

A MONOGRAPH OF THE VOCHYSIACEAE II. CALLISTHENE¹

BY

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The genus *Callisthene* is found in the Extra Amazonian part of the Brazilian mainland, particularly in the zone of the campos and in the adjacent parts of Bolivia. The genus comprises eight species, as defined in this paper. It shows its greatest diversity on the central plateau of the Brazilian state of Minas Geraes. Most of the species are typical trees of the campos of the interior Brazilian plateau, which is characterized by a climate with a severe dry season.

The genus was first described by MARTIUS in 1824. He mentioned all important characters and placed it in the *Vochysiaceae*, a family which had been described only four years earlier by A. DE ST. HILAIRE (1820). It was named after *Callisthenes* (360—327 B.C.), the Greek naturalist and historian of Alexander the Great, relative and pupil of Aristotle. MARTIUS (l.c.) described 3 species, WARMING (1875 in the "Flora Brasiliensis") 7, while BRIQUET (1919) added several others, only one of which — in the opinion of the present author — can stand after careful studies of the complete type material.

ACKNOWLEDGMENTS

The continuation of the investigation of the *Vochysiaceae* has been made possible by the courtesy and the coöperation of the following herbaria and institutions. These are indicated in this monograph by the abbreviations proposed in Part I of the Index Herbariorum by the International Association for Plant Taxonomy: The Arnold Arboretum (A), the British Museum of Natural History (BM), the Jardin Botanique at Brussels (BR), the Universitets Botaniske Museum at Copenhagen (C), the Chicago Natural History Museum (F), the Delessert and Boissier Herbaria in Geneva (G-DEL, G-BOIS), the University Herbarium of Goettingen (GOET), the Gray Herbarium (GH), the Instituto Agronomico do Norte (IAN), the Herbarium of the Royal Botanic Gardens, Kew (K), the State Herbarium at Leiden (L), the Jardin Botanique at Madrid (MA), the Missouri Botanical Garden (MO), the New York Botanical Garden (NY), the Oxford University Herbarium (OXF), the Muséum d'Histoire Naturelle, Phanérogamie at Paris (P), the Jardim Botânico of Rio

¹ Part. I, comprising *Salvertia* and *Vochysia* in Rec. Trav. Bot. Néerl. Vol. XLI 1948, p. 397 seq., also in Med. Bot. Mus. Utr. 95 p. 397 seq.

de Janeiro (RB), the Naturhistoriska Riksmuseet at Stockholm (S), the Botanical Museum and Herbarium at Utrecht (U), the U.S. National Herbarium (US) and the Naturhistorisches Museum at Vienna (W), Botanische Staatssammlungen München (M).

The author wishes to express his sincerest thanks to the directors of these herbaria and institutes, the highly important collections having been put at his disposal in such a courteous and generous manner.

MORPHOLOGICAL REMARKS

Callisthene is — like the other genera of the Vochysiaceae — very sharply defined and distinctly separated from the other genera by characters of important morphological value. These characters can be found in the structure of the flowers and the fruit. They will be discussed in some detail as they illustrate clearly the variations on the theme of the Vochysiaceous flower.

The *Vochysiaceae* can be divided in two tribes: the *Vochysieae* and the *Erismeeae*¹. The latter tribe, characterized by a unilocular, practically inferior ovary and an indehiscent fruit enclosed by the calyx-lobes, will be discussed in a subsequent section of this monograph.

The tribe of the *Vochysieae* comprises the genera *Salvertia*, *Vochysia*, *Qualea* and *Callisthene*. It is characterized by a trilocular superior ovary, by a free loculicidal capsule, which is not enveloped by enlarged calyx-lobes and by the simple or biramosse hairs of the indumentum. The diagrams of the flowers of these genera are given in fig. 1.

It is apparent that *Salvertia*, with its five petals has — morphologically speaking — the simplest flowers.

The calyx is the most constant feature: no reductions or further specializations are found in this tribe. The fourth lobe is always larger than the others and practically always spurred. (The spur is absent in the subgenus *Amphilochia* of *Qualea*). In the *Erismeeae* the calyx-lobes are enlarged after anthesis and envelop the fruit.

For the sake of convenience, the spurred lobe is often named the posterior lobe, the first and second lobes the laterals and the third and fifth ones the anterior lobes. This designation, often found in literature, is strictly speaking not accurate, as can be seen from the diagrams.

The corolla is extremely variable. A complete set of 5 petals, like the calyx quincuncially arranged and linking up with the aestivation of the latter, is to be found only in *Salvertia* (in the *Erismeeae* in *Erismadelphus*). In the other genera the corolla is reduced. *Vochysia* has normally three petals, the aestivation of which does not completely agree with that of *Salvertia* (see part I p. 407). In a number of cases the lateral petals or even all petals are absent in *Vochysia*.

¹ *Vochysieae* Dumort. 1829 p. 6.
Erismeeae Dumort. 1829 p. 6.

Qualea has one petal, like the central petal of *Vochysia* corresponding with the third petal of *Salvertia*. Rudimentary petals are sometimes met with in *Qualea*; they are found in the same places as the lateral petals of *Vochysia*.

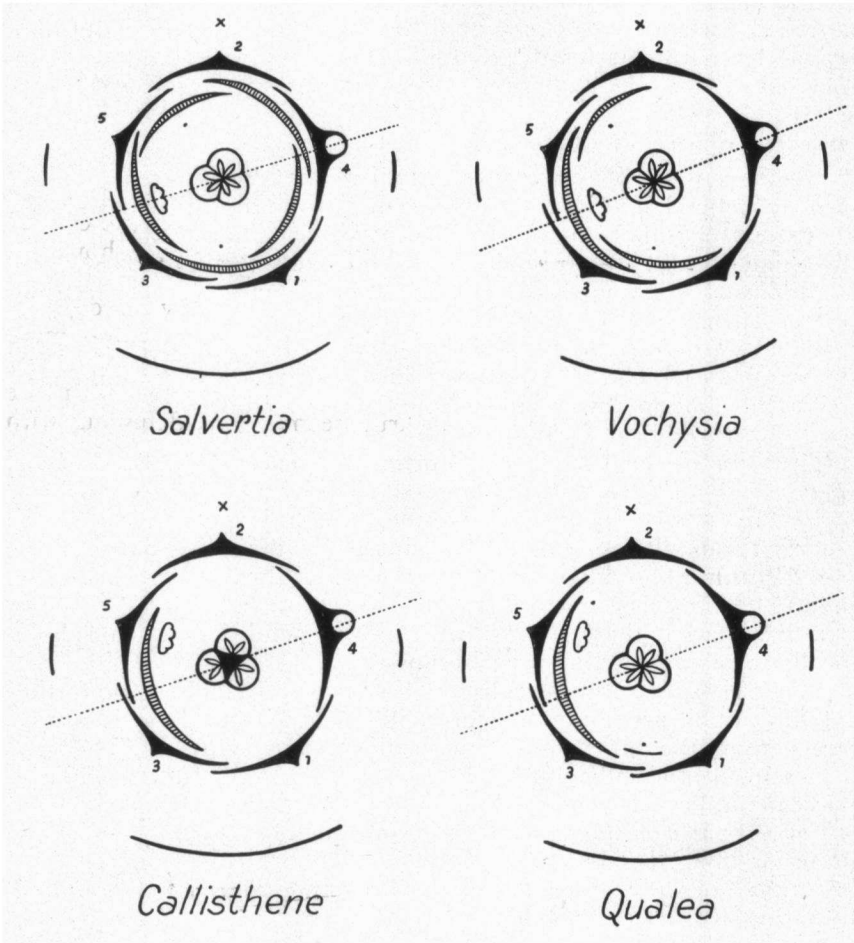


Fig. 1. Diagrams of the genera of the tribe *Vochysieae* Dumort.

Callisthene also has one petal, the third one. Rudimentary petals have not been found by the present author. This third petal, standing in the plane of symmetry of the flowers is apparently the most conservative element in the corolla.

The androecium too is varied. In each genus only one fertile stamen is found, not always, however, belonging to the same cycle. In *Salvertia*, *Vochysia* (and *Erismadelphus*) the fertile stamen stands in the symmetry plane at the base of the third petal (cf. diagram). 2 Staminodes belonging to this cycle are often found in each of these

genera. In *Qualea*, *Callisthene* (and *Erisma*), however, the single fertile stamen stands in front of the fifth calyx-lobe, outside the plane of symmetry. The cycle to which this stamen belongs alternates with the corolla. The staminodes, however, are in the same situation as in *Salvertia* and *Vochysia*: alternating with the calyx. In *Callisthene* staminodes are mentioned by WARMING (1875 p. 21), but the present author has never seen any.

In the Vochysiaceous flower two cycles of stamens may be represented: it is only in the genus *Qualea* that both are present in the same flower.

The gynoeceum is a very constant feature of the flower of this tribe, being always superior and trilocular. In each locule 2 ovules (*Salvertia* and *Vochysia*) or 2 series of ovules are found on the central placenta. The number of ovules per loculus in *Callisthene* may, however, be small or even one.

The fruit of the *Vochysieae* is a loculicidal trivalvous capsule. *Callisthene* differs since the exocarp, which is very fragile and more or less crusty, separates irregularly from the endocarp. The latter is regularly trivalvous (see fig. 3). These valves often split from the top along the midrib and then the fruit seems to be dehiscing with 6 equal valves. Another character in which the fruit of *Callisthene* differs considerably from that of the other genera is the presence of a thick and voluminous, persistent central column (see fig. 3 c, d).

The seeds of the *Vochysieae* are characterized by the presence of a wing. In *Salvertia*, *Vochysia* and *Qualea* the wing is unilateral and consists of numerous long hairs inserted on the testa. In *Callisthene*, the wing is a narrow and circumferential excrescence of the testa.

The stipules are completely obsolete or at most weakly developed in *Callisthene*. This reduction is generally not so extreme in the other genera. Those of *Vochysia* and *Salvertia* are small but distinct, the entire stipules being deciduous. This is not the case in *Qualea*. The stipules of this genus show remarkable specializations which will be discussed together with the taxonomic treatment of that genus in a subsequent part of this monograph. The absence or the extremely weak development of the stipules in *Callisthene* is in itself another further specialization of the genus, although diametrically opposed to that found in *Qualea*.

The vegetative buds of *Callisthene* are perulate, that is: furnished with a number of small brownish, protective scales. These scales, or cataphylls, are more or less persistent and are to be found at the base of the youngest branchlets (fig. 4e). The basal ones are crowded and the respective internodes are correspondingly short. In the section *Cataphyllantha* the most apical cataphylls bear the flowers.

Such perulate buds are mostly absent in *Vochysia* according to WARMING. The vegetative buds are naked and the younger branchlets bear no cataphylls at the base. On the contrary, the first internode is often longer than the subsequent ones and the first node bears normal frondose leaves. This feature is not so constant in *Vochysia*

as WARMING suggests. Several species have the same abbreviated internodes as *Callisthene*, in *Vochysia tucanorum* e.g. both structures can be found in different specimens. No semipermanent cataphylls are found at the bases of the branchlets: this agrees with WARMING's observation that *Vochysia* is characterized by naked vegetative buds.

Perulate buds are also common in *Qualea*, although in many cases provided with only a small number of scales. In particular the species of the subgenus *Amphilochia* have the same structure as *Callisthene* and their first internodes too are extremely short.

The common feature of the inflorescence of all *Vochysiaceae* is the cincinnus. The cincinni may be arranged in numerous ways: in their simplest form they are one-flowered and stand in the axils of ordinary leaves. (*Callisthene* div. spec.). These one-flowered cincinni are recognizable as such by the presence of bracteoles on the pedicels. Strictly speaking, this denomination is wrong and the one-flowered cincinni are normal bibracteolate flowers. When comparing them with the normal 2-many flowered cincinni, often present even on the same branchlet, we feel justified in considering these axillary flowers as one-flowered cincinni. In other genera these cincinni may be arranged in racemes or panicles, the latter often constituting many-flowered thyrsoid inflorescences. The peduncles of the cincinni are well developed in *Salvertia* and *Vochysia* and in one or two species of *Qualea*. In nearly all species of the latter genus and in *Callisthene* the peduncles are reduced and the flowers are crowded in the axils of the respective bracts, cataphylls or ordinary leaves. The bracts and bracteoles are also crowded at the base of these e-pedunculate cincinni.

The supraspecific variation within the genus *Callisthene* is very slight. The main dividing issue is the position of the flowers on the branchlets. In the section *Callisthene* the flowers are placed in the axils of the ordinary (frondose) leaves; in the section *Cataphyllantha* they are placed in the axils of the cataphylls near the base of the branchlets. The leaves of the former section are generally small and the sterile branchlets with their numerous pairs of strictly distichously arranged small leaves have the aspect of a pinnately compound leaf; in some species the total branch system even resembles the leaves of *Caesalpinia*.

The flower is singularly constant in this genus: there is a slight variation in the shape of the small calyx-lobes but otherwise the variations are of minor importance. Further notes about the relationships are given in the taxonomic section in notes under the species.

GEBOTANICAL AND ECOLOGICAL REMARKS

The area of *Callisthene* is uniregional in VESTER's sense (1940), being limited to South America. The species are found in two different phytogeographic zones (as defined by SAMPAIO 1934) e.g. in the zone of the *Campos* and in that of the *Caatingas*. Both zones

belong to the Southern Brazilian (Extra Amazonian) Province of the Tropical American Territory (ENGLER 1912, SAMPIAO l.c.).

The eastern boundary of the area runs along the inner margin of the coastal rainforests. The southern boundary is less distinct; *C. hassleri* is the southernmost species, still found, however, in the campos. *Callisthene*, unlike *Salvertia* and *Qualea grandiflora*, does not feature in the savannas of Lower Amazonia. Generally speaking, the area corresponds to the zone of the Central Brazilian and Bolivian Campos, with a northern extension into the zone of the caatingas.

The Caatinga Zone is situated in N. E. Brazil and is characterized by tropical deciduous scrub forests. These scrub forests comprise a host of different types of vegetation, described by LÜTZELBURG (1923). *Callisthene*, like *Vochysia* and *Salvertia*, occurs in this zone in those places which can be considered as "disjunctions" of the Zone of the Campos (see part. I p. 411). The species are rarely found in the typical caatinga scrub forest.

The areas of the species are shown in fig. 2. Only two species are limited entirely to the Zone of the Caatingas. All the other

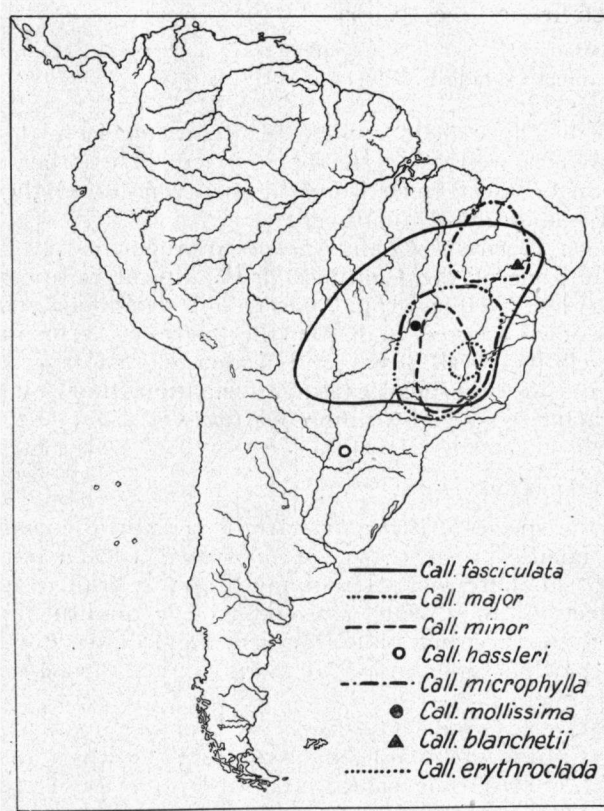


Fig. 2. Distribution of the species of *Callisthene* Mart.

species are found in the Zone of the Campos and constitute in it a very particular feature of the scenery.

The habitats of the species are listed in table I. All the species are trees from the campos cerrados (c.c.). These are parklike grass plains (savannahs) with scattered trees and small open forests. These

TABLE I
Habitat and distribution of the species of Callisthene

	no. of coll.	Habitat	Phyto- geogr. Zone	Sect.
1. <i>C. fasciculata</i>	38	campos cerrados (c.c.) .	Campos	I
2. <i>C. major</i> var. <i>major</i> .	41	agreste and carrasco . .	Caatingas	II
		"capões" in c.c.	Campos	
		campina and carrasco . .	Caatingas	II
<i>C. major</i> var. <i>pilosa</i> .	9	"capões" in c.c.	Campos	
3. <i>C. minor</i>	6	"capões" in c.c.	Campos	II
4. <i>C. hassleri</i>	1	unknown	Campos	II
5. <i>C. microphylla</i>	9	campos, carrasco	Caatinga	II
6. <i>C. mollissima</i>	1	unknown	Campos	II
7. <i>C. blanchetii</i>	1	unknown	Caatinga	II
6. <i>C. erythroclada</i>	3	"capões" in c.c.	Campos	II

c.c. means campos cerrados, see below.

thickets are locally called "capões". *C. fasciculata* seems to be found in the capões as well as in the open spaces. The other species — as far as can be ascertained from the scanty notes on the labels — seem to be found mostly in the capões.

C. fasciculata, *C. microphylla* and *C. major* are reported by LÜTZELBURG (l.c.) in the zone of the Caatingas from typical campo vegetation ("campinas") as well as from "carrasco" (deciduous scrub forests with only a few *Cactaceae*) and from the "agreste", a formation with scattered, relatively tall, trees and a dense grass layer. *Callisthene* is never found in the typical caatinga formation, that is in the scrub forest characterized e.g. by numerous *Cactaceae*.

NOTES AND ABBREVIATIONS

Most of the species of *Callisthene* are of very little economic value or even of no use at all. *C. fasciculata* is used as charcoal (CORREA 1931 p. 109) and firewood. The name "Carvão branco" points also in that direction (lit. "white firewood"). The qualities as firewood are excellent on account of the presence of resins. The "variety" "Carvão vermelha" mentioned by CORREA is not known from herbarium specimens.

The *abbreviations* which have been used for the herbaria are those given by LANJOUW in his lists in *Chronica Botanica* V p. 142—150 and VI p. 377—378. They are at the same time those proposed for the INDEX HERBARIORUM by the INTERNATIONAL ASSOCIATION FOR PLANT TAXONOMY.

- Fl. Months during which flowering specimens have been collected.
 Fr. Idem, fruiting specimens.
 K^x Present in the Kew herbarium but not seen by the present author.

III. CALLISTHENE

Callisthene Mart., Nov. Gen. et Sp. I, 1824 p. 123; D. C. 1828 p. 25; A. Dietr. 1831 p. 95; Don 1832 p. 668; Meisner 1836—43 I p. 119, II p. 85; Endlicher 1836—40 p. 1177; D. Dietr. 1839 p. 20; Steudel 1841 p. 259; Benth. and Hook. 1862—67 I p. 976; Baill. 1874 p. 95; Warming 1875 p. 21; Petersen 1896 p. 317; Lemée 1929 I p. 762.

Trees or shrubs. Indumentum-if present-consisting of simple hairs. Branchlets opposite, distichous, the young ones at the base with several crowded cataphylls, the cortex sometimes more or less irregularly exfoliating, the fragments usually rather small; older branchlets glabrous, lenticellate. Perulate buds present. Stipules minute, sometimes subglandular, or obsolete. Leaves annual, simple, opposite, distichous, penninerved, equal-sided, often crowned with a brownish triangular gland, the margin entire. Flowers either solitary or in few-flowered — nearly e-pedunculate — cincinni in the axils of the cataphylls or the ordinary leaves, rather small — the bud 0.5—1.2 cm long — hermaphrodite, tetracyclic, irregular. Calyx gamosepalous, quincuncial, the base cup-shaped, the limb five-parted, the lobes unequal and deciduous, the fourth one spurred, as long as the flower-bud, convolute and enveloping the inner whorls, the other lobes smaller — the "lateral" ones often smallest. Corolla with the stamen perigynously inserted on the calyx; one petal, obcordate-obovate, the base cuneate-unguiculate, mainly yellow or yellow-white, membranous, glabrous, alternating with the third and fifth calyx-lobes, convolute, caducous. Stamen one, in front of the fifth calyx-lobe, glabrous, the filament cylindrical or subcylindrical, somewhat elongate after anthesis; the anther innate, oblong or sublanceolate, bithecate, the locules introrse, the connective produced beyond the locules but not cucullate; the pollen grains subglobose, tricolporate. Staminodes not present. Pistil tricarpeal, glabrous or nearly so. Ovary superior, ovoid, ellipsoid or subglobose, not sulcate, abruptly merging into the style, trilocular; the ovules epitropous, axile, few per loculus, inserted in two rows, the central placentas incrassate, integuments two. Style one, simple, cylindrical. Stigma terminal, capitate. Fruit a trilocular ellipsoid or subglobose capsule with one or few seeds per loculus, solitary on the incrassate pedicel. Exocarp fragile, crusty or somewhat woody, separating with irregular fragments from the endocarp, the latter regularly trivalvovous loculicidal, the valves elliptic, pergamentaceous or somewhat woody, with prominent midrib inside, often split from the top along the midrib, brownish outside and yellowish inside. Central column persistent, thick, triangular with acute nearly winged angles. Seeds compressed,

elliptic with rounded base and apex, the testa excurrent in a narrow circumferential wing, the hilum linear. Embryo straight, exalbuminous, the cotyledons plicate, the radicle very short and the plumule inconspicuous.

Distribution: Eight species in the dry regions of southern and central Brazil, northern Paraguay and eastern Bolivia.

Type species: *Callisthene major* Mart.

Ecology: Trees from campos, savannas etc.

Observation: The name has been derived from Callisthenes, the Greek historian and naturalist (360—327 B.C.).

Key to the sections

- 1a. Flowers in 2—3 flowered cincinni in the axils of the cataphylls, at most one or two in the axils of the lowermost ordinary leaves. Branchlets provided with 2—5 pairs of 3—17 cm long ordinary leaves. sect. A: **Cataphyllantha** p. 230.
- b. Flowers solitary or rarely in 2-flowered cincinni in the axils of the ordinary leaves, at most one or two in the axils of the uppermost cataphylls. Branchlets provided with 5—15 pairs of 0.3—3 (rarely—5) cm long ordinary leaves sect. B: **Callisthene** p. 232.

section A. **CATAPHYLLANTHA** Staf. nov. nom.

Warming 1875 p. 23 sub: "*Sect. I*". (gives latin diagnosis).

Flowering branchlets with three to nine pairs of opposite or subscattered, subconspicuous cataphylls and two to five pairs of opposite or subopposite foliage leaves; the latter medium-sized or large (3—17 cm long), not or only rarely provided with a triangular apical gland, not provided with a marginal nerve. Flowers in 2—3 flowered cincinni in the axils of the cataphylls or rarely in the axils of the lowermost foliage leaves. Flower-bud elongate-conical, acute-acuminate. Spur about as long as or somewhat shorter than the pedicel (0.6—1.0 cm). Anther about as long as or somewhat longer than the filament, the produced apical part subglandular.

Type species: *Callisthene fasciculata* Mart.

Distribution and Ecology: see under species.

1. ***Callisthene fasciculata*** Mart., Nov. Gen. et Sp. I, 1824, p. 126, II t. 100; Schult. 1827 p. 106; D.C. 1828 p. 26; A. Dietr. 1831 p. 96; St. Hilaire 1832 t. 192; Don 1832 p. 668; D. Dietr. 1839 p. 21; Warming 1875 p. 23, tab. 2; Spencer Moore 1895 p. 309; Malme 1905 p. 5, 6; Lützelburg 1923 III p. 225, 226; Correa 1931 p. 109. *Qualea fasciculata* Spreng. 1827 p. 10. *Callisthene floribunda* Gardner 1839 p. 333. *Qualea maliformis* Lk ex Warming 1875 p. 24. *Vochysia maliformis* Klotsch ex Warming 1875 p. 24. *Qualea excelsa* Glaziou 1905 p. 31 (nomen). *Qualea minaensis* Glaziou 1905 p. 31 (nomen).

Tree. Branchlets and leaves fulvous or brownish pubescent in varying degree, particularly along the nervation and the margin of the leaves, sometimes nearly glabrous. Petioles 0.2—0.6 cm long,

Leaves on flowering branchlets membranous-subchartaceous, subdiaphanous, often $3-6 \times 2-4$ cm, the lower ones broadly obovate or suborbicular, with subobtuse or subrotundate, often emarginate apex and obtuse or rounded base, the upper ones elliptic or subovate with obtuse, rarely subacute or subrotundate apex and similar base. Older leaves subcoriaceous, shaped as the younger ones, up to 17×9 cm. Lateral nerves five to ten on each side, the bases often decurrent along the midrib, the angle with the midrib of the central ones about $50-60'$, straight. Bracts and bracteoles linear, subulate, $0.2-0.3$ cm long, together with the pedicels and the outside of the calyx pubescent or subpubescent. Pedicels slender, $0.7-1.0$ cm long. Flower-bud $1.0-1.2 \times 0.2-0.3$ cm. Smaller calyx-lobes elongate-ovate, subsubulate, the laterals about 0.15 cm, the anteriors about $0.3-0.4$ cm long. Spurred calyx-lobe elongate-ovate, acute-acuminate, $0.8-1.0$ (-1.2) $\times 0.5-0.6$ (-0.7) cm, the spur $0.6-1.0$ cm long. Petal about $1\frac{1}{2}-2$ cm long and wide, apically rounded, yellow and — in particular in the centre — spotted with violet. Anther $0.6-0.8$ cm long; filament $0.5-0.7$ cm long. Ovary $0.2-0.3$ cm long, the style $0.6-0.7$ cm long. Capsule on the incrassate, obconical $\frac{1}{2}-1$ cm long pedicel, ellipsoid, $2-2\frac{1}{2}$ cm long. Seeds about $1\frac{1}{2}$ cm long.

Type: Martius s.n. in Brazil, Minas Geraes between Serra de S. Antonio and Rio S. Francesco acc. to Martius (1824 p. 127). The type has not been seen by the present author: its whereabouts are not clear. In M. Martius' specimens from Piahy and Bahia are preserved, but apparently none from Minas Geraes. The type sheet may have got lost temporarily or Martius' citation of locality may be erroneous. In the last case, the specimen from the Rio das Contas, Bahia in M ought to be chosen as the lectotype.

Type of *Qualea excelsa* Glaziou: Glaziou 20686 in P. Type of *C. floribunda* Gardner: prob. Gardner 1595 in BM. *Qualea minaensis* Glaziou is a name given to Glaziou 10740, 19151. The type(s) of *Qualea maliformis* Link ex Warm. and *Vochysia maliformis* Klotsch ex Warm. was (were) probably present in the Berlin herbarium. (Probably Sellow 2006).

Distribution: Southern and central Brazil and eastern Bolivia.

BRAZIL, Maranhão: Carolina, Krukoff 2056 (A, G-DEL, K^x, NY, U, US); — Pires and Black 2346 (IAN, U); —, — 2584 (IAN, U) Piahy: Pussa, Lützelburg 1328 (M); Gardner 2569 (G-BOIS, G-DEL, GH, K, NY, P, US, W); Martius s.n. (M). Parahyba do Norte: Serra do Araripe, Lützelburg 12733 (F, M). Ceara: Grangeiro, Lützelburg 25992 (M), —, — 26167 (M); Gardner 1595 (G-BOIS, G-DEL, GH, K, L, NY, P, S, US). Matto Grosso: Cuyaba, Malme II 2545, 2545a; —, Riedel s.n. (OXF); Barra do R. d. Bugres, Lindman A 3179 (S); Spencer Moore 260 (K, NY, P), — 539 (K, NY), — 731 (BM, K); Gaudichaud 279 (P). Goyaz: Rio Taboca, Glaziou 20686 (BR, C, G-DEL, K^x, P); Natividade, Pohl 2327 (BR, F, W); Cavalcante-Conceição, Burchell 8105 (BR, GH, K, P); Sertão d'Amaroleitê, Weddell 2798 (P); Gardner 3141 (G-BOIS, G-DEL, K, NY, OXF, P, W). Bahia: Santa Rita, Zehntner (— v. Lützelburg) 3037 (M); Almas, v. Lützelburg 12740 (M, W); Martius s.n. (M); Minas Geraes: Corinto, Mexia 5586 (F, G-DEL, GH, K^x, MO, NY, S, U, US); Villa Funda, Glaziou 10740; Paracatu, Riedel s.n. (G. BOIS, GH, P, K, NY); Glaziou 19151 (C); St. Hilaire B, 1950 (NY, P); — s.n. (F, K, NY, P); Macedo 453 (MO); Claussen 55 (P); — s.n. (BM, K). Rio de Janeiro: Sao Fidelis, Glaziou 10741 (C, K^x, P). Locality unknown: Sellow 2006 (G-DEL, M, P, US); Claussen 163 (G-BOIS).

BOLIVIA, Sara, Santa Cruz, Buenavista, Steinbach 6592 (G-DEL, GOET, F, K, NY, S). Chiquitos: d'Orbigny 950 (BR, G-DEL, P); Weddell 3451 (P).

Ecology: Small tree of the campos cerrados. Flowers and leaves appear almost simultaneously shortly after the first rains. The leaves fall towards the end of the dry season (see Malme l.c.) In Bahia in "agreste" and "carrasco" (see p. 000.).

Vernacular Names: BRAZIL, Goyaz and Minas Geraes: Jacaré. Matto Grosso: Carvao Branco. Ceara: Cravo. BOLIVIA, Sara: Tinto Chico. (in lit.: Capitao do Campo sec. Correa l.c.)

Use: Charcoal and firewood (Correa l.c.).

Observation: Carvao Branco means "white firewood". Pau de Terra means: "wood from the earth", a name given also to several other plants e.g. *Qualea* div. spec. Capitao do Campo ("captain of the field") is a name mostly given to *Cordia obscura* Cham. Cravo is a general name for many plants with Dianthus-like flowers.

section B. **CALLISTHENE**

Warming 1875 p. 23 sub: "*Sect. II*". (Gives Latin diagnosis).

Flowering branchlets with a small number of cataphylls and with six to fifteen pairs of opposite foliage leaves; the latter relatively small (0.3—3 cm long), distichous, — the branchlet often resembling a pinnate leaf, — nearly always provided with an acute triangular apical gland; a marginal nerve often present. Flowers solitary or sometimes in two-flowered cincinni in the axils of the ordinary leaves and sometimes a few in the axils of the uppermost cataphylls. Flower-bud conical, acute or subacute, spur short, about half as long as the pedicel or shorter. Anther shorter than the filament, the produced apical part short, not glandular.

Type species: *Callisthene major* Mart.

Distribution: Seven species distributed over the entire area of the genus.

Ecology: Trees from campos, savannas etc.

Key to the species

- 1a. Lower surface of the leaves glabrous 2
- b. Lower surface of the leaves — at least of the young ones — pilose (sometimes mainly on the midrib) 5
- 2a. 8—15 pairs of leaves per branchlet, the leaves 0.3—0.9 cm wide 3
- b. 5—7 (— 8) pairs of leaves per branchlet, the leaves generally wider than 0.9 cm. 2. **C. major** Mart. var. **major**
- 3a. Up to 11—15 pairs of leaves per branchlet 4
- b. 7—9 (— 10) pairs of leaves per branchlet, leaves 1—2 cm long and 0.3—0.5 cm wide, oblong, elongate or lanceolate 3. **C. minor** Mart.
- 4a. Leaves 0.8—2.0 × 0.3—0.8 cm, strongly heteromorphous on each branchlet 4. **C. hassleri** Briq.
- b. Leaves 0.3—0.6 × 0.2—0.4 cm, oblong or elliptic-oblong 5. **C. microphylla** Warm.
- 5a. Upper surface of the leaves glabrous or nearly so 6
- b. Upper surface of the leaves densely tomentose 6. **C. mollissima** Warm.
- 6a. Indumentum on the lower side of the leaves spread over the entire surface or along the midrib only 7

- b. Indumentum on the lower side of the leaves mainly along the nervation. Calyx-lobes subequal, shortly acute-acuminate 7. **C. blanchetii** Warm.
- 7a. 5—7 (— 8) pairs of leaves per branchlet. Calyx-lobes obtuse or acute. Indumentum on the branchlets fulvous or brownish 2. **C. major** Mart. var. **pilosa** Warm.
- b. 10—15 pairs of leaves per branchlet. Indumentum on the branchlets ferrugineous. Calyx-lobes long acute-acuminate (if indumentum weakly developed and greyish see also n. 5, *C. microphylla* Warm.). 8. **C. erythroclada** Warm.

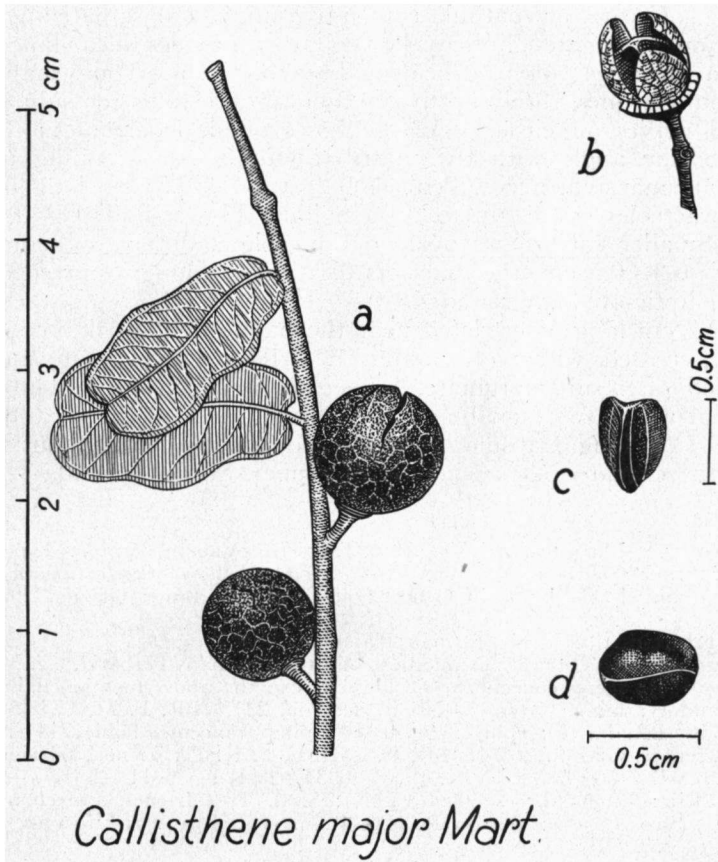


Fig. 3. *Callisthene major* Mart. a. Capsules; b. dehiscent capsule, the exocarp already separated from the endocarp; c. and d. central column of ripe fruit

2. **Callisthene major** Mart., Nov. Gen. et Sp. I, 1824 p. 124 fig. 75; Schult. 1827 p. 104; D.C. 1828 p. 25; A. Dietr. 1831 p. 95; Don 1832 p. 668 fig. 90; Warming 1875 p. 24 t. 3 fig. II; Malme 1900 p. 44; Lützelburg 1923 III p. 225, 226. *Callisthene durifolia* Briq.

1919 p. 378. *Callisthene clausсенiana* Briq. 1919 p. 378. *Callisthene glazioui* Briq. 1919 p. 379. *Qualea disticha* Spreng. 1827 p. 10.

This publication fig. 3.

var. **major**

Tree. Branchlets and leaves glabrous or puberulous, the margins of the young leaves often ciliate. Flowering branchlets slender, about 0.1 cm wide and 8—12 cm long, with two to six — 0.2—0.3 cm long — cataphylls and 5—7 (— 8) pairs of ordinary leaves. Petioles 0.1—0.2 cm long. Leaf-blade variable in size, shape and texture according to age and position; on flowering branchlets subpapyraceous, subdiaphanous, mostly $2-3 \times 1-1\frac{1}{2}$ cm, the lower ones smaller, elliptic, oblong, obovate, or spatulate with a rounded emarginate apex, the upper ones elongate-elliptic or lanceolate, sometimes linear-lanceolate with acute apex; on fruit-bearing branchlets coriaceous, shaped as the younger ones, rarely up to 7×3 cm. Seven to fifteen subparallel lateral nerves on either side, the bases often decurrent along the midrib, the angle with the midrib about 30—60', ending in the undulate marginal nerve. Pedicels 0.2—0.4 (— 0.5) cm long. Bracts and bracteoles ovate, up to 0.1 cm long. Flower-bud 0.8—1.0 cm long. Smaller calyx-lobes ovate or lanceolate, obtuse or acute, the laterals 0.3—0.5 cm, the anteriors 0.4—0.6 cm long. Spurred calyx-lobe elliptic-oblong, rounded, $0.8-1.2 \times 0.5-0.6$ cm; the spur 0.1—0.2 cm long, constricted near the base, often subglobose. Petal yellow, spotted with violet; about $1.1-1.4 \times 1.2-1.5$ cm, apically rounded, often subemarginate. Anther about 0.3 cm long, acute, the filament about twice as long. Ovary about 0.10—0.15 cm, the style 0.5—0.7 cm long. Capsule short-ellipsoid or subglobose, about $1\frac{1}{2}$ cm long, the exocarp black with bluish pruina. Seeds about $0.7-1.0 \times 0.4-0.6$ cm.

Holotype: Martius s.n. in M from Tabaleiro, Vao de Parana. Type of *C. durifolia* Briq.: Claussen s.n. (1838—1839) in G-DEL.; of *C. clausсенiana* Briq.: Claussen s.n. (1838—1839) in G-DEL.; of *C. glazioui* Briq.: Glaziou 20681 in G-DEL.

Distribution: Central Brazilian Plateau.

BRAZIL, Minas Geraes: Numerous collections in many herbaria, e.g. Martius s.n. type (M); many collections of Claussen (e.g. the above-mentioned Briquet-types) and Warming. Goyaz: Natividade, Pohl 2315 (BR, F, M, U, US, W.); Pohl 2718 (BR, F, W); Pohl 1930 (BR); Capitaó Vincente, Pohl 1744 (F, W); S. d. Pyreneos, Glaziou 20681, (BR, C, G-DEL, F, K, P); Tichoa, Glaziou s. n. (P); Burchell 6150 (BR, GH, K, P), — 6334—2 (K), — 6411—2 (K), — 7650 (K). Bahia: Brejão, Froes 20096 (IAN); S. d. Tres Irmãs, Lützelburg 527 (M, W); Sao Paulo: Bucido R., Lund s.n. (C). Loc. unknown: Schott 5 (W), — s.n. (K); Schuech s.n. (W).

Ecology: Often in the open bushes (capões) of the campos cerrados; in Bahia in Campinas and Carrasco (see p. 228). Fl. Aug.-Nov. Fr. Jan.-Apr.

Vernacular names: *Brazil*, Minas Geraes: Pao terra do mato (see obs. 4), Itapicury, Tiriba. Goyaz: Ja carié mirim.

Observation 1: This species is rather variable as regards the size and shape of the leaves, but the leaves are at least $1\frac{1}{2}$ times (mostly 2—4 times) longer than those of the species 3—8.

— — — 2: The older leaves of this species are always coriaceous and sometimes also somewhat larger than those on the flowering branchlets. The latter are very young for the flowers and the leaves appear almost simultaneously. C.

durifolia Briq. and *C. clauseniana* Briq. have been described mainly on account of this difference in texture and some differences in leaf-size. It is clear that these species cannot be maintained. *C. glazioui* Briq. differs in no respects from *C. major*: the type specimen Glaziou 20681 has been compared by Briquet l.c. with *C. mollissima* and with *C. minor* but not with *C. major*, at least not with the Martius specimen. Between the latter and the former no fundamental differences are to be observed.

— — — 3: In describing this species together with *C. minor* and *C. fasciculata* Martius seems to have considered a capsule of *C. fasciculata* as that of *C. major*. See Warming l.c.

— — — 4: Pau terra is a name given to several species (*Callisthene*, *Qualea*). Mato means thicket.

var. ***pilosa*** Warm. in Flora Bras. XIII, II, 1875 p. 26. *Callisthene robusta* Briq. et Glaz. ex Briq. 1919 p. 379; Glaziou 1905 p. 30 nomen. *Callisthene mucronata* Briq. et Glaz. ex Briq. 1919 p. 381; Glaziou 1905 p. 30 nomen p.p.

Lower surface of the leaves, petioles, pedicels, and cortex of the young branchlets densely fulvous or brownish pubescent.

Holotype: Warming s.n. Lagoa Santa 6—9—1864 in C. Type of *C. mucronata* Briq. et Glaz.: Glaziou 20680 in G-DEL; type of *C. robusta* Briq. et Glaz.: Glaziou 20679 in G-DEL.

Distribution: Minas Geraes, Goyaz.

BRAZIL, Minas Geraes: Lagoa Santa, Warming s.n. 6—9—1864 (C); Corinto, Mexia 5597 (A, F, G-DEL, GH, K^x, MO, NY, P, S, U, US); —, — 5638 (A, F, G-DEL, GH, K^x, MO, NY, S, US); Arcos, Oliveira 224 (IAN), Lagoa Santa, — s.n. (IAN), Ant. Maihado do Sul, Schwacke 8922 (C). Goyaz: Sertao d'Amaro-leitê, Weddell 2762 (F, P); R. Descoberto, Glaziou 20680 (BR, C, F, G-DEL, K^x, P, S); Catalao, Riedel s.n. (G-BOIS, GH, K, NY); R. Paranaua, Glaziou 20679 (BR, C, G-DEL, K^x, P, S); Furnas—Pisarao, Burchell 5879 (K).

Ecology: see var. major.

Vernacular name: *Brazil*, Minas Geraes: Capucurú.

Observation: The specimen Glaziou 20769 (type of *C. robusta* Briq. et Glaz.) is bearing fruits and has the coriaceous leaves characteristic of this state. There are no further fundamental differences with the Warming type. The specimen Glaziou 20680 (type of *C. mucronata* Briq. et Glaz.) has rather smallish leaves but this variation falls easily inside a range of variability as for instance in the var. *major*.

3. ***Callisthene minor*** Mart., Nov. Gen. et Sp. I, 1824, p. 126 t. 76; Schult. 1827 p. 105; D.C. 1828 p. 26; A. Dietr. 1831 p. 95; Don 1832 p. 668; D. Dietr. 1839 p. 20; Schnizlein 1843—70 t. 260 fig. 3; Warming 1875 p. 27; Kuhlmann et Kühn 1947 p. 81. *Qualea minor* Spreng. 1827 p. 10.

Tree. Flower-bearing branchlets puberulous, subpuberulous or nearly glabrous, provided with seven to ten pairs of ordinary leaves, 5—8 cm long and up to 0.1 cm wide; the internodes distinctly shorter than the leaves. Older branchlets glabrous. Cataphylls about 0.1—0.2 cm long, two to six scattered and a few crowded near the base. Petioles about 0.1 cm long. Leaf-blade oblong, elongate-elliptic, lanceolate or linear, glabrous or nearly so, apex and base varying from acute to rounded, 1—2 × 0.3—0.5 cm, thinnish sub-papyraceous in youth, coriaceous in age. Lateral nerves 6—10 on either side, irregular, ending in the undulate marginal nerve. Pedicels subpuberulous, about 0.2 cm long. Flower-bud 0.6—0.8 cm long. Smaller calyx-lobes unequal, ovate-elliptic, acute, ciliate and sub-

puberulous; the laterals about 0.2 cm long, the anteriors about 0.4 cm long. Spurred calyx-lobe broad-elliptic or ovate, about 0.8 cm long; the spur about 0.1 cm long, cylindrical. Petal yellowish, about 0.8—1.0 × 0.8—1.0 cm, apically rounded and often emarginate. Anther about 0.3 cm long, acute, the filament about 0.4—0.5 cm long. Ovary about 0.1 cm, the style about 0.5 cm long. Capsule ellipsoid, about 1 cm long.

Holotype: Martius s.n. in M, from Paranan.

Distribution: Mainly in Minas Geraes.

BRAZIL, Minas Geraes: Paranan, Martius s.n. (L, M); Ouro Fino, Regnell III 1539 (K, S, US); near Carmo, Regnell III, 1541 (K, S); S. Gonçalo, Widgren s.n. (S). Sao Paulo: Cabreuva, Hoehne 31011 (NY). Goyaz: Ule 201 (P).

Ecology: In open woods and bushes of the campos cerrados.

Vernacular names: BRAZIL, Sao Paulo: Itapiuna, Alecrim do Mato (the last name is often given to *Baccharis* species (Comp.) —).

Observation: Nearest related to *C. major* Mart. but differing from it by the size and the shape of the leaves. Differing from *C. blanchetii* Warm. by the glabrous leaves and the acute, not acuminate, smaller calyx-lobes.

4. ***Callisthene hassleri*** Briq. in Ann. Cons. Jard. Bot. Genève XX, 1919 p. 382.

This publication: fig. 4.

Flower-bearing branchlets slender, 10—15 cm long, minutely subpuberulous, provided with some cataphylls and 8—15 pairs of ordinary leaves, the internodes about as long as or slightly shorter than the leaves. Cataphylls 0—4 scattered and some crowded near the base. Petioles 0.1—0.2 cm long. Leaf-blades heteromorphous, glabrous except the ciliate margin, 0.8—2.0 × 0.3—0.8 cm, the central ones on each branchlet elliptic-oblong with rounded sub-emarginate apex and obtuse-subrotundate base, the basal ones smaller, shortly elliptic to suborbicular, the apical ones slender, lanceolate or lanceolate-elliptic with subacute, obtuse or subacuminate apex. Lateral nerves 6—10 on either side, ending in an undulate marginal nerve. Veins reticulate. Pedicels subpuberulous, 0.2—0.3 cm long. Bracts and bracteoles ovate, about 0.05 cm long. Flower-bud 0.8—1.0 cm long, slender. Smaller calyx-lobes unequal, ciliate and subpuberulous, the laterals elliptic or ovate, rounded or obtuse, about 0.2 cm long; the anteriors ovate or ovate-subelliptic, subacute, 0.4—0.5 cm long. Spurred lobe elliptic-oblong, 0.8—1.0 cm long, obtuse or subacute, the spur cylindrical, about 0.1 cm long. Petal about 1.0—1.2 cm long and wide, apically rounded or truncate, often emarginate. Anther about 0.3 cm long, acute; the filament 0.4—0.5 cm long. Ovary about 0.1 cm, the style about 0.4 cm long. Capsule unknown.

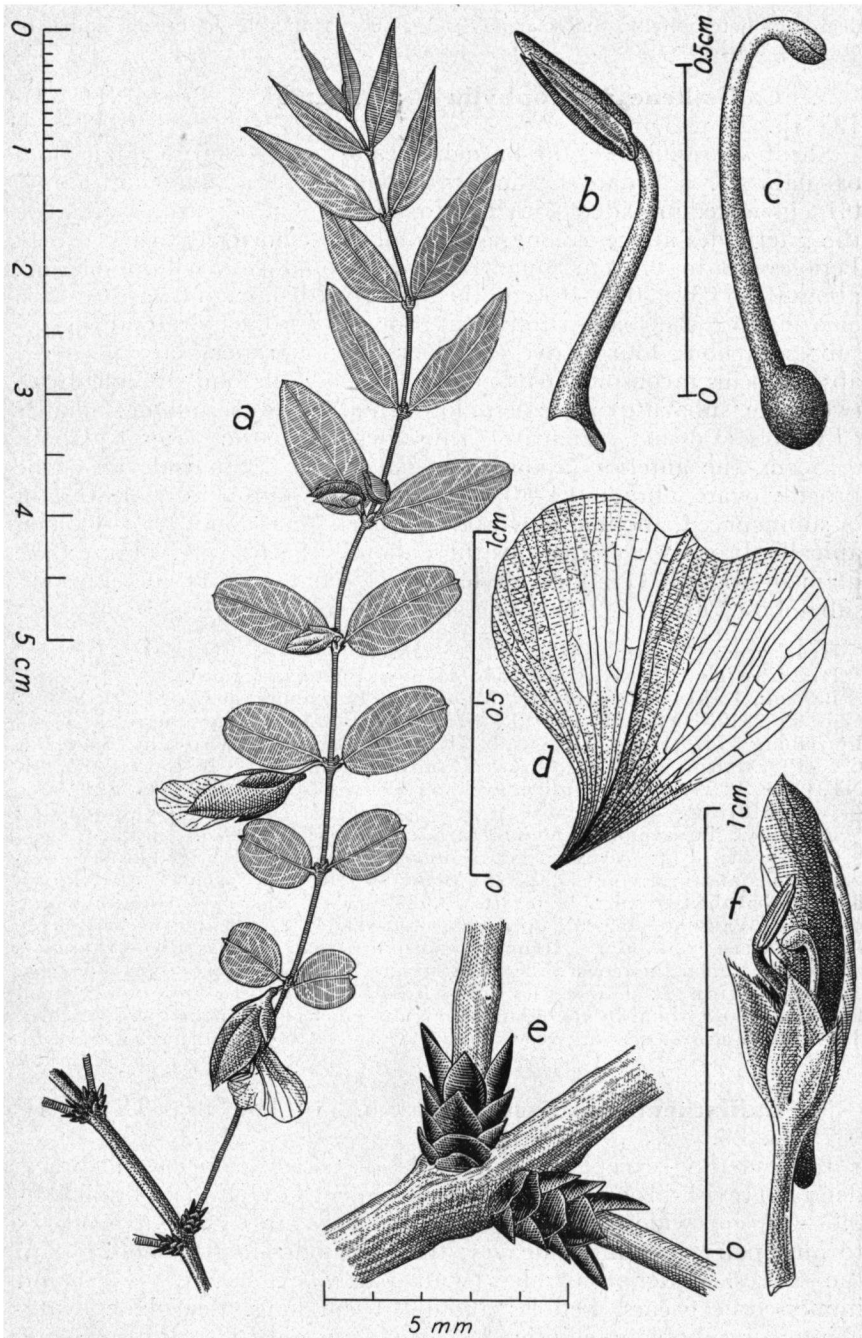
Holotype: Hassler 10638 in G-DEL.

Distribution: Once collected in N. Paraguay.

PARAGUAY, "In altiplanitie et declivibus Sierra de Amanbay", Rojas-Hassler 10638, (BM, F, G-BOIS, G-DEL, K^x, P, W).

Ecology: Fl. Sept.

Observation: Closely related to *C. major* Mart. and *C. minor* Mart. but differing by the long and slender branchlets with up to 15 pairs of leaves, the high



CALLISTHENE HASSLERI BRIQ.

Fig. 4. *Callisthene hassleri* Briq. a. Young branchlet; b. stamen; c. pistil; d. petal; e. cataphylls; f. flower, the petal taken away

degree of heterophylly, the relatively large flowers and the elliptic, rounded or obtuse lateral calyx-lobes.

5. **Callisthene microphylla** Warm. in Flora Bras. XIII, II, 1875 p. 28 t. 3 fig. I.

Shrub or small tree, the branchlets and leaves whitish puberulous or glabrous. Ultimate branchlets about 3—7 cm long and up to 0.1 cm wide, provided with ten to fifteen pairs of ordinary leaves, the internodes about as long as or somewhat shorter than the leaves. Petioles up to 0.1 cm long. Leaf-blade oblong or elliptic-oblong, about 0.3—0.6 × 0.2—0.4 cm, the apex rounded or subtruncate, often emarginate, the base subtruncate or subcordate. Lateral nerves subconspicuous, four to five on either side; a proper marginal nerve absent; veins inconspicuous. Pedicels 0.1—0.3 cm long, provided with two ovate, subacute bracteoles. Flower-bud 0.4—0.5 cm long. Smaller calyx-lobes ovate, subacute, subpuberulous, the laterals about 0.15 cm, the anteriors about 0.2—0.3 cm long. Spurred calyx-lobe broadly ovate, obtuse, 0.4—0.6 cm long; the spur cylindrical, straight or subincurved, about as long as the pedicel. Petal about 0.5 × 0.5 cm, apically broadly rounded. Anther about 0.1 cm long, obtuse; the filament about 0.3 cm long. Style 0.3—0.5 cm long. Capsule ellipsoid-subglobose, up to 1.2 cm long, the base of the style subpersistent.

Holotype: Gardner 3142 in P. (see obs. 1).

Distribution: Bahia, Goyaz and Piauhý (Caatinga-region).

BRAZIL: Bahia: Chapada de Mt. Algre, Lützelburg 3027 (M). Piauhý: Gardner 2315, cotype (F, G-DEL, GH, K, NY, OXF, P, W); Serra do Brejo, Lützelburg 1747 (1746) (M, S (sub RB 16125), U (id.)); Urussuhý, Snethlage 625 (F); Martius s.n. (M). Goyaz: Gardner 3142, (F, G-BOIS, G-DEL, K, NY, OXF, P, W); Serra Geral, Lützelburg 630, also sub RB 5981 (M, S, U, W); —, — 1818 (M).

Ecology: In savannas, campos, carrasco etc. (see p. 228.).

Observation 1: WARMING l.c. mentions GARDNER 2315 first. This specimen bears fruits and in a note (l.c. p. 28) WARMING refers this specimen to GARDNER 3142, so that the latter may be regarded to be the type. In C. a drawing is found, made by WARMING after the specimen GARDNER 3142 from the herbarium de FRANCHEVILLE (now in P). It must be assumed that this has been WARMING's original specimen, moreover: the Paris specimen bears WARMING's handwriting.

Observation 2: This species differs from all other species by its very small leaves and flowers and by the relatively high number of internodes per branchlet. The branching systems with very young leaves have the appearance of leaves of *Caesalpinia*.

6. **Callisthene mollissima** Warm. in Flora Bras. XIII, II, 1875, p. 26.

Branchlets — except the older ones —, leaves, pedicels and bracts densely greyish-brownish or brownish tomentose. Ultimate branchlets 0.1—0.2 cm wide, provided with two to four cataphylls and six to nine pairs of ordinary leaves; the internodes mostly shorter than the leaves. Older branchlets with partly exfoliating cortex and immersed leaf-scars. Petioles about 0.1 cm long. Leafblade ovate-elliptic or suboblong-elliptic, 1—2 cm long and 0.5—1.2 cm wide, the apex rounded, truncate or — in young leaves — obtuse, the base rounded, the indumentum on the upper surface greyish-

glaucous, on the lower surface brownish. Lateral nerves seven to ten on either side, anastomosing near the margin, the apical anastomoses constituting a marginal nerve. Pedicels 0.2—0.4 cm long. Bracts and bracteoles ovate, 0.1—0.3 cm long. Smaller calyx-lobes ciliate, pilose on the back, elliptic-ovate, acute, subacuminate or obtuse; the laterals 0.20—0.35 cm long, the anteriors 0.35—0.45 cm long. Spurred lobe broadly ovate, 0.7—0.9 cm long; the spur cylindrical, about half as long as the pedicel. Petal apically subtruncate. Anther about 0.3 cm long, acute, the filament about 0.4 cm long. Style about 0.6 cm long. Capsule unknown.

Holotype: Burchell 7871 in BR.

Distribution: Once collected in Goyaz.

BRAZIL, Goyaz: Between Goyaz and Cavalcante, Burchell 7871 (BR, GH, K, P).

Observation 1: The Brussels specimen bears *Warming's* handwriting.

— — — 2: Characterized by the indumentum, in particular by the tomentose upper surface of the leaves.

7. **Callisthene blanchetii** Warm. in Flora Bras. XIII, II, 1875 p. 26.

Tree of medium size. Flowering branchlets greyish-brown tomentose or pubescent, about 5—8 cm long, provided with a few cataphylls at the base and seven to eleven pairs of ordinary leaves; the internodes much shorter than the leaves. Adult branchlets glabrous, lenticellate. Leaves glabrous above and provided with long, crisp, undulating hairs along the nervation below; 0.7—1.5 × 0.4—0.8 cm; the basal ones obovate or oblong with rounded or truncate and often emarginate apex and rounded or obtuse base; the apical ones narrowly elliptic or lanceolate, with acute or subacute apex and acute or obtuse base. Five to eight lateral nerves on either side; marginal nerve present. Pedicels pubescent, 0.2—0.3 (— 0.4) cm long. Smaller calyx-lobes subequal, pubescent on the back, ovate-elliptic, shortly acute-acuminate or mucronate, 0.2—0.4 cm long. Spurred lobe broad-ovate, 0.6—0.8 cm long and up to 0.5 cm wide; the spur very short, equalling about one fourth of the pedicel. Anther about 0.1—0.2 cm long, obtuse; the filament about 0.4 cm long. Style about 0.5 cm long. Capsule unknown.

Holotype: Blanchet 2793 in BR.

Distribution: Once collected in Bahia.

BRAZIL, Bahia: Serra d'Açurua (Rio S. Francisco), Blanchet 2793, (BR, G-BOIS, G-DEL, F phot., K^x, MO, NY, OXF, P, W).

Ecology: "Dans les bois et les montagnes".

Observation 1: The Brussels specimen bears *Warming's* handwriting.

— — — 2: Characterized by the indumentum on the lower side of the leaves, the small size of the leaves, the extremely short spur, the obtuse anther and particularly by the ovate-elliptic smaller calyx-lobes, with a distinct acute-acuminate or even mucronate apex.

8. **Callisthene erythroclada** Warm. in Flora Bras. XIII, II 1875 p. 28.

Shrub or small tree, the leaf-bearing branchlets densely ferruginous-tomentose, the lower surface of the young leaves subtomentose,

the older leaves and branchlets glabrous. Branchlets 5—9 cm long, about 0.1 cm wide, with 10—15 pairs of ordinary leaves, at the base provided with some cataphylls; the internodes shorter than the leaves; older branchlets lenticellate. Petioles up to 0.1 cm long. Leaf-blade elliptic, broad-elliptic or oblong-elliptic, 0.8—1.2 (—1.7) × 0.4—0.6 (—1.2) cm; the apex rounded or truncate, often emarginate; the base rounded or cordate. Five to seven lateral nerves on either side, irregular, the marginal anastomoses more or less constituting a marginal nerve. Pedicels 0.2—0.3 cm long. Bracts and bracteoles lanceolate, acuminate, up to 0.2 cm long. Smaller calyx-lobes subpuberulous on the back, subequal, the laterals lanceolate, about 0.3 cm long, long-acuminate, the top about 0.15 cm long; the anteriors ovate, acute, about 0.3—0.4 cm long. Spurred lobe broad-ovate, about 0.7 cm long, the spur about 0.1 cm long, cylindrical. Petal about 0.7 × 0.7 cm, apically broadly rounded. Anther about 0.2 cm long, acute, the filament about 0.3 cm long. Style 0.4—0.5 cm long. Capsule ellipsoid, up to 1.2 cm long.

Holotype: Pohl 3602 in W., leg. between Fazenda Lopez and Sao Joao, Minas Geraes.

Distribution: Thrice collected in Minas Geraes.

BRAZIL, Minas Geraes: Between Fazenda Lopez and Sao Joao, Pohl 3602 (F, W; in K sub 1958); Diamantina, Mello Barreto 9677 (F); Santa Luzia, Mello Barreto 8324 (F) (doubtful).

Ecology: In open bushes (capões) in the campos.

Observation: Characterized by the ferruginous indumentum of the branchlets, the 10—15 pairs of leaves per branchlet and the long-acuminate lateral calyx-lobes and bracteoles.

VERNACULAR NAMES

		p.
Alecrim do mato	3. <i>Callisthene minor</i>	235
Capucurú	2. <i>C. major</i>	233
Capitão do Campo	1. <i>C. fasciculata</i>	230
Carvão branco	1. <i>C. fasciculata</i>	230
Carvão vermelha	1. <i>C. fasciculata?</i>	230
Cravo	1. <i>C. fasciculata</i>	230
Itapicurú	2. <i>C. major</i>	233
Itapiúna	3. <i>C. minor</i>	235
Jacaré	1. <i>C. fasciculata</i>	230
Ja-carié-mirim	2. <i>C. major</i>	233
Pau de Terra	1. <i>C. fasciculata</i>	230
Pau de terra do mato	2. <i>C. major</i>	233
Tinto Chico	1. <i>C. fasciculata</i>	230
Tiriba	2. <i>C. major</i>	233

COLLECTOR'S NUMBERS

The numbers in parentheses refer to the running-numbers of the species of *Callisthene* used in this publication. The collector's numbers printed in *italics* are not mentioned in the text.

BARRETO 7094 (2); 8324 (8); 8325 (2); 9677 (8). BLANCHET 2793 (7). BURCHELL 5879 (2); 6150 (2); 6334—2 (2); 6411—2 (2); 7650 (2); 7871 (6); 8105 (1). CLAUSSEN 55 (1); 58—25 (2); 138a (2); 163 (1); 429 (2); 491 (2). FROES 20096 (2). GARDNER 1595 (1); 2315 (5); 2579 (1); 3141 (1); 3142 (5). GAUDICHAUD 279 (1). GLAZIOU 10740 (1); 10741 (1); 19151 (1); 19152 (2); 20297 (2); 20679 (2); 20680 (2); 20681 (2); 20682 (2); 20686 (1). HASSLER 10638 (4). HILAIRE B₁ 1950 (1).

HOEHNE 31011 (3). KRUKOFF 2056 (1). LINDMANN A. 3179 (1) LUTZELBURG 527 (2); 630 (5); 1328 (1); 1747 (5); 1818 (5); 3027 (5); 3037 (1); 12733 (1); 12740 (1); 25992 (1); 26167 (1). MACEDO 453 (1). MALME II 2545 (1); II 2545a (1). MEXIA 5586 (1); 5597 (2); 5638 (2). MIERS 2425 (2). MOORE 260 (1); 539 (1); 731 (1). OENIKE 44 (2). OLIVEIRA 224 (2); 610 (2). ORBIGNY 950 (1). PIRES & BLACK 2346 (1); 2584 (1). POHL 1744 (2); 1930 (2); 2315 (2); 2327 (1); 2718 (2); 3602 (8). REGNELL III 1539 (3); III 1541 (3). SCHOTT 5 (2). SCHWACKE 8922 (2). SELLOW 2006 (1). SNETHLAGE 625 (5). STEINBACH 6592 (1). ULE 201 (3). WEDDELL 2762 (2); 2798 (1); 3451 (1). ZEHNTNER 3037 (1).

SCIENTIFIC NAMES

Synonyms have been printed in *italics*

Amphilochia (Mart.) Warm.	223, 226
Baccharis.	236
Cactaceae	228
Caesalpinia	226, 238
Callisthene Mart. (genus)	229
Callisthene (sect.)	230, 232
<i>blanchetii</i> Warm.	228, 233, 236, 239
<i>clauseniana</i> Briq.	233, 235
<i>durifolia</i> Briq.	233, 235
<i>erythroclada</i> Warm.	228, 233, 239
<i>fasciculata</i> Mart.	228, 230, 235
<i>floribunda</i> Gard.	230
<i>glazioui</i> Briq.	233, 235
<i>hassleri</i> Briq.	227, 232, 236, 237
<i>major</i> Mart.	228, 233, 236
var. <i>major</i>	228, 232, 233
var. <i>pilosa</i> Warm.	228, 233, 235
<i>microphylla</i> Warm.	228, 232, 238
<i>minor</i> Mart.	228, 232, 235, 236
<i>mollissima</i> Warm.	228, 232, 235, 238
<i>mucronata</i> Briq. et Glaz.	235
<i>robusta</i> Briq. et Glaz.	235
<i>Cataphyllantha</i> Staf.	225, 226, 230
<i>Cordia obscura</i>	232
<i>Erisma</i> Rudge	225
<i>Erismadelphus</i> Mildbr.	223, 224
<i>Erismeae</i> Dumort.	223
<i>Qualea</i> Mart.	223, 224, 225, 232, 235
<i>disticha</i> Spreng.	233
<i>excelsa</i> Glaziou	230
<i>grandiflora</i> Mart.	227
<i>fasciculata</i> Spreng.	230
<i>maliformis</i> Lk ex Warm.	230
<i>minaensis</i> Glaziou	230
<i>minor</i> Spreng.	235
<i>Salvertia</i> A. de St. Hil.	223, 224, 225, 226, 227
<i>Vochysia</i> Poir.	223, 224, 225, 226, 227
<i>maliformis</i> Klotsch ex Warm.	230
<i>tucanorum</i> Mart.	226
<i>Vochysieae</i> Dumort.	223, 224, 225

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