezes and *C. dusenii* Schltr., or those that occur in Brasília but not at this particular site, such as *C. fowliei* L. C. Menezes, *C. latifolium* Bianchetti & J. A. N. Bat., *C. pallidum* Rchb. f. & Warm., *C. triste* Rchb. f. & Warm., and *C. linearifolium* J. A. N. Bat. & Bianchetti. Additionally, the pseudobulbs of *C. braemii*, *C. fowliei* and *C. latifolium* are reddish-purple externally, while in the holotype of *C. gonzalezii* they are whitish.

The characterization of the vegetative parts of the remaining species for comparison, including the holotype of *Cyrtopodium gonzalezii*, is shown in Table I. Because of its similarity to *C. brunneum*, *C. triste* is also included in the comparison. All measurements were taken from living specimens under field conditions, except for the measurements of pseudobulbs and the holotype of *C. gonzalezii*, which were obtained from dried specimens. Only mature and adult specimens and fully developed leaves were considered in the analysis. Leaf length was measured from the surface of

TABLE I
VEGETATIVE CHARACTERISTICS IN SEVEN TERRESTRIAL SPECIES OF *Cyrtopodium* KNOWN FROM THE LAGO NORTE DISTRICT OF BRASÍLIA, BRAZIL

| | *C. brunneum* | *C. triste* | *C. brandonianum* | *C. gonzalezii* (holotype) | *C. poecilum* | *C. blanchetii* | *C. caiapoense* |
|---|---|---|---|---|---|---|---|
| Pseudobulbs | | | | | | | |
| Length (cm) | (4–)5–6.5(–7.5) | (3–)4–6 | 3.5–5.5(–6.5) | 3.5–4 | (5–)6–8(–11.5) | (4.5–)5–8(–8.5) | 7.5–8 |
| Width (cm) | (1.4–)1.7–2.3(–2.8) | 1–2.3 | 0.8–1.5(–2) | 1.2–1.3 | 1.5–2.8 | 1.5–2.5(–3.5) | 0.8–1.2 |
| Position | buried | buried | buried | buried | buried | buried | buried |
| Color | white | white | white | white | reddish purple | white | white |
| Leaves | | | | | | | |
| Number | (4–)5–7(–8) | (3–)4–5(–6) | (3–)4–5(–7) | 5 | (3–)5–6 | (3–)4–5(–6) | (6–)8–10 |
| Length (cm) | (6–)16–25(–33) | (5–)12–21(–31) | (24–)41–60(–81) | 22–42 | (14–)35–55(–81) | (18.5–)35–65(–85) | (12–)25–45 |
| Width (cm) | (0.6–)1.1–2.1(–2.6) | (0.8–)1.1–1.6(–2.0) | (0.7–)1–1.5(–2.1) | 0.5–0.9 | (1.3–)2.5–3.5(–5.1) | (1.3–)2–2.9(–3.4) | 1.2–2.7 |
| Ratio L/W[1] | (8.1–)9.5–15.5(–17.2) | 12.9–15.5(–21.9) | (31.2–)37–42(–60) | 55 | (12.7–)16.5–18.5(–30) | (11.6–)18.5–25(–33.2) | 15.3–18.5(–21.6) |
| Ratio L/W[2] | (6.7–)8.5–16.7(–22) | (7.2–)10–21(–29.3) | (15–)30–58(–76) | 55 | (7.6–)11.3–20.8(–30.6) | (8.8–)14–30(–47.2) | 10–22(–31.7) |
| Shape | lanceolate | linear-lanceolate | linear | linear | lanceolate | lanceolate | lanceolate |
| Position | spreading | spreading | erect | erect | spreading | erect | erect |
| Articulation | present | present | present | present | present | present | present |
| Length (cm) | (0.5–)1–2(–3) | (0.5–)1–2(–2.5) | (2.5–)4–6(–10.5) | 4–4.5 | (2.5–)3.5–6.5(–8) | (3–)4.5–6.5(–8) | 2–3.5(–6) |

[1] Mean ratio per plant.
[2] Ratio per leaf.

the soil, which corresponds approximately to the distance from the apex of the pseudobulb to the apex of the leaf. *Cyrtopodium poecilum* and *C. blanchetii* have much broader leaves than *C. gonzalezii*. The pseudobulbs of *C. poecilum* are reddish-purple externally, and therefore distinct from all the other species in this comparison; the pseudobulbs of *C. blanchetii* are larger than those of *C. gonzalezii*. *Cyrtopodium caiapoense* has more and wider leaves and usually has longer pseudobulbs than *C. brunneum*. On the other hand, *C. brunneum* has shorter and broader leaves. The mean leaf length-to-width ratio was 9.5–15.5 for *C. brunneum*, and 55 for *C. gonzalezii*. Additionally, the leaves of *C. brunneum* are typically spreading, while in *C. gonzalezii* they are erect. The pseudobulbs of *C. brunneum* are usually slightly longer and broader than those of *C. gonzalezii*. Another difference involves the distance of the leaf articulation relative to the apex of the pseudobulb, which was shorter in *C. brunneum* than in *C. gonzalezii*. A plot of leaf length versus width for *C. brunneum*, the holotype of *C. gonzalezii*, and *C. brandonianum* is shown in Figure 3. These results show that the vegetative characteristics of the holotype of *C. gonzalezii* are distinct from those of *C. brunneum*, *C. poecilum*, *C. blanchetii*, and *C. caiapoense*, but fall within the range of variation of *C. brandonianum*.

The slightly smaller values for *C. gonzalezii*, particularly for leaf width, can be explained by the fact that the measurements were taken from a dried specimen, in which the leaves may have shrunk during drying. The size and number of pseudobulbs indicate that the type specimen of *C. gonzalezii* is most certainly an adult plant, but with immature leaves. To further examine this possibility, the length and width of immature leaves of *C. brunneum* and *C. brandonianum* were plotted with the data for the holotype of *C. gonzalezii* (Fig. 3). The leaf measurements for the holotype of *C. gonzalezii* fell within the range of measurements for *C. brandonianum*. In agreement with these results, the collection date for the holotype of *C. gonzalezii* as indicated on the holotype label is early November. Most *Cyrtopodium* species in central Brazil, flower at the end of the dry season and the beginning of the rainy season (September to November), while *C. brandonianum* flowers mainly during the peak of the rainy season (December and January). However, in common with most other species, the vegetative growth of *C. brandonianum* starts at the beginning of the rainy season, usually during October, so that in November, plants have already initiated vegetative growth but have incompletely developed leaves.

Of the remaining terrestrial species of *Cyrtopodium* with small, buried pseudobulbs, only two have long, linear, straight leaves like the holotype of *C. gonzalezii*. The first, *C. linearifolium*, occurs in dark, sandy-clay soil associated with *campo rupestre* vegetation found at higher altitudes, has nonarticulated leaves, and, in the Distrito Federal, is known only from the higher altitude meadows of the Chapada da Contagem. The second, *C. pallidum*, occurs at several sites throughout the Distrito Federal but typically grows in dark, sandy-clay soil found in wetter areas (close to gallery forests) usually associated with regularly spaced mounds of earth known as *murundus*, and does not occur on the dark red latosol of typical *cerrado* of the Lago Norte district. In summary, we conclude that the type specimen of *C. gonzalezii* is an individual of *C. brandonianum* with leaves that are not fully developed.

A critical analysis of the description of *C. gonzalezii* (Menezes, 1995) reveals a mixture of characteristics, with the vegetative parts corresponding to *C. brandonianum* and the reproductive parts to *C. brunneum*. Menezes (1995) intended to describe a new species, and, indeed, the pictures of flowers in the original description are from *C. brunneum*. However, according to the International Code of Botanical Nomenclature (Greuter et al., 2000), the nomenclatural type is that element to which the name of a taxon is permanently attached, whether as a correct name or as a synonym. The holotype of *C. gonzalezii* is *C. brandonianum*, thus *C. gonzalezii* is a synonym of *C. brandonianum*.

*Cyrtopodium brunneum* inhabits the

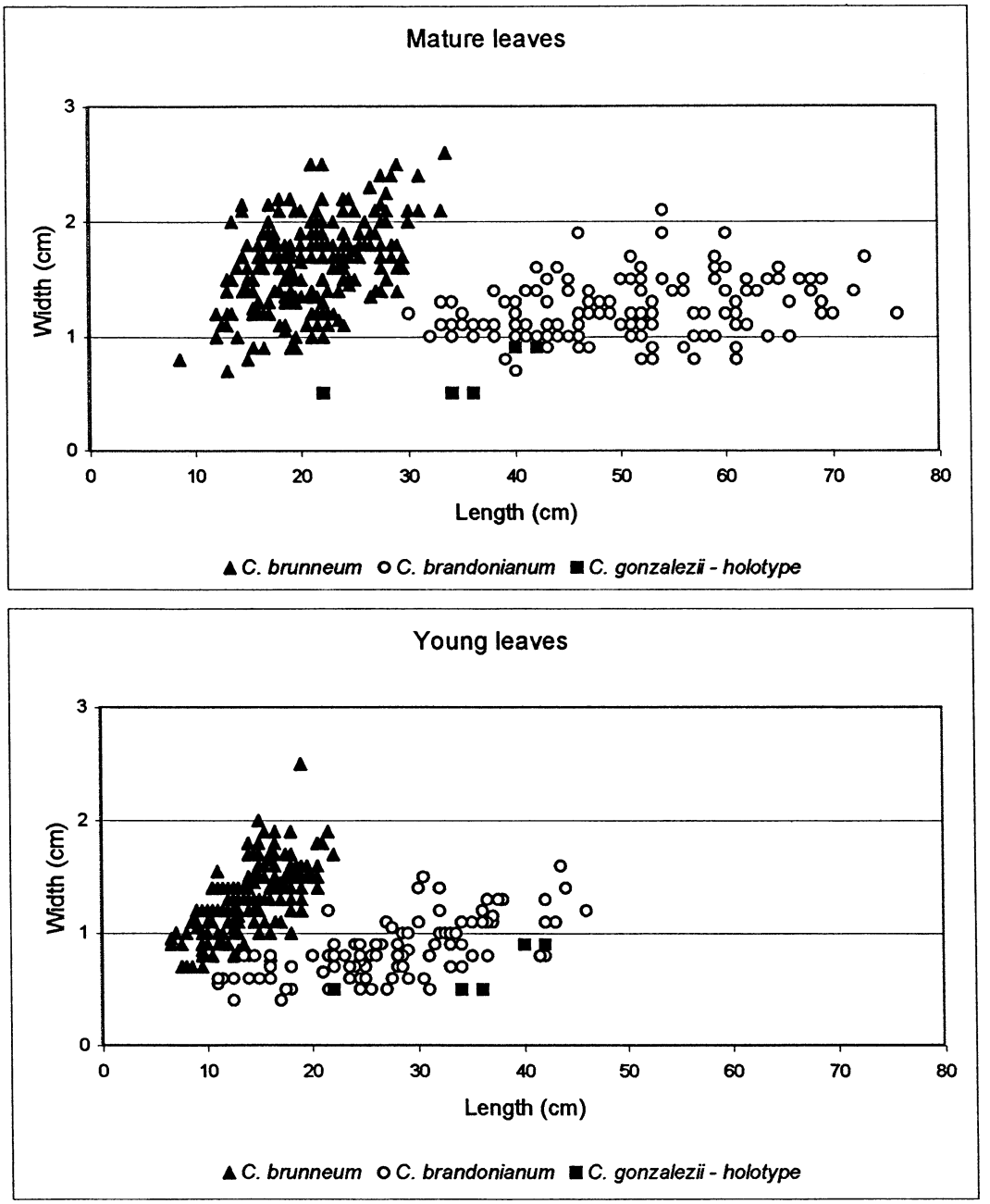


FIG. 3. Plot of leaf length vs. width for mature, fully developed leaves and young, incompletely developed leaves of *C. brunneum*, *C. brandonianum* and the holotype of *C. gonzalezii*. Measures of the holotype of *C. gonzalezii* are the same and repeated for both mature and young leaves.

*campo limpo* and *campo sujo* vegetation, on deep, reddish, clay soil (dark red latosol), exposed to full sun, being protected only by the surrounding herbaceous vegetation. This soil is moist for brief periods during the rainy season, but never retains water for long periods and dries completely during the dry season. *Cyrtopodium poecilum*

Rchb. f. & Warm., *C. brandonianum* Barb.Rodr., *C. triste* Rchb. f. & Warm., *C. blanchetii* Rchb. f., and *C. caiapoense* L. C. Menezes all occur in the same habitat and are frequently found with *C. brunneum*. Less often, *C. brunneum* is found on rocky, shallow, sandy clay soil, where it grows with *C. vernum* Rchb. f. & Warm and *C. cristatum* Lindl. *Cyrtopodium brunneum* also occurs in the typical *cerrado*, under partial shade. In all of these habitats, the pseudobulbs of *C. brunneum* are completely buried in the ground, sometimes with only the upper part exposed.

Flowering in *Cyrtopodium brunneum* extends from the end of the dry season to the beginning of the rainy season, from late August to November, but it flowers mainly during September and October. This flowering coincides with that of *C. poecilum*, *C. blanchetii*, *C. caiapoense*, *C. cristatum*, and *C. vernum*; *C. triste* usually flowers a little later (late October to early December), as does *C. brandonianum* (mainly from December to January). As with other terrestrial *Cyrtopodium*, flowering is enhanced by fire, and among the species with small, buried pseudobulbs *C. brunneum* is usually the first to flower after a fire. The inflorescence appears a few days after a fire and the plants are in full bloom 2–3 weeks later. Flowering of the species in unburned places is very rare or infrequent; we have never seen plants flowering at unburned sites. Cultivated plants can flower without fire, very infrequently, and only when exposed to hydric stress and full sun. The flowers have a slightly sweet scent. Removal of the pollinarium occurs somewhat frequently, indicating that deposition on the stigma may be a more limiting factor than lack of pollinator visits. Fruit set is low in nature.

The species most closely related to *Cyrtopodium brunneum* is *C. triste*. In their overall vegetative aspects, *C. brunneum* and *C. triste* are very similar and difficult to separate. The main vegetative differences between the two species are presented in Table I. In addition, the leaves of *C. brunneum* are slightly more slender, flexible, less coriaceous and rarely crack when bent; have the base laterally compressed; usually turn light green and yellow before drying, and tend to fall earlier than those of *C. triste*. In *Cyrtopodium triste* the leaves are slightly more rigid and coriaceous, and usually crack when bent; the base flatter than in *C. brunneum*; and change little in color and turn from green to brownish during senescence. However, many of these characteristics are discrete and depend upon the age and development of the plants. As a result, separating the two species based only on their vegetative parts is difficult.

Development of the leaves of *C. brunneum* is dependent upon habitat conditions. Plants growing under shade in typical *cerrado* on deep clay soil usually show maximum leaf development in length and width. Plants growing on rocky slopes, on sandy, shallow, poor soil, in almost full sun, are much smaller, and resemble *C. triste* in leaf length, but not in width (small specimens of *C. triste* have very narrow leaves). The development of the leaves at anthesis is incipient and they only become fully developed 1–2 months after flowering. As with most other *Cyrtopodium* species of central Brazil, growth of *C. brunneum* is during the rainy season and dormancy is during the dry season, when the leaves are lost. Plants very frequently appear in groups, with several specimens (from 3 to more than 15) growing close to each other. *Cyrtopodium brunneum* and *C. triste* are also very similar in terms of flower color. Both species have dark brownish sepals and petals and a yellowish red lip. However, *C. triste* frequently has a branched inflorescence with up to three lateral branches, larger flowers, and a lip with broadly obovate lateral lobes.

*Cyrtopodium brunneum* is also somewhat similar in overall aspect to *C. dusenii* Schltr. However, the leaves of *C. dusenii* are already well developed at anthesis, there is usually a branched inflorescence with (0–)1–2(–3) lateral branches, and the smaller flowers are completely yellow with brown spots. *Cyrtopodium brunneum* also has been confused with *C. parviflorum*, which has a similar flower color and falcate lateral lobes of the lip. However, *C. parviflorum* has larger and exposed pseudobulbs (7–20 cm long), nonarticulate leaves, a longer and frequently branched inflorescence (0.6–1.2 m long and with (0–)2–4 lateral

branches), usually larger flowers, and longer lateral lobes of the lip (8–10 mm long). *Cyrtopodium parviflorum* occurs in wet places and, when found in drier places, is usually from sandy soils in *campo rupestre* vegetation; it is never found in red clay latosol in typical *cerrado* vegetation. *Cyrtopodium brunneum* has a relatively constant flower color, especially when compared to other species such as *C. braemii* L. C. Menezes and *C. pallidum* Rchb. f. & Warm., which are highly variable in color. However, *C. brunneum* is extremely variable in terms of lip morphology (Fig. 1E: a–e), particularly the mid-lobe, and is probably one of the most variable species in the genus for this character.

*Cyrtopodium brunneum* is not an uncommon species, but the buried pseudobulbs and small size of the plants, which grow almost completely obscured by grasses, can make finding plants in the field a difficult task. Plants are most easily located when they are in flower in vegetation recently burned. The species is found in the states of Goiás, Mato Grosso, Minas Gerais, and the Distrito Federal, in the central-western, central and southeastern Brazilian cerrado. The species may also be expected to occur in the cerrado region of Tocantins and western Bahia.

CYRTOPODIUM BRANDONIANUM Barb.Rodr., Gen. Sp. Orchid. 1: 132. 1877. TYPE: BRAZIL. Minas Geraes, Capivary, *Barbosa Rodrigues s.n.* (No original material is known. Typified by Cribb & Toscano de Brito, 1996: 1: 30. Original illustration by Barbosa Rodrigues, reproduced in Sprunger, 1996: 1: 332).

*Cyrtopodium gonzalezii* L. C. Menezes, Bol. CAOB 6(1): 9. 1995. TYPE: BRAZIL. Distrito Federal, península do Lago Norte, 9 Nov 1994, *L. C. Menezes UB-54* (HOLOTYPE: UB).

**Cyrtopodium lamellaticallosum** J. A. N. Bat. & Bianchetti, sp. nov. (Figs. 4 & 5)

TYPE: BRAZIL. Minas Gerais, Município de Moeda, Serra da Moeda, nos morros a margem da estrada vicinal que liga a BR-040 a Moeda, ca. 1400 m, 24 Oct 2001, *J. A. N. Batista, L. B. Bianchetti, A. Salino, R. C. Mota & P. L. Viana 1262* (HOLOTYPE: CEN; ISOTYPES: AMES, K, RB, SP).

*Cyrtopodio cristato* Lindl. similis sed bracteis floralibus longioribus et deflexis, petalis et sepalis brunneo-purpureis, labelli lilacino-purpureo cum callo lamellato marginibus irregulariter dentatis praedito differt.

Terrestrial herb. *Roots* many, whitish, glabrous. *Pseudobulbs* exposed or occasionally partially buried, ovoid, acuminate, leafless from the second year onwards, externally greenish, 5–11 × 1.4–2.4 cm. *Leaves* at flowering 7–8, incompletely developed but already apparent, 11–23 × 0.6–1.4 cm, when fully developed 9–10, erect, coriaceous, linear-lanceolate, the lowermost 1–2 leaves sheath-like, the uppermost 8–9 leaves 16–35 × 1–1.8 cm, articulate 4.8–6.2 cm from the leaf base, the apex acuminate. *Inflorescence* lateral, erect, usually simple, occasionally with a lateral branch up to 13 cm long, lax, 19–35 cm, greenish to brownish green; peduncle 11–20 cm, the 1–2 sheath-like bracts loosely adpressed, 1.5–3 cm long, frequently also with 1–2 pair of opposite bracts with abortive flowers; rachis 9–18 cm long; floral bracts deflexed, parallel and partially covering the rachis, broad, ovate to ovate-lanceolate, occasionally opposite, 2–2.7 × 1.4–2 cm, brownish green, the apex acute, discreetly apiculate, the margins undulate; ovary with pedicel 1.9–4.7 cm long, brownish green. *Flowers* 10–15 per inflorescence, showy, discreetly sweet-scented. *Sepals* reflexed in fully opened flowers, broadly lanceolate to ovate or elliptical, 15–20 × 9–14 mm, dark brownish-purple, the apex discreetly apiculate, the margin slightly undulate; lateral sepals slightly oblique. *Petals* usually reflexed in fully opened flowers, slightly concave, broadly obovate-oblong, 14–16 × 11–14 mm, brownish purple, base lighter, the apex rounded, slightly apiculate, the base attenuate, the margins entire, smooth. *Lip* 3-lobed, 10–12 mm long, 13–16 mm wide between the apices of the side lobes when spread, the base unguiculate, ca. 2 mm long, yellow; lateral lobes erect, not parallel, turned ca. 45° forward, reniform, (4–)5.5 × 6–7(–8) mm, the base and center lilac, towards the borders pinkish, the base

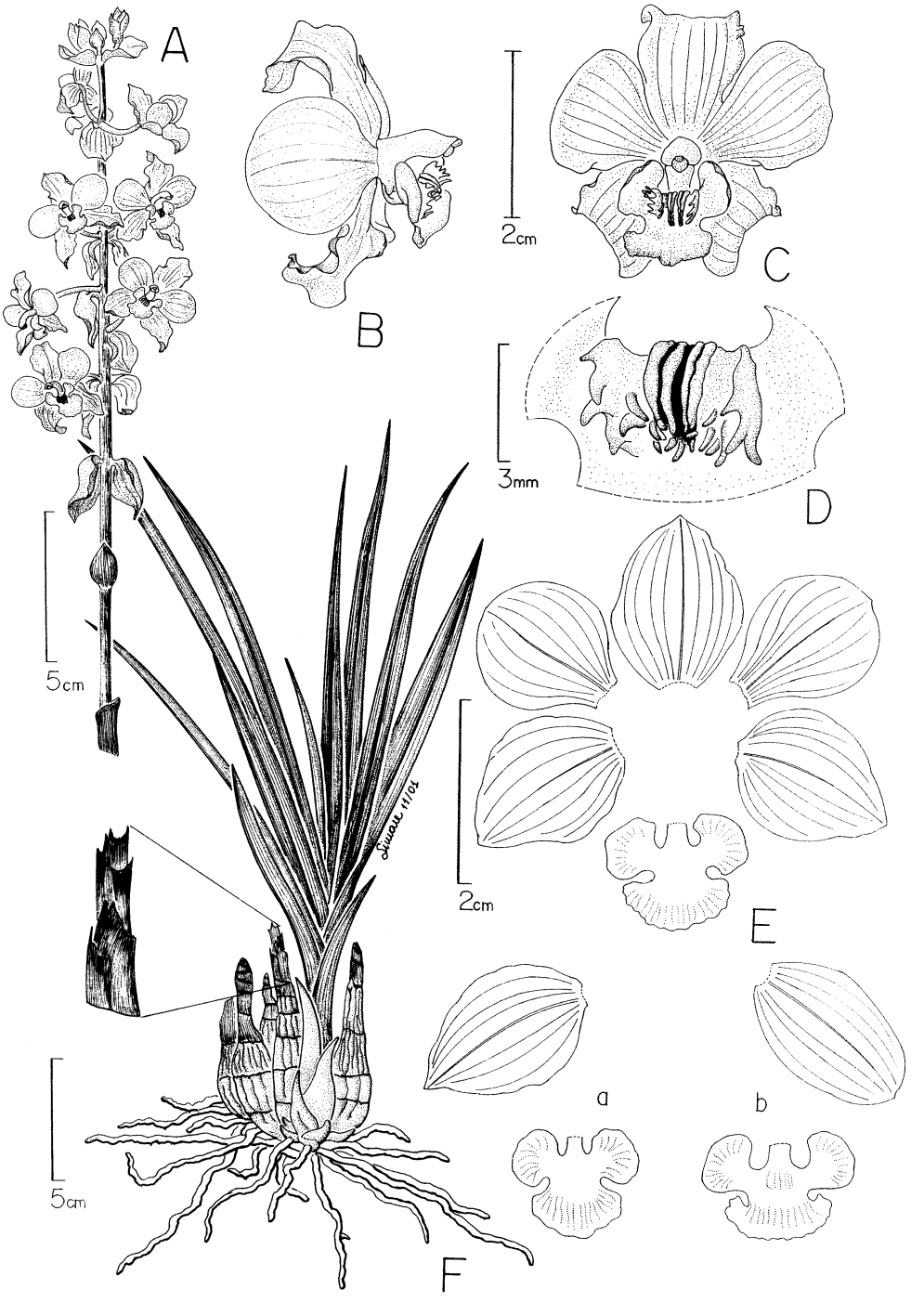


FIG. 4. *Cyrtopodium lamellaticallosum*. **A.** Inflorescence. **B.** Flower, side view. **C.** Flower, frontal view. **D.** Callus. **E.** Perianth. **a**–**b.** Variations in lateral sepals and lip morphology, from different individuals of the same population. **F.** Habit with almost fully developed leaves about 1–2 months after flowering. The apex of a one year old pseudobulb showing the remaining sheet of the leaves and the articulation pattern is enlarged. Drawn from *Batista et al. 1262* by Simone C. Souza e Silva.

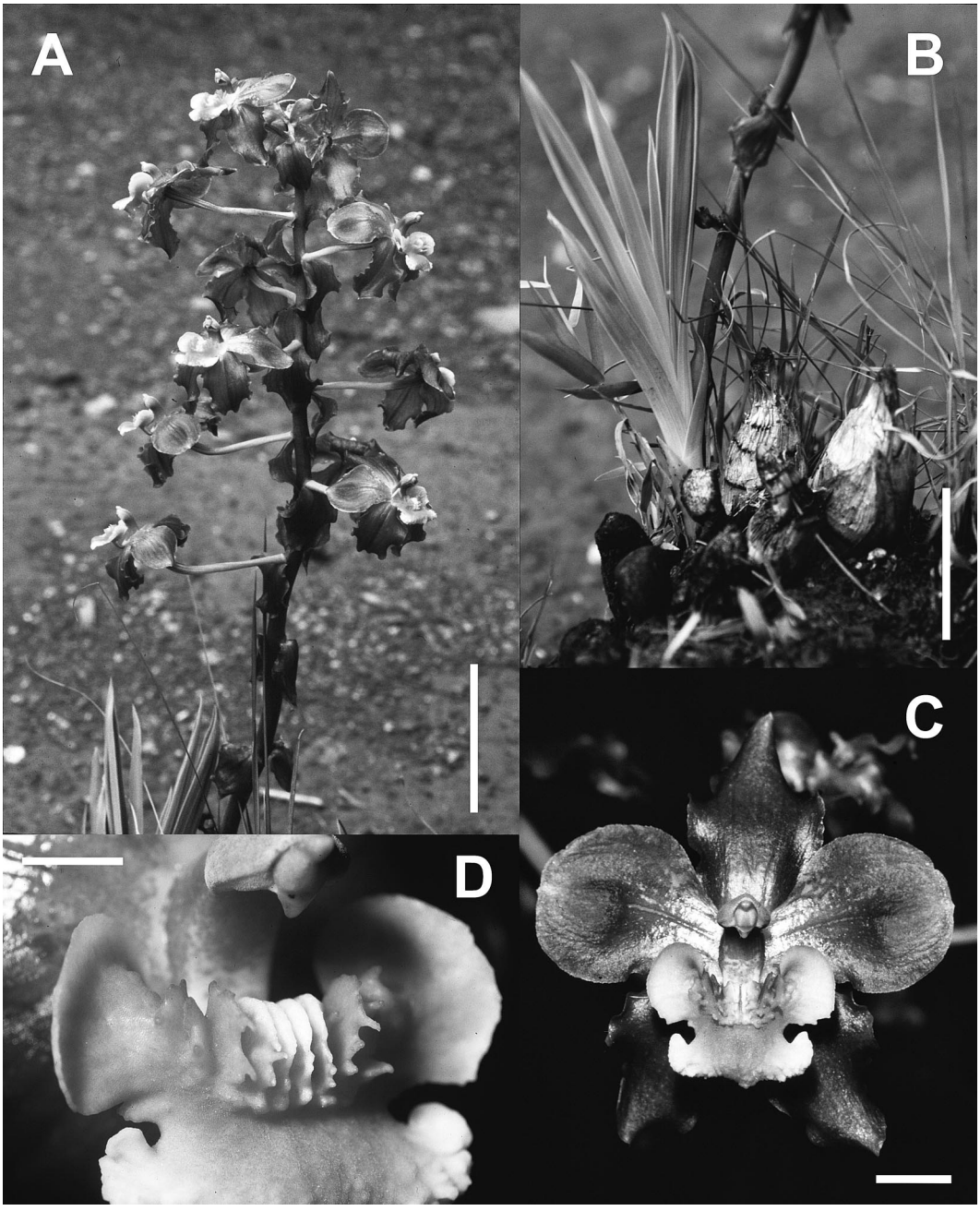


FIG. 5. *Cyrtopodium lamellaticallosum*. **A.** Inflorescence. Note the large, deflexed, floral bracts partially covering the rachis and the reflexed flower segments. **B.** Pseudobulbs and young, incompletely developed leaves at the time of flowering (October). **C.** Flower, front view. **D.** Callus, lateral view. Note the rounded lamellae with irregularly dentate margins. Scale bars = 5 cm (A, B), 5 mm (C), 3 mm (D).

constricted, the margins usually entire to occasionally slightly serrate; callus prominent, formed by (4–)6(–8) parallel lamellae, longitudinally extending from the base of the central lobe to the unguicule, the central 2(–4) lamellae rounded, thicker, yellow with the margins entire or slightly dentate, the outermost 2(–4) larger, slender, slightly spread, discreetly to profusely irregularly dentate, dark lilac; isthmus separating the lateral lobes from the central lobe discreet, ca. 1 mm long; central lobe, reniform to lunate and then with the lateral edges auriculate, 4–5 × 9–11 mm, the base and central part dark lilac, apex slightly orange, lateral edges yellowish, the lilac becoming faint orange with aging, the apex rounded or very discreetly retuse when flattened, the margin reflexed, slightly verrucose to completely smooth. *Column* erect, slightly arcuate, trigonous, 9–10 mm long, base yellowish white, middle lilac, towards the apex purple greenish; column foot 2–3(–4) mm long, at the very end immediately before the unguicule with a conspicuous dark brown stripe. *Anther* 3 × 2.5 mm, yellowish, apex green; pollinia 2, waxy, sulcate, ca. 1.3–1.5 × 0.8–1 mm, yellow, attached to a triangular stipe. *Fruit* not known.

*Etymology*.—The epithet refers to the lamellate callus with irregular dentate margins, a very distinctive and unique characteristic in the genus.

Additional specimens examined. BRAZIL. **Minas Gerais**: Ouro Preto, Três Moinhos, 10 Oct 1977 (fl), *Badini s.n.* (OUPR); Mun. Moeda, Serra da Moeda, Nov 1988 (fl), *Martens s.n.* (BHCB), near the rd. connecting Moeda to BR-040, 18 Oct 1997 (fl), *Salino 3610b* (BHCB) (p.p., with *C. poecilum* var. *roseum*).

*Cyrtopodium lamellaticallosum* was found in the *campo rupestre*, on dark, sandy-clay soil. This soil can retain water for a few days or weeks during the rainy season, November to March, but dries out completely during the dry season, May to September. Like most other *Cyrtopodium* species of central and southeastern Brazil, *C. lamellaticallosum* flowers during October and November, the beginning of the rainy season. Similar to most other *Cyrtopodium* species, a new vegetative shoot is formed at the time of flowering, but leaves only become fully developed about two months later. Nonflowering specimens usually have larger leaves which reach full development earlier. Plants grow during the rainy season and are dormant during the dry season, when they loose their leaves. *Cyrtopodium lamellaticallosum* is sympatric with *C. poecilum* Rchb. f. & Warm., *C. eugenii* Rchb. f., and *C. pallidum* Rchb. f. & Warm. Flowering of *C. lamellaticallosum* and *C. poecilum* is concurrent, while *C. eugenii* flowers earlier, from June to September, and *C. pallidum* flowers later, from late November to early January.

Flower color is variable and changes with age. The lilac color turns to faint orange and the lip ends up with a yellowish orange color in older flowers. Some color variants with a completely lilac lip have also been observed. As in most other species in the genus, the column foot has a conspicuous dark spot at the base near the claw. The function of this spot is unknown; it might facilitate pollination.

*Cyrtopodium lamellaticallosum* is a very distinct species; it is not clear which species is most closely related to it. In overall aspect, with the small, exposed pseudobulbs and the usually simple inflorescence, *C. lamellaticallosum* (particularly dried specimens), somewhat resembles *C. cristatum* Lindl. However, *C. lamellaticallosum* can easily be distinguished by the usually slightly larger flowers, the larger and deflexed floral bracts, the brownish purple sepals and petals, and the lamellate callus with irregularly dentate margins. Lamellate calli are uncommon in the genus and only *C. blanchetii* Rchb. f. and *C. hatschbachii* Pabst, share this characteristic. In *C. blanchetii*, the overall aspect of the callus, particularly of the central lamella, is similar to that of *C. lamellaticallosum*; in *C. blanchetii* there are always four lamellae, but are frequently less prominent, more elongated, and less rounded, and have margins that are entire or slightly irregular. In *C. hatschbachii*, there are just two lamellae, which are larger, farther apart, and rounded, with smooth, sometimes slightly undulate margins. Beyond these differences in the callus, *Cyrtopodium blanchetti* is usually from typical cerrado and has completely buried pseudobulbs; petals and sepals spotted

brown over a greenish background; lateral lobes of the lip spathulate, brownish; and the midlobe obovate-subrhombiform, yellow. *Cyrtopodium hatschbachii* is from permanently wet areas; has larger pseudobulbs, 8–21 × 2.5–5 cm; the sepals and petals completely pink; and the lateral lobes of the lip elliptical and subfalcate.

*Cyrtopodium lamellaticallosum* is a rare species. It is known from just two localities at the southernmost Serra do Espinhaço in central Minas Gerais state. This species might be expected to occur at other sites or on other mountains in the Espinhaço range.

**Cyrtopodium poecilum** Rchb. f. & Warm. var. **roseum** J. A. N. Bat. & Bianchetti, var. nov.

TYPE. BRAZIL. Minas Gerais, Município de Moeda, Serra da Moeda, nos morros a margem da estrada vicinal que liga a BR-040 a Moeda, ca. 1400 m, 24 Oct 2001, *J. A. N. Batista, L. B. Bianchetti, A. Salino, R. C. Mota & P. L. Viana 1261* (HOLOTYPE: CEN; ISOTYPE: BHCB).

A varietate typica floribus fragrantibus et labelli lobis lateralibus roseis et marginibus lobi centralis roseis differe.

*Etymology*.—The epithet refers to the pink margins of the central lobe and pink lateral lobes of the lip.

Additional specimen examined. BRAZIL. **Minas Gerais**: Mun. of Moeda, Serra da Moeda, near the rd. connecting Moeda to BR-040, 18 Oct 1997 (fl), *Salino 3610b* (BHCB) (p.p., with *C. lamellaticallosum*).

*Cyrtopodium poecilum* var. *roseum* is morphologically identical to *C. poecilum* var. *poecilum* in vegetative and most floral characters. Both have mature pseudobulbs that are small, externally reddish purple, and completely buried; large and broad leaves; a simple to 3-branched inflorescence; and sepals and petals profusely spotted brownish purple over a greenish background. The principal difference is the color of the lateral lobes and margins of the central lobe of the labellum, which are pink in the new variety and brownish, reddish brown or reddish purple in *C. poecilum* var. *poecilum*. All specimens of *C. poecilum* var. *poecilum* that we have examined in the Distrito Federal have a discreet but unpleasant smell somewhat resembling rancid butter, *C. poecilum* var. *roseum* has a slightly sweet scent. This difference in flower scent may attract different pollinators. The pollinators and pollination mechanisms of *C. poecilum* are unknown.

The holotype of *C. poecilum* var. *poecilum* is from Lagoa Santa, central Minas Gerais, which is closer to the Serra da Moeda than to the Distrito Federal, where we have collected more intensively and where we have found most of the material we have examined *in situ*. However, examination of the original description (Reichenbach, 1881) and original illustration (Warming, 1884) of *C. poecilum* var. *poecilum* revealed that the color pattern of the type material matches the specimens from the Distrito Federal. The specimens from the Serra da Moeda with a distinct color pattern are considered here as a color variant. In the Distrito Federal, *C. poecilum* occurs preferentially on deep red clay latosol in typical cerrado or *campo sujo* and *campo limpo* vegetation. In the Serra da Moeda, the variety was found growing on dark, sandy clay soil in *campo rupestre* vegetation, where it grew close to *C. lamellaticallosum* and *C. pallidum*. Both varieties of *C. poecilum* flower mainly in October and flowering is enhanced by fire. A visit to the Serra da Moeda in one year revealed no specimens in flower, whereas in the next year, after the area had burned, a great number of flowering specimens were observed.

In general, color variants are better treated as forms rather than as varieties. However, for *C. poecilum* var. *roseum*, the color variation seems to be clearly fixed in the population, as most of the individuals had this character. Within this color variant, some differences in shade have been observed, e.g., a more or less intense shade of pink, particularly in relation to the margins of the central lobe, or a fading of the pink in older flowers, rendering the lip somewhat dull and discolored.

## Acknowledgments

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## Literature Cited

**Batista, J. A. N. & L. B. Bianchetti.** 2001. *Cyrtopodium linearifolium* (Orchidaceae): a new species from central Brazil. Lindleyana 16: 226–230.

**Bianchetti, L. B. & J. A. N. Batista.** 2000. *Cyrtopodium latifolium* (Orchidaceae): a new species from central Brazil. Lindleyana 15: 222–226.

**Cribb, P. & A. Toscano de Brito.** 1996. Introduction and history. Pages 23–32. *In:* S. Sprunger, editors. Iconographie des orchidées du Brésil/João Barbosa Rodriguez. Vol 1. Illustrations. Friedrich Reinhardt Verlag, Basle, Switzerland

**Greuter, W., J. McNeill, F. R. Barrie, H. M. Burdet, V. Demoulin, T. S. Filgueiras, D. H. Nicolson, P. C. Silva, J. E. Skog, P. Trehane, N. J. Turland & D. L. Hawksworth,** editors. 2000. International Code of Botanical Nomenclature (Saint Louis Code). Regnum Vegetabile. 138. Koeltz Scientific Books, Königstein.

**Menezes, L. C.** 1995. Novas orquídeas brasileiras (New Brazilian orchids). Bol. CAOB 6: 8–13.

**———.** 2000. Genus *Cyrtopodium*: espécies brasileiras. Ed. IBAMA, Brasília.

**Reichenbach, H. G.** 1881. VII—Novitiae Orchidaceae Warmingianae. *Cyrtopodium*. Otia Botanica Hamburgensia 2(1): 58–60.

**Sprunger, S.,** editor. 1996. Iconographie des orchidées du Brésil/João Barbosa Rodriguez. Vol 1. Illustrations. Friedrich Reinhardt Verlag, Basle, Switzerland.

**Warming, E.** 1884. Symbolae ad floram Brasiliae centralis cognoscendam, Part 30. Orchideae 2. Videnskabelige Meddelelser fra den naturhistoriske Forening i kjöbenhavn 5–8: 86–99.