

Taxonomic notes on the genus *Chrysolaena* (Vernonieae, Asteraceae), including a new species endemic to Paraguay

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The genus *Chrysolaena* H. Rob. (Vernonieae, Asteraceae) is redefined to include two taxa previously placed in *Lessingianthus* subgen. *Oligocephalus* H. Rob. Additionally, a new species of the genus endemic to eastern Paraguay is described and illustrated. The new species differs from its morphologically closest species, *C. simplex* (Less.) Dematteis, in its inflorescence of a single head, 3–4-seriate involucre, pilose corolla lobes and discoloured leaves, with silvery-greyish hairs on the abaxial surface.

Key words: Asteraceae, *Chrysolaena*, *Lessingianthus*, nomenclature, taxonomy, Vernonieae

Introduction

The Vernonieae (Asteraceae) are a pantropical tribe with 89 genera and about 1700 species in America, Asia and Africa. The New World genera are grouped in ten subtribes, which are distinguished by the pollen type, number of florets, receptacle surface, chemical composition and chromosome number (Robinson 1999). The subtribe Vernoniinae constitutes the largest group of the tribe, with 25 genera and more than 450 species especially distributed in South America. It contains the species previously included in the large sect. *Lepidaploa* of the genus *Vernonia*, which has recently been transferred to different genera (Bremer 1994).

The genus *Chrysolaena* comprises nine species mostly concentrated in southern Brazil and

the northeast of Argentina. Among the Vernoniinae genera, *Chrysolaena* is characterized by its sericeous to velutinous pubescence, achenes with glands, styles without a basal node and glanduliferous anther appendages (Robinson 1988a). The genus is particular also in the surface morphology of the pollen grains, which are tricolporate, echinolophate, with lacunae disposed in a regular pattern, having a polar lacuna at each pole. Such pollen form has been designated *Vernonia cognata* type by Stix (1960), but is more commonly known as type “C” (Keeley & Jones 1979). Type “C” pollen occurs in some species of other Vernoniinae genera, such as *Lepidaploa* and *Eirmocephala*. However, in the New World such pollen form is distinctive of all the species of *Chrysolaena* and *Stenocephalum* (Robinson 1999).

Additionally *Chrysolaena* can be distinguished by the chromosome number, since it is the single American genus with base number $x = 10$ (Dematteis 2002). The remaining New World members of Vernonieae often have basic chromosome numbers that range between $x = 13$ and $x = 17$ (Dematteis & Robinson 1997).

The genus *Chrysolaena* was initially established to segregate almost all the species previously placed into *Vernonia* subsect. *Flexuosae*. This group was revised by Jones (1981) under the name of series *Flexuosae*, including a total of eight species on the base of its xylopodial habit, yellowish pubescence and type C pollen. Six of these species along with an additional entity were later segregated to the new genus *Chrysolaena* (Robinson 1988a). However, two taxa belonging to the *Flexuosae* group were excluded from *Chrysolaena* and subsequently placed in *Lessingianthus* subgen. *Oligocephalus*, on the basis of its pedunculate heads and lack of glands on the anther appendages (Robinson 1988b). Both taxa closely resemble *Chrysolaena* species and show certain characters present in this genus, such as type C pollen, velutinous pubescence and glandular achenes. One of these entities, *Lessingianthus simplex* has been examined cytologically, showing the base number $x = 10$ (Ruas *et al.* 1991). The features indicate that it should be transferred to *Chrysolaena*, as was anticipated by Robinson (1999).

In the present paper, two taxa previously placed into *Lessingianthus* subgen. *Oligocephalus* are included in *Chrysolaena*. In addition, a new species from Paraguay is described and illustrated.

Material and methods

The examined specimens are deposited at BM, BR, CTES, G, G-DC, K, LP, M, P, S, SI and SP. Pollen samples were obtained by removing one or two florets from herbarium specimens of the species. The pollen grains were acetolyced according to the procedure suggested by Erdtman (1966). For light microscopy (LM) the pollen samples were mounted in glycerine-jelly on glass slides and then examined with a Zeiss Axioplan microscope. Permanent slides were deposited at

the Palynological Laboratory of the Universidad Nacional del Nordeste (PAL-CTES).

For scanning electron microscopy (SEM), acetolyced pollen grains were firstly washed in 96% alcohol and absolute alcohol, next sputtered with gold-palladium and then observed in a JEOL 5800 LV scanning electron microscope. The terminology applied for pollen grain description in general follows Keeley and Jones (1979) and Punt *et al.* (1994). To examine the hairs, leaves were prepared in a critical point dryer, mounted on aluminium stubs and then coated with gold-palladium.

Taxonomic treatment

Chrysolaena H. Rob.

Proc. Biol. Soc. Wash. 101(4): 956. 1988. — TYPE: *Vernonia flexuosa* Sims.

Vernonia sect. *Lepidaploa* subsect. *Oligocephalae* Baker in Mart., Fl. Bras. 6(2): 46. 1873, *pro parte*.

Vernonia sect. *Lepidaploa* subsect. *Flexuosae* Cabrera, Darwiniana 6: 329. 1944. — *Vernonia* sect. *Vernonia* subsect. *Scorpioides* series *Flexuosae* (Cabrera) S.B. Jones, Rhodora 81: 442. 1979. — LECTOTYPE (designated by Jones 1979): *Vernonia cognata* Less.

Vernonia sect. *Vernonia* subsect. *Nudiflorae* series *Verbascifoliae* S.B. Jones, Rhodora 81: 438. 1979, *pro parte*. — TYPE: *Vernonia verbascifolia* Less.

Lessingianthus H. Rob. subgen. *Oligocephalus* H. Rob., Proc. Biol. Soc. Wash. 101(4): 949–950. 1988, *syn. nov.* — TYPE: *Vernonia simplex* Less.

Perennial herbs, 20–180 cm tall, with xylopodia. Stems erect, usually unbranched to inflorescence, sericeous, hirsute or velutinous, trichomes yellowish to golden-brown. Leaves alternate, sessile, greatly reduced upward, sparsely to densely pubescent, pinnatinervate. Capitula sessile to shortly pedunculate, solitary to glomerate, arranged in cymose to paniculate inflorescences. Bracts of inflorescence reduced to absent. Involucre campanulate to hemispherical. Phyllaries in 2–5 series, loosely imbricate, lanceolate to linear, acute at the apex. Florets 10–65, pink to purple. Corollas lobes lanceolate, glandular or pilose, rarely glabrous. Anther appendages usually with glands. Styles lacking of basal node. Cypselas 5-ribbed, glandular, densely sericeous. Pollen grains 40–50 μm in diameter, tricolpo-

rate, echinolophate, colpi relatively long, joined among them by polar areoles (type C). Basic chromosome number $x = 10$.

The genus *Chrysolaena* presents some characters that relate it to *Lessingianthus* and others that relate it to *Lepidaploa* (Table 1). *Chrysolaena* and some species of *Lepidaploa* commonly have glands among the hairs of the cypselas, while *Lessingianthus* usually lacks glands. In *Lepidaploa* the style often has a large sclerified disc at the base, which has been designated basal stylar node (Robinson 1990). Instead, the styles of *Lessingianthus* and *Chrysolaena* lack a disc or show a small area of thick-walled cells. *Chrysolaena* commonly has reduced bracts at the inflorescences (occasionally the bracts are absent) whereas *Lepidaploa* and *Lessingianthus* have well-developed leafy bracts at each node of the inflorescence. The shape of the raphids in the achene wall is elongate in *Chrysolaena* and *Lepidaploa*, while in *Lessingianthus* it is almost always quadrate to subquadrate.

Although the genus was defined on the basis of its apical anther appendages with glands, some species, like *C. herbacea*, usually lack glands. Also, as pointed out by Robinson (1990), several *Lepidaploa* species have glands on the appendages and some of them have type C pollen.

The Vernoniaceae pollen is very variable in surface morphology and apertures, due to which it has been considered one of the most useful characters for taxonomic studies in the tribe (Skvarla *et al.* 2005). According to the pollen type, *Chrysolaena* seems to be more closely related to the genus *Lepidaploa*, because some taxa of this genus also have type C pollen. All the species of *Lessingianthus* (excluding subgen. *Oligocephalus*) have type B pollen. This form

is tricolporate and echinolophate like C type pollen, but lacks polar areoles and shows a different pattern of lacunae (Keeley & Jones 1979, Dematteis 2003).

The chromosome number probably constitutes one of the most striking features to separate *Chrysolaena* from the other two genera, since no other South American member of Vernoniaceae has the base number $x = 10$ (Galiano & Hunziker 1987). The closely related *Lepidaploa* has $x = 14$, $x = 15$ or $x = 16$, whereas *Lessingianthus* invariably has $x = 16$ (Dematteis 2002). The only two South American genera of the tribe with a base number lower than $x = 13$ are *Acilepidopsis* and *Mesanthophora*, which are polyploids with the base number $x = 9$ (Dematteis & Robinson 1997, Dematteis & Salgado 2001). These two groups are not closely related to *Chrysolaena* and have triporate, psilolophate, pollen grains.

Chrysolaena is mostly distributed in southern South America, with the major center of distribution in southern Brazil and northeastern Argentina. From this area, the species are distributed toward the south to La Plata river and upward into the Amazon region and west to eastern Peru. The greatest concentration of species is in the Brazilian states of Parana and Santa Catarina, where eleven taxa that mostly grow in campo and cerrado habitats occur. Almost all of the *Chrysolaena* species have a relatively broad geographic distribution. However, there are also some endemic species, such as *C. nicolackii* and *C. hastchbachii*, which are only restricted to northern Parana in Brazil.

The twelve recognized species of the genus can be separated using the following key, which is partially based on previous taxonomic treatments (Cabrera 1944, Jones 1981, Robinson 1992).

Table 1. Comparison of critical features among *Chrysolaena*, *Lessingianthus* and *Lepidaploa*.

Character	<i>Chrysolaena</i>	<i>Lessingianthus</i>	<i>Lepidaploa</i>
Inflorescence bracts	reduced to absent	foliaceous	foliaceous
Heads	sessile to pedunculate	mostly sessile	sessile
Basal style node	absent	absent	usually well developed
Anther appendages	glandular	non-glandular	rarely glandular
Raphid shape	elongate	quadrate	elongate
Cypselas	glandular	non-glandular	rarely glandular
Pollen type	C	B	C, D or G
Basic chromosome number	10	16	14, 15, 16

Key to the species of *Chrysolaena*

1. Inflorescence of a single head 2
1. Inflorescence of few to several heads, cymose, umbellate or paniculate 3
2. Corollas glabrous or glandular; phyllaries 2-seriate
..... *C. desertorum* (Mart. ex DC.) Dematteis
2. Corollas often with hairs at the tip of the lobes; phyllaries 3–4-seriate *C. guaranitica* Dematteis
3. Largest leaves near base of stem, frequently with smaller leaves above 4
3. Largest leaves above base of stem, having smaller leaves below 6
4. Heads pedunculate; inflorescence umbellate to subumbellate *C. oligophylla* (Vell.) H. Rob.
4. Heads sessile; inflorescence with cymose branches 5
5. Involucre cylindrical to narrowly campanulate; florets 14–20 *C. propinqua* (Hieron.) H. Rob.
5. Involucre hemispherical to widely campanulate; florets 40–50 *C. flexuosa* (Sims) H. Rob.
6. Phyllaries often recurvate; leaves densely imbricate to subimbricate 7
6. Phyllaries appressed; leaves laxly alternate 8
7. Leaf surfaces discolorous; florets 15–25
..... *C. hatschbachii* H. Rob.
7. Leaf surfaces concolorous; florets 25–28
..... *C. nicolackii* H. Rob.
8. Heads short to largely pedunculate; corolla lobes with numerous hairs at apex *C. simplex* (Less.) Dematteis
8. Heads sessile; corolla lobes glabrous or glandular, rarely with 1–2 hairs at tip 9
9. Leaves densely velutinous-tomentose, with yellowish or brownish hairs 10
9. Leaves sparse to densely strigose, with whitish or pale-yellowish hairs 11
10. Involucre 8–10 mm high *C. herbacea* (Vell.) H. Rob.
10. Involucre 14–16 mm high
..... *C. verbascifolia* (Less.) H. Rob.
11. Leaf blades linear to linear-lanceolate; involucre 4–6 mm high *C. lithospermifolia* (Hieron.) H. Rob.
11. Leaf blades elliptic to oblong-lanceolate; involucre 6–9 mm high *C. platensis* (Spreng.) H. Rob.

***Chrysolaena guaranitica* Dematteis, sp. nova** (Figs. 1–3)

Vernonia desertorum var. *macrocephala* Chodat, Bull. Herb. Boissier, ser. 2, 2: 300. 1902. [non *Vernonia macrocephala* Less.] — TYPE: Paraguay. Canindeyú: In campo pr. fl. Carymbatay, Sep. 1902, *E. Hassler 4555* (holotype G).

Haec species C. simplici similis sed inflorescentia monocephala et folia discolora differt. Herba erecta 20–40 cm alta, caulibus simplicibus striatis inferne sparse foliatis. Folia discolora 3–6 cm longa 0.3–0.7 cm lata, linear-lanceolata

vel lanceolata, supra villosa, inferne sericea, ad venis majoribus leniter villosa. Capitula solitaria hemisphaerica vel late campanulata ad apicem ramorum disposita. Corolla 15–17 mm longa, lobis lanceolatis, 5–6 mm longis, paulo villosis. Grana pollinis subsphaerica, echinolphata, 30–35 µm in diametro, tricolporata, semitectata, regulariter areolata et spinulosa (typus C).

TYPE: Paraguay. Caaguazú: Ruta 2, 2 km al E de Caaguazú, 8.II.1966 *A. Krapovickas, C. L. Cristóbal & R. A. Palacios 12524* (holotype CTES).

Perennial herbs, 20–40 cm height, with xylopodia 2–3 cm in diameter. Stems 1–2, erect, unbranched, striate, sericeous, sparsely villous, leafy only at lower portion. Internodes 0.5–2 cm long. Leaves alternate, discolorous, membranaceous, subsessile, ascending, largest ones above base. Leaf blades linear-lanceolate to lanceolate, 3–6 cm long, 0.3–0.7 cm wide, entire, revolute at margin, apically acute, cuneate at base, villous above, densely white-sericeous beneath, villous on major veins. Capitula solitary, disposed at top of stems. Involucre hemispheric to widely campanulate, 12–15 mm high. Phyllaries 3–4-seriate, appressed, linear-lanceolate to lanceolate, acuminate at apex, villous, inner phyllaries with middle vein yellowish, conspicuous, outer ones gradually shorter. Florets 15–25, violet. Corollas 15–17 mm long, lobes lanceolate, 5–6 mm long, pilose at apex. Anthers basally calcarate, thecae 3.3–3.8 mm long, anther appendages ovate, often with some glands. Style 15–18 mm long, branches linear, 2.5–3 mm long. Cypselas densely villous, glandular, 2.5–3 mm long. Pappus yellowish to brownish, setiform, inner bristles 9–11 mm long, outer ones 1.5–2 mm long. Pollen grains sub-spherical, echinolphate, 30–35 µm diameter, tricolporate, exine semi-tectate, regularly areolate, spiculate (type C).

ETYMOLOGY. The specific epithet refers to the region where the species occurs, which has been traditionally inhabited by indigenous guarani.

PHENOLOGY. Most of the flowering specimens were collected in February, but one also in September. It is unknown if the flowering period ranges from September to February or some of these months represent a sporadic blooming.

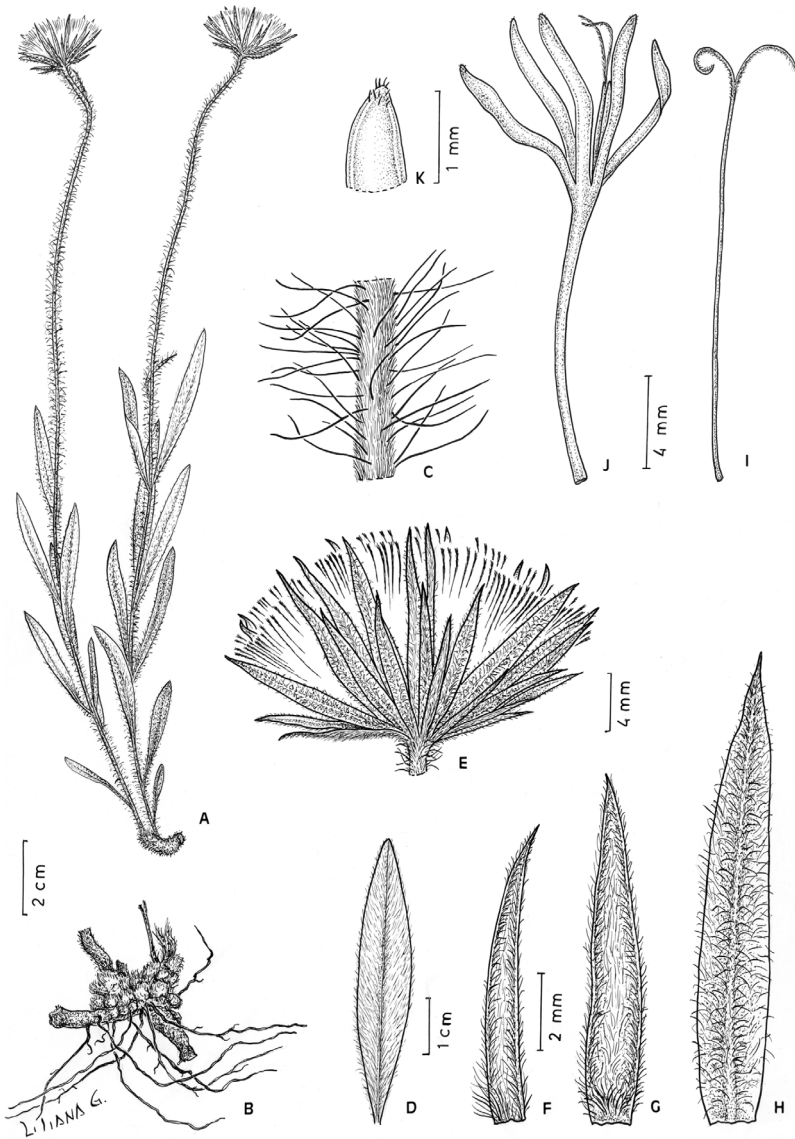


Fig. 1. *Chrysoleaena guaranitica* (A, C, E, F, G, H from holotype; B, D, I, J, K from Jörgensen 4812, S). — A: Habit. — B: Xylopodia. — C: Detail of stem hairs. — D: Leaf. — E: Capitula. — F–H: Outer, middle and inner phyllaries respectively. — I: Style. — J: Corolla showing tips of stamens and style. — K: Tip of corolla lobe.

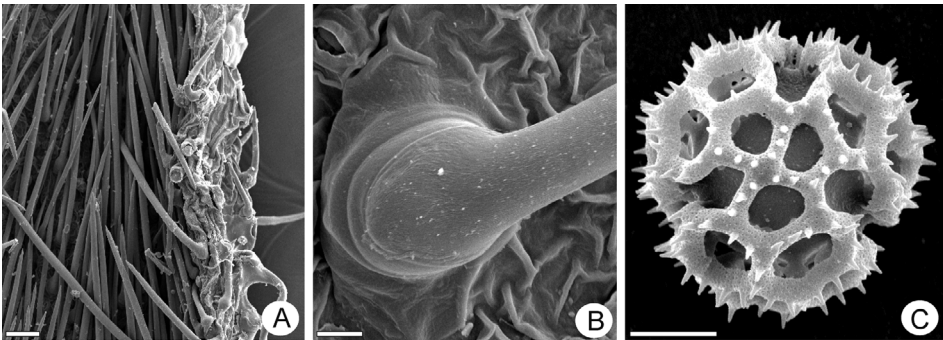
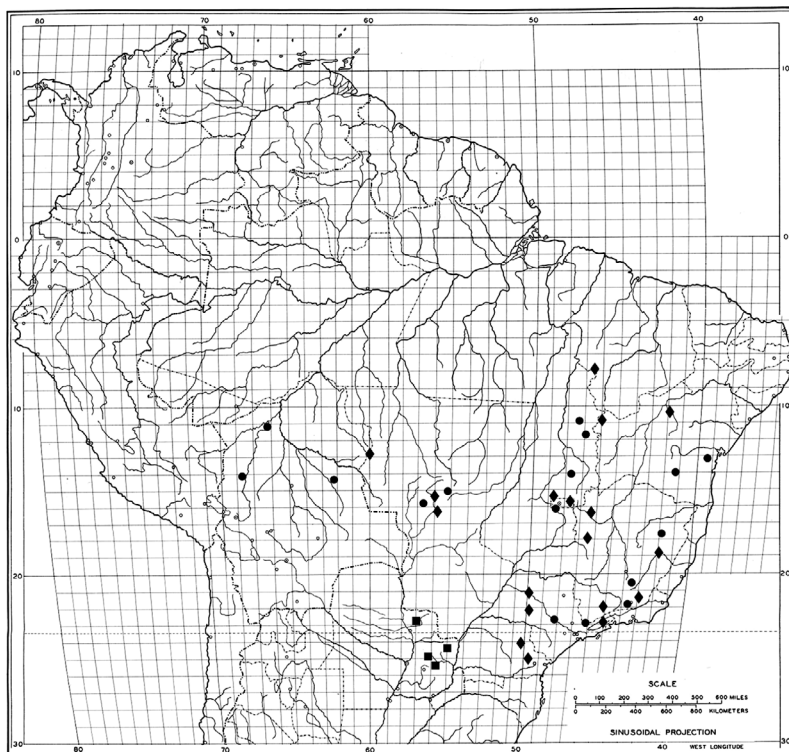


Fig. 2. Scanning electron photomicrographs of *Chrysoleaena guaranitica* (from holotype). — A: Abaxial surface of leaves showing pubescence, scale = 100 µm. — B: Base of hairs, scale = 10 µm. — C: Pollen grain, polar view, scale = 10 µm.

Fig. 3. Geographic distribution of *Chrysolaena guaranitica* (■), *C. desertorum* (◆) and *C. simplex* (●).



DISTRIBUTION AND HABITAT. It grows on campo and grassy savannas with dry, rocky soils. The species is endemic to eastern Paraguay (departments Caaguazú, Concepción and Canindeyú). This constitutes an area of low hills placed between the Parana and Paraguay rivers and characterized by limestone outcrops (Fig. 3). Other Vernonieae have previously been described from this region and some of them are endemic to that area (Chodat 1902, Cabrera & Dematteis 1999).

ADDITIONAL SPECIMENS EXAMINED (paratypes): **Paraguay.** Caaguazú: Prope Caaguazú, in campis, II.1905 *E. Hassler* 9022 (BM, G, K). Concepción: Estancia Primavera, Feb., *P. Jörgensen* 4812 (LP, S, SI, US).

Until now specimens representing this species have been included in the widespread *C. desertorum* (Jones 1981). However, *C. guaranitica* has a combination of features that distinguish it from the other eleven taxa of the genus (Table 2). The most evident ones are the single-headed inflorescences, the 3–4-seriate involucre, the pilose corolla lobes, the discoloured surfaces of the leaves and the sericeous abaxial surface of the leaf blades, having appressed silvery-greyish

hairs (Figs. 1 and 2). *Chrysolaena desertorum* has glabrous to glandular corolla lobe tips, 2-seriate involucre, concolorous surfaces of the leaves and leaf blades with the abaxial surface densely villous, having erect, pale-yellowish hairs.

Chrysolaena guaranitica most closely resembles *C. simplex*, especially in head size, number of phyllaries and leaf shape. Nevertheless, *C. simplex* differs by having numerous heads arranged in cymose inflorescences and the abaxial surface of the leaves densely villous, with erect, yellowish hairs (Table 2). In addition, *C. guaranitica* occurs in open campo and grasslands of northeastern Paraguay, whereas *C. simplex* is found in the cerrado of the central planalto of Brazil (Fig. 3).

Chrysolaena guaranitica is evidently the same as *Vernonia desertorum* var. *macrocephala*. However, since varietal names have priority only at that taxonomic rank (Greuter *et al.* 2000), it is possible to elevate it to the specific level or describe the entity as a new species based on a different type. I chose the second option and base the new species on more complete material, instead of proposing a new combination based on the incomplete type collection of the variety.

***Chrysolaena desertorum* (Mart. ex DC.)
Dematteis, *comb. nova***

Vernonia desertorum Mart. ex DC., Prodr. 5: 43. 1836. — *Cacalia desertorum* (Mart. ex DC.) Kuntze, Rev. Gen. Pl. 2: 970. 1891. — *Lessingianthus desertorum* (Less.) H. Rob., Proc. Biol. Soc. Wash. 101(4): 950. 1988. — TYPE: Brazil. Minas Gerais: in deserto trans fluemem St. Francisci, *C. Martius s.n.* (holotype M!; isotypes G-DC!, P!).

Vernonia desertorum var. *longipes* Baker in Mart., Fl. Bras. 6(2): 48. 1873. — LECTOTYPE (designated by Jones 1981): Brazil. Goiás: dry upland campos Mission of Duro, X. 1839 *G. Gardner 3248* (BM!; isolectotype BR!).

This species is widely distributed in the central area of Brazil, including the states of Bahía, Distrito Federal, Goiás, Mato Grosso, Minas Gerais and São Paulo (Fig. 3). It occurs in savanna and cerrado vegetation.

In addition to *Chrysolaena guaranitica*, this species is closely related to *C. simplex*. They both share the same involucre shape, heads size and leaf pubescence. However *C. simplex* is taller and has many heads in the inflorescence.

REPRESENTATIVE SPECIMENS EXAMINED: **Brazil.** Bahía: Mun. Rio das Contas, Pico das Almas, 20.II.1988 *R. M. Harley 26941* (K, MBM, RB, SPF). Distrito Federal: Cristo Redentor. 10.X.1990 *A. L. Brochado 73* (RB); Brasília, Cabeça de Beado. 17.X.1964 *A. P. Duarte 9340* (RB). Goiás: Bords du Rio Tocantins, campos prope Carolina, VII–IX.1844 *H. A. Weddell 2395* (P); Mun. Corumbá, Pirineus. 28.VII.1952 *A. Macedo 3704* (RB). Mato Grosso. Between Cuiabá et Chapada Plateau, VIII.1891–1892 *S. Moore 65* (BM); Inter Coxipó et Cuyabá, 21.X.1902 *G. O. Malme 2510* (S). Minas Gerais: Caldas, 26.IX.1865 *A. F. Regnell III 656* (S); Lagoa Santa, in campis ustis, 26.VII.1864 *E. Warming 2640* (C). Parana. Capão Grande, 18.XII.1903 *P. Dusen 2780* (R); Mun. Jaguariaiva, Rio Jaguariaiva. 11.II.1997 *O. S. Ribas & L. P. B. Pereira 1732* (MBM). Rondonia. 4 km de Vilhena. 30.X.1979 *M. G. Vieira et al. 787* (RB). Sao Paulo. Vila Ema, XII.1933 *A. C. Brade 12946* (RB); Serra de Cunha. 14. III.1939 *M. Kuhlmann & A. Gehrt s.n.* (SP).

***Chrysolaena simplex* (Less.) Dematteis,
*comb. nova***

Vernonia simplex Less., Linnaea 4: 280. 1829. — *Cacalia simplex* (Less.) Kuntze, Rev. Gen. Pl. 2: 971. 1891. — *Lessingianthus simplex* (Less.) H. Rob., Proc. Biol. Soc. Wash. 101(4): 950. 1988. — NEOTYPE (designated by Jones 1981): Brazil. 1831, *F. Sellow s.n.* (G-DC!).

Vernonia simplex var. *angustifolia* Less., Linnaea 4: 281. 1829. — NEOTYPE (designated by Jones 1981): Brazil. São Paulo, *B. Pickel 1456* (US! as photo).

Vernonia simplex var. *latifolia* Less., Linnaea 4: 280. 1829. — NEOTYPE (designated by Jones 1981): Brazil. Goiás: upland campos Mission of Duro, X.1839 *G. Gardner 3251* (NY; isoneotypes BM!, BR!, G!, K!, P!, S!).

Vernonia simplex var. *regnellii* Baker in Mart., Fl. Bras. 6(2): 53. 1873. — LECTOTYPE (designated by Jones 1981): Brazil. Minas Gerais: in campis prope Caldas, 1867 *A. F. Regnell III 656* (BR!; isolectotypes P!, S!, SP!).

Vernonia erigerontis Mart. ex DC., Prodr. 5: 43. 1836, *nom. nud. pro syn.*

This constitutes one of the most widely distributed species of the genus. It occurs on cerrado and grassy campo of northwestern Bolivia and the central Brazilian highlands, in the states of Bahía, Distrito Federal, Goiás, Mato Grosso, Minas Gerais, Paraná, Santa Catarina and São Paulo (Fig. 3).

Chrysolaena simplex is a highly variable species, particularly in leaf shape and size, which has resulted in the designation of several varieties. The type specimen of *Vernonia simplex* var. *latifolia* notably differs from *V. simplex* var. *regnellii* and *V. simplex* var. *angustifolia*. The first has widely lanceolate blades that commonly range between 20 and 30 mm wide, while the type material of the latter two varieties have narrowly linear blades, from only 2–4 mm wide. However, I observed a continuous pattern of variation in leaf shape between these two extremes.

Table 2. Diagnostic morphological characters of *Chrysolaena guaranitica* and related species.

Character	<i>C. guaranitica</i>	<i>C. simplex</i>	<i>C. desertorum</i>
Height	20–40 cm	30–70 cm	10–20 cm
Leaf surfaces	discolourous	concolorous	concolorous
Leaf pubescence	sericeous, whitish	villous, yellowish	villous, yellowish
Head number	1	3–10	1
Corolla lobes	pilose	pilose	glabrous to glandular
Phyllaries series	3–4	3–4	2
Distribution	NE Paraguay	Brazilian planalto	Brazilian planalto

Among the *Chrysolaena* species, *C. simplex* is most distinct in the pedunculate heads of its cymose inflorescence. The remaining species having such inflorescence pattern always have sessile heads. This taxon is most closely related to *C. guaranitica*, from which it can be distinguished as indicated above.

REPRESENTATIVE SPECIMENS EXAMINED: **Brazil.** Bahía: circa Igreja Velha, 1841 *J. S. Blanchet 3413* (BM, G, P, W); Mun. Barra da Estiva, 8 km S de Barra da Estiva, camino a Ituacu, 22.XI.1992 *M. M. Arbo, R. Mello Silva & J. Vicente 5704* (CTES, SPF). Distrito Federal: Brasília, Parque do Gama, 16.X.1965 *A. P. Duarte 9328* (RB); Campus da Universidade de Brasília, 14.XI.1978 *E. P. Heringer 17162* (SP). Goiás: Chapada dos Veadeiros, 6 km S of Alto Paraíso, 16.X.1980 *G. L. Smith 1076* (C); Ponte Alta, 28.IX.1894 *A. F. M. Glaziou 21583* (BR, P). Mato Grosso: Santa Anna da Chapada, 8.IX.1902 *G. O. Malme 2070* (S); Inter Coxipó Mirim et Aricá, 21.X.1902 *G. O. Malme 2070* (S). Minas Gerais: In campis glareosis Mont. Vermelho, IX.1824 *L. Riedel 613* (P); São Pedro de Alcantara, *J. E. Pohl 366* (W). Paraná: Inter Senges et Fabio Rego, 11.XII.1903 *P. Dusen 10973* (S); Mun. Curitiba, Jardim das Américas, 5.XI.1992 *J. Cordeiro & C. B. Poliquesi 885* (HUEFS, W). São Paulo: Campo W Itapetininga, 15.IX.1887 *A. Löfgren 130* (P); In campis Mugy et St. Marcos, VIII.1834 *L. Riedel 891* (P). **Bolivia.** Beni. Prov. Vaca Diez. Riberalta, 65 km hacia Santa Rosa, ca. desvío a Cobjia, 18.X.1991 *S. G. Beck 20524* (LPB). La Paz. Prov. Franz Tamayo, Senda Apolo-San José de Uchupiamonas, 2 km antes de Naranjal, 22.XI.2002 *F. Canqui, C. Maldonado, T. Miranda & R. Alvarez 79* (LPB). Santa Cruz. Prov. Velasco, Parque Nacional Noel Kempff Mercado, 15 km SE de Los Fierros, 23.XI.1994 *T. J. Killeen & O. Peña 7237* (CTES, USZ).

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References

Bremer, K. 1994: *Asteraceae. Cladistics and classification.*

- Timber Press, Portland.
- Cabrera, A. L. 1944: Vernonieas Argentinas (Compositae). — *Darwiniana* 6: 265–379.
- Cabrera, A. L. & Dematteis, M. 1999: Novedades en el género *Vernonia* Schreb. (Compositae-Vernonieae) para la Flora del Paraguay. — *Candollea* 54: 103–110.
- Chodat, R. 1902: Plantae Hasslerianae: énumération des plantes récoltées au Paraguay par le Dr. Émile Hassler de 1885–1895 et de 1898–1900. — *Bull. Herb. Boissier*, ser. 2, 3: 297–305.
- Dematteis, M. 2002: Cytotaxonomic analysis of South American species of *Vernonia* (Vernonieae: Asteraceae). — *Bot. J. Linn. Soc.* 139: 401–408.
- Dematteis, M. 2003: New species and new combinations in Brazilian Vernonieae (Asteraceae). — *Taxon* 52: 281–286.
- Dematteis, M. & Robinson, H. 1997: Chromosome studies and taxonomic considerations in *Acilepidopsis* (Vernonieae, Asteraceae). — *Phytologia* 83: 366–370.
- Dematteis, M. & Salgado C. R. 2001: Pollen morphology and chromosome number of *Vernonia rojasii* (Vernonieae, Asteraceae). — *Comp. Newsl.* 36: 69–76.
- Erdtman, G. 1966: *Pollen morphology and plant taxonomy. Angiosperms.* — Hafner, New York.
- Galiano, N. G. & Hunziker, J. H. 1987: Estudios cariológicos en Compositae. IV. Vernonieae y Eupatorieae. — *Darwiniana* 28: 1–8.
- Greuter, W., McNeil, J., Barrie, F. R., Burdet, H. M., Demoulin, V., Filgueiras, T. S., Nicolson, D. H., Silva, P. C., Skog, J. E., Trehane, P., Turland, N. J. & Hawksworth, D. L. 2000: *International code of botanical nomenclature (Saint Louis Code).* — Koeltz Sci. Books, Königstein.
- Jones, S. B. 1979: Synopsis and pollen morphology of *Vernonia* (Compositae: Vernonieae) in the New World. — *Rhodora* 81: 425–447.
- Jones, S. B. 1981: Revision of *Vernonia* series *Flexuosae* (Compositae: Vernonieae). — *Brittonia* 33: 214–224.
- Keeley, S. C. & Jones, S. B. 1979: Distribution of the pollen types in *Vernonia* (Vernonieae: Asteraceae). — *Syst. Bot.* 4: 195–202.
- Punt, W., Blackmore, S., Nilsson, S. & Le Thomas, A. 1994: *Glossary of pollen and spore terminology.* — LPP Foundation, LPP Contributions series No. 1. Univ. Utrecht, The Netherlands.
- Robinson, H. 1988a: Studies in the *Lepidaploa* complex (Vernonieae: Asteraceae). V. The new genus *Chrysolaena*. — *Proc. Biol. Soc. Wash.* 100: 952–958.
- Robinson, H. 1988b: Studies in the *Lepidaploa* complex (Vernonieae: Asteraceae). IV. The new genus *Lessingianthus*. — *Proc. Biol. Soc. Wash.* 100: 929–951.
- Robinson, H. 1990: Studies in the *Lepidaploa* complex (Vernonieae: Asteraceae). VII. The genus *Lepidaploa*. — *Proc. Biol. Soc. Wash.* 103: 464–498.
- Robinson, H. 1992: Two new species of *Chrysolaena* from Brazil (Vernonieae: Asteraceae). — *Proc. Biol. Soc. Wash.* 105: 657–663.
- Robinson, H. 1999: Generic and subtribal classification of American Vernonieae. — *Smithsonian Contr. Bot.* 89: 1–116.

- Ruas, P. M., Ruas, C. F., Vieira, A. O. S., Matzenbacher, N. I. & Martins, N. S. 1991: Cytogenetics of the genus *Vernonia* Schreber (Compositae). — *Cytologia* 56: 239–247.
- Skvarla, J. J., DeVore, M. L. & Chissoe, W. F. 2005: Lophate sculpturing of Vernonieae (Compositae) pollen. — *Rev. Paleobot. Palynol.* 133: 51–68.
- Stix, E. 1960: Pollenmorphologische untersuchungen an Compositen. — *Grana Palynol.* 2: 41–104.