

THE VASCULAR FLORA OF LA SELVA BIOLOGICAL STATION,  
COSTA RICA\*  
MARANTACEAE

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SCHUMANN, K. 1902. Marantaceae. In A. ENGLER, ed., Das Pflanzenreich. IV. 48: 1-184.

Rhizomatous perennial herbs, ranging in size from 0.1 to nearly 4 meters tall; the aerial shoots short or long, branched or not. *Leaves* simple, entire, spirally arranged, sometimes 2-ranked; lateral veins parallel, sigmoidally curved, joined by fine, closely parallel transverse veins; petiole distally thickened in a region of specialized cells (pulvinus), basally open sheathed. *Inflorescence* terminal on the leafy shoot or sometimes arising directly from the rhizome, compound, the basic unit a two-flowered monochasium subtended by a series of bracts, the outer bracts often colored, these basic units more or less congested into spikelike structures, and these often units of a larger synflorescence. *Flowers* of 3 equal, distinct, sepals, 3 somewhat unequal and basally connate petals, and 2-4 specialized staminodes, the outer staminodes (1-2) most often petaloid, the inner 2 (callose staminode and cucullate staminode) important structures in the elaborate "trigger" pollination mechanism, which usually prevents self-pollination; fertile stamen one; style and stigma one, the ovary inferior, 3-locular. *Fruit* a more or less fleshy capsule or chartaceous berry, 3-carpellate, 1- or 3-seeded; seeds often blue gray to black, provided with an oily aril.

The sigmoid curved lateral veins connected by fine parallel cross veins, together with the pulvinus, are diagnostic vegetative features for this family. The spring-loaded floral mechanism is also unique to the Marantaceae. The family is pantropical but is richest in species in Central and South America, where euglossine bees are the primary pollinators and *Calathea* is the largest genus. The 13 New World genera with about 330 species are restricted to the neotropics.

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KEY TO THE GENERA

1. Aerial shoots much branched distally.
  2. Inflorescence narrowly cylindrical, more than 12 cm long; bracts tightly imbricate throughout; floral tube 3-4.5 cm long, leaves ovate, pubescent within, but not alongside, the midrib. . . . . 3. *ISCHNOSIPHON*.
  2. Inflorescence ovate, somewhat flattened, no more than 8 cm long; bracts loosely imbricate; floral tube less than 1 cm long; leaves oblong, sparsely villous in lines alongside the midrib. . . . . 2. *CTENANTHE*.
1. Aerial shoots either unbranched or branched basally.
  3. Inflorescence flattened, narrowly ovate-elliptic, about 2 cm wide; bracts usually pruinose, tightly imbricate throughout, the margins erect; fruit 1-seeded; leaf tip with the midrib off center (eccentric). . . . . 4. *PLEIOSTACHYA*.
  3. Inflorescence terete, capitate or if flattened then oblong and more than 4 cm wide; bracts not pruinose, basally imbricate, the margins recurved, deeply splitting, or erect; fruit 3-seeded; leaf tip usually symmetrical. . . 1. *CALATHEA*.

1. *CALATHEA* G. F. W. Meyer

KENNEDY, H. 1978. Systematics and pollination of the "closed-flowered" species of *Calathea* (Marantaceae). Univ. Calif. Publ. Bot. 71: 1-90.

Plants 0.1-3(4) m tall; aerial shoots unbranched, short to elongate, with leaves mostly borne near the base or occasionally clustered distally on the aerial shoot and the basal leaves lacking. *Leaf* blades narrowly to broadly ovate, glabrous or pubescent, forming a rosette or in some species obviously 2-ranked. *Inflorescence* spicate, solitary on the shoot or one of several in a branched synflorescence, terminal on the shoot which may be elongate or very short, rarely borne on a leafless shoot arising directly from the rhizome; bracts 2-ranked and the inflorescence flattened or the bracts spirally arranged and the inflorescence terete and capitate, often brightly colored, usually persistent and conspicuous in fruit, rarely disintegrating. *Flowers* opening spontaneously or remaining closed until opened

by an appropriate visitor, rarely cleistogamous; floral tube 4- to many-times longer than wide. *Fruit* a 3-seeded capsule; seeds oblong, trigonate, light bluish gray to shiny black with a white aril.

This genus is the largest and most widespread of the neotropical Marantaceae, accounting for

perhaps two-thirds of its species and ranging from Mexico through Brazil and into the West Indies. More than 200 species are now recognized in *Calathea* with many more expected with further exploration of the wet lowland tropics.

#### KEY TO THE SPECIES

1. Leaves with a waxy bloom beneath; large plants of open secondary areas. . . . . 11. *C. lutea*.
1. Leaves without a waxy bloom beneath; smaller plants of primary forest or forest edges.
  2. Plants less than 20 cm tall; leaves less than 15 cm long; inflorescences about 1 cm long. . . . . 12. *C. micans*.
  2. Plants more than 50 cm tall; leaves usually more than 30 cm long; inflorescences 4 cm or more long.
    3. Inflorescences distinctly flattened, 1-4 per shoot; bracts 2-ranked, conduplicate.
      4. Leaves velvety short tomentose beneath; bracts pale yellowish green, villous throughout. . . . . 9. *C. lasiostachya*.
      4. Leaves glabrous beneath; bracts bright yellowish orange or yellowish green, glabrous or somewhat villous basally.
        5. Leaves densely villous above, 2.5-3 times longer than wide; bracts bright yellowish orange. . . . . 14. *C. similis*.
        5. Leaves glabrous above, 2 times or less longer than wide; bracts yellowish green. . . . . 8. *C. insignis*.
    3. Inflorescences cylindrical or ovoid, solitary; bracts spirally arranged but not 2-ranked.
      6. Apex of bracts acute to acuminate; inflorescences borne basally on short shoots, directly from the rhizome, or on elongate but leafless shoots; leaves mostly glabrous beneath (except *C. gymnocarpa* with uncinata trichomes).
        7. Bracts rapidly drying to papery brown, and soon disintegrating to fibers or completely rotting away; inflorescence globose to ovoid, 6-13 cm long, rather bulky, borne on a peduncle 25-100(150) cm tall.
          8. Leaves puberulent with uncinata trichomes beneath; inflorescence bracts soon totally disintegrating leaving the young fruits naked; juvenile leaves with pink lines on dark green above, purple beneath. . . . . 6. *C. gymnocarpa*.
          8. Leaves lacking uncinata trichomes beneath; inflorescence bracts disintegrating into fibers; juvenile leaves green. . . . . 7. *C. inocephala*.
        7. Bracts green or purple, or drying somewhat chartaceous but not disintegrating; inflorescence ovoid, 3.5-6 cm long, not bulky, borne on peduncles 1-27 cm long.
          9. Inflorescences borne on separate, leafless shoots directly from the rhizome; corolla lobes purple, staminodes white; leaves broadly elliptic, less than 2.5 times longer than wide. . . . . 1. *C. cleistantha*.
          9. Inflorescences borne from among the leaf sheaths of the main aerial shoot; corolla and staminodes bright yellow; leaves narrowly elliptic, 3-4 times longer than wide. . . . . 2. *C. cuneata*.
      6. Apex of bracts truncate to rounded; inflorescences borne on elongate leafy shoots (except *C. elegans*).
        10. Leaves glabrous beneath.
          11. Inflorescences borne basally among the leaf sheaths; leaves narrowly elliptic, 3-4 times longer than wide. . . . . 4. *C. elegans*.
          11. Inflorescences borne distally on the elongate leafy aerial shoot.
            12. Leaves 2-ranked; margin of bracts erect. . . . . 3. *C. donnell-smithii*.
            12. Leaves spirally arranged but not 2-ranked; margin of bracts recurved.
              13. Bracts bright green, glabrous; sepals green. . . . . 15. *C. venusta*.
              13. Bracts straw-colored to pale green, velvety tomentose; sepals pale yellow. . . . . 5. *C. foliosa*.
  10. Leaves pubescent beneath (although only minutely so along the veins in *C. marantifolia*).
    14. Bracts yellow to greenish, never white; leaves minutely pubescent along the veins beneath. . . . . 12. *C. marantifolia*.
    14. Bracts white or often tinged purple on the margin; leaf blades conspicuously pubescent at least beneath.
      15. Leaves burgundy and velvety tomentose beneath, variegated with a striking lighter green fish-tail pattern and glabrous above. . . . . 16. *C. warszewiczii*.
      15. Leaves green (rarely burgundy beneath) and usually villous throughout, occasionally irregularly variegated along the midrib above. . . . . 10. *C. leucostachys*.

### 1. *Calathea cleistantha* Standl.

Plants nearly acaulescent, leaves forming a rosette to 70 cm tall. *Leaf* blades mostly 35–54 cm long, 14–22 cm wide, broadly elliptic, apically acute to obtuse, basally rounded or acute overall but abruptly narrowed and then decurrent for about 1 cm; leaf surface glabrous above except within midrib, minutely and sparsely pubescent beneath. *Inflorescence* ovoid, 3.5–5 cm long, solitary or several together, peduncle 1–3(7) cm long, arising directly from the rhizome; bracts spirally arranged, narrowly ovate, apically acuminate, purplish, sparsely pubescent. *Flowers* with sepals greenish white, corolla lobes purple, staminodes white; opening spontaneously. Flowering in the rainy season from late August through February. Costa Rica and Panama.

Although never abundant, *Calathea cleistantha* is widespread at La Selva. It occurs in older successional woods as well as throughout the primary forest. The somewhat yellowish, bright green leaves and the abruptly narrowed and decurrent leaf base help distinguish this species vegetatively from others in the area. *Calathea inocephala* is the only other species at La Selva that sometimes bears inflorescences directly from the rhizome, but in other respects it bears little resemblance to *C. cleistantha*.

### 2. *Calathea cuneata* H. Kennedy

Plants nearly acaulescent, to 1 m tall. *Leaf* blades 30–45 cm long, 7–13 cm wide, narrowly elliptic and somewhat eccentric, apically acute to acuminate, basally acute; leaf surface glabrous above except midrib hirsute, glabrous beneath except for minute (less than 0.1 mm long) trichomes scattered along the midrib. *Inflorescence* ovoid, 4.5–5.5 cm long, borne solitary from within the sheathing leaf bases on a peduncle 5–16(27) cm long; bracts spirally arranged, narrowly ovate, apically acuminate, purple (drying tan chartaceous), densely appressed pubescent with trichomes to 0.8 mm long. *Flowers* (petals and staminodes) bright yellow, petaloid staminodes to 3 cm long by 2 cm wide, opening spontaneously. Flowering in the rainy season from August to November. Costa Rica and Panama.

Apparently restricted to slopes and ridges in primary forest and known from only a few localities especially along the Southwest Trail. The narrow and more or less erect leaf blades are distinctive but might be confused with those of the sympatric *Calathea elegans*. This latter species, however, has very conspicuously floccose leaf sheaths while those of *C. cuneata* are only sparsely appressed pubescent.

The La Selva populations of this species have

leaf blades that are about half as long and as wide, as those of *Calathea cuneata* previously described and observed in Panama. Furthermore, the leaf base in the La Selva plants is merely acute rather than cuneate, and the petals and petaloid staminodes are a much deeper yellow. *Calathea cuneata* s. str. has so far been collected mostly from higher elevations (1,000–2,000 m) and even wetter habitats (wet montane to cloud forest) than the La Selva form.

### 3. *Calathea donnell-smithii* K. Schum.

Caulescent plants to 1.5 m tall, all the leaves borne well above the middle of the stem. *Leaves* 2-ranked, drying dark olive green; the blades, 20–30 cm long, 9–14 cm wide, oblong, apically abruptly acuminate, basally truncate-rounded overall but slightly and abruptly decurrent near the petiole; leaf surface glabrous except minutely pubescent on midrib above. *Inflorescence* solitary, cylindrical, 6–8 cm long; peduncle 13–25 cm long; bracts spirally arranged, truncate-rounded, green at first but soon becoming dark purple, glabrous, the margins erect. *Flowers* with green sepals and white petals and staminodes; never opening spontaneously. Flowering November to April. Costa Rica and Panama.

Known from only a few plants along Quebrada Esquina. It has a habit similar to the somewhat more common *Calathea venusta* but can be distinguished from that species by its 2-ranked rather than spiral leaf arrangement. It is also distinguished by its very long, white flowers, the dark purple bracts with erect margins and the decurrent rather than merely acute or truncate leaf base. Both species are restricted to wet areas in the forest.

### 4. *Calathea elegans* H. Kennedy

Strongly rhizomatous, nearly acaulescent plants to 1.75 m tall. *Leaf* blades 35–50 cm long, 10–20 cm wide, narrowly ovate, apically acute, basally acute to obtuse or rounded, dark green (drying silvery green) above, lighter green or dark burgundy beneath; leaf surface glabrous except for short trichomes on midrib above; petiole sheath densely floccose with tan, silky trichomes to 3 mm long. *Inflorescence* solitary, ovoid, to 5–6 cm long, borne from within the sheathing leaf bases on a peduncle 5–21 cm long; bracts spirally arranged, rounded, green, densely villous with tan, silky trichomes to 3 mm long. *Flowers* white (corolla and staminodes); opening spontaneously. Flowering from July to September. Costa Rica south into Colombia.

At La Selva, this species is known from only two low ridges in the primary forest. At the site just west of the Holdridge Trail near line 1900, very dense, breast-high, clonal thickets are formed, often excluding all other understory herbs. Vegetatively the plants somewhat resemble a sympatric form of *Calathea cuneata* but are larger and have floccose rather than sparsely appressed pubescent leaf sheaths. Plants at La Selva differ from other collections of *C. elegans* in having truncate to rounded rather than acute to acuminate inflorescence bracts. The petiole sheaths are also more densely pubescent, and the inflorescences are borne lower and always appear to be solitary rather than one to three per shoot. Typical *C. elegans* is known only from Panama and Colombia.

##### 5. *Calathea foliosa* Rowlee ex Woodson

Causcous plants to 2 m tall, all the leaves borne well above the middle of the stem. *Leaves* apparently whorled or spirally arranged; blades 16–44 long, 6.5–16 cm wide, ovate to elliptic, apically acute, basally more or less truncate to rounded; leaf surface glabrous except for short pubescence on midrib above. *Inflorescence* ovoid to 5–7.5 cm long, the peduncle 2–7 cm long, solitary on the leafy shoot; bracts spirally arranged, apically rounded and recurved, densely pubescent with trichomes to 0.5 mm long, light green. *Flowers* pale yellow, never opening spontaneously. Flowering at the end of the dry season, May. Costa Rica and Panama.

Apparently very rare at La Selva, having been found just off La Selva property along the Río Peje at the southwest corner of the Western Annex. *Calathea foliosa* is known from very few locations, all on the Caribbean slope of southern Central America.

##### 6. *Calathea gymnocarpa* H. Kennedy

Plants appearing nearly acaulescent, leaves forming a rosette to 1.5 m tall. *Leaf* blades 35–50(65) cm long, 19–30(40) cm wide, ovate-elliptic, apically rounded and sometimes with a slight acumen, basally rounded overall but shortly and abruptly decurrent on the petiole; leaf surface glabrous above, scaberulous with short (0.15 mm) uncinete trichomes and often purplish beneath; juvenile leaves dark shiny green above, variegated with white lines paralleling the lateral veins, dark burgundy beneath. *Inflorescence* solitary, ovoid, 7–13 cm long, subtended by 1 or 2 bladeless sheaths borne from nodes above the middle of an elongate shoot 25–65 cm long arising from within the rosette of sheathing leaf bases; bracts

spirally arranged, narrowly lanceolate, light tan, thin, chartaceous, densely appressed pubescent, rotting away in early fruiting state. *Flowers* creamy tan to off-white, sparsely pilose, the petaloid staminode lightly streaked with purple; flowers opening spontaneously. Flowering mostly during the rainy season, July through October but also found flowering and fruiting in March and April. Panama and Costa Rica.

Known at La Selva only from the old secondary woods of abandoned cacao along the Río Puerto Viejo. It is easily confused with the more robust, sympatric *Calathea inocephala* because of similar inflorescence and habit. The strikingly colored juvenile leaves of *C. gymnocarpa*, however, are unique among the Marantaceae of La Selva as are the uncinete trichomes of the lower leaf surface. The petioles of *C. gymnocarpa* are distinctly spongy whereas those of *C. inocephala* are relatively solid. The flowering phenology of *C. gymnocarpa* is apparently unique in the genus; flowers in the whole lower portion (half or more) of the inflorescence open almost simultaneously in one day with the remaining flowers opening within a few days. Species of *Calathea* typically produce only a few flowers each day over a much longer period. The fugacious bracts are also unusual.

##### 7. *Calathea inocephala* (O. Ktze.) H. Kennedy & D. Nicolson

Plants nearly acaulescent, leaves forming a rosette to 2.5 m tall. *Leaf* blades (45)70–100 cm long, (22)30–50 cm wide, elliptic, apically broadly acute to rounded, basally rounded or truncate overall but slightly decurrent on the petiole; leaf surface glabrous except for short pubescence along the midrib beneath, dull above, shiny beneath. *Inflorescence* globose-ovoid, 6–12 cm long, borne solitary on a nodeless peduncle 40–100(150) cm tall, bearing bladeless sheaths only basally, often arising directly from the rhizome; bracts spirally arranged, ovate, the tip acuminate, golden tan, papery, minutely appressed pubescent (trichomes less than 0.1 mm long), splitting and persisting in fruit as fibers. *Flowers* with creamy white petals, the staminodes with yellow streaks; flowers opening spontaneously. Flowering mostly in the rainy season, April through September. Costa Rica, Panama and South America.

At La Selva this species occurs both in swampy areas and stream sides, as well as on higher ground in the forest. *Calathea inocephala* has an inflorescence and habit very similar to the presumably closely related *C. gymnocarpa* but overall is a much more robust plant. The juvenile leaves are merely green (not variegated and purple), and

the adult leaves are nearly twice the size of those of *C. gymnocarpa*.

#### 8. *Calathea insignis* O. Petersen

Caulесcent plants to nearly 3(4?) m tall with most leaves basal. *Leaf* blades 75–110 cm long, 45–55 cm wide, ovate-elliptic, apically broadly rounded, sometimes with a small acumen, basally truncate or obtuse, the surface glabrous. *Inflorescences* several per shoot, oblong and flattened, 14–25 cm long, 5.5–7.5 cm wide; bracts 2-ranked, distantly pubescent, shiny yellowish green. *Flowers* with corolla and staminodes yellowish orange; opening spontaneously. Flowering in the rainy season, June through August. Mexico south into Peru.

*Calathea insignis* appears to be less common at La Selva than the closely related *C. similis*. Both species are found most often at the edge of forest or occasionally in gaps. Although the two are very similar in habit, inflorescence and habitat preference, the differences in leaf pubescence are absolute and correlate with a number of other, less obvious differences. At La Selva the bracts of *C. insignis* are yellowish green while those of *C. similis* are bright yellowish orange.

#### 9. *Calathea lasiostachya* Donn. Sm.

Caulесcent plants 1 to 2 m tall with leaves mostly basal. *Leaf* blades 50–70 cm long, 10–20 cm wide, narrowly ovate, apically acute, basally acute to truncate or rounded; leaf surface usually glabrous above except sparingly villous apically and basally or occasionally throughout on younger leaves, villous throughout beneath. *Inflorescences* several per shoot, oblong-flattened, 8–17 cm long, 5–6(8) cm wide, the peduncles 5–30(34) cm long; bracts 2-ranked, villous throughout, dull yellowish green. *Flowers* with pubescent, greenish creamy yellow petals, the staminodes lavender to pink; flowers opening spontaneously. Flowering mostly in the rainy season, May to December but also known to flower as early as March. Costa Rica and Panama.

Very common at La Selva, where frequently found along trails and in gaps, but also on slopes and ridges. Seemingly restricted to such areas in primary forest and unlike most other local Marantaceae, *C. lasiostachya* prefers relatively well drained sites. The narrowly lanceolate leaf blades, which are three to four times longer than wide and usually glabrous above, but villous on the lower surface, distinguish this *Calathea* from all others at La Selva. At maturity the shiny, black, arillate seeds lie exposed in the inflorescence con-

trasting strongly with the pale bracts and are probably dispersed by birds.

#### 10. *Calathea leucostachys* Hook. f.

Caulесcent plants 40–80 cm tall, the stem elongating as the lower leaves fall to leave a more or less decumbent lower portion often supported on stout adventitious roots, the leaves forming a rosette. *Leaf* blades (23)30–36 cm long, (11.5)15–20 cm wide, oblong-elliptic, apically and basally rounded overall but sometimes broadly acute, villous above or beneath or on both surfaces, green and often with a lighter dendritic pattern along the midrib above, green or burgundy beneath. *Inflorescence* solitary, ovoid, 7–9 cm long, the peduncles 23–40 cm long; bracts spirally arranged, the margin recurved and often purple tinged with white overall, villous with golden trichomes. *Flowers* white, never opening spontaneously. Flowering in the rainy season, July to October. Nicaragua to Panama.

This species is shade loving and restricted to swampy areas in the forest. At La Selva it is known from a few small populations. Populations with leaves green beneath as well as populations with leaves burgundy beneath occur at La Selva.

*Calathea leucostachys* might be mistaken for its presumed nearest relative *C. warscewiczii*. However, the decumbent and adventitiously rooted stem of *C. leucostachys* is distinctive as is the relatively long, hirsute pubescence of the leaf blades.

#### 11. *Calathea lutea* (Aubl.) Schult.

Caulесcent plants 1–4 m tall, the leaves mostly basal and forming a rosette. *Leaf* blades 75–100 cm long, 45–50 cm wide, oblong apically, base broadly rounded to truncate; the surface of the blade pruinose beneath, glabrous throughout. *Inflorescences* several per shoot, cylindrical, 16–20 cm long, 2.5–5 cm wide; bracts more or less spirally arranged appearing somewhat 2-ranked especially in dried material, funnel-shaped (conduplicate when pressed), bronze to reddish brown, glabrous. *Flowers* yellow, opening spontaneously. Flowering mostly in the dry season, February through March. Belize to Brazil and Peru; West Indies.

*Calathea lutea* is found in open swamps as well as in relatively well drained areas in abandoned pasture. This species is probably the most massive *Calathea* at La Selva; in some successional areas it can become the dominant plant in early stages. It is the only *Calathea* at La Selva whose leaves are white beneath from a buildup of epidermal wax.

12. *Calathea marantifolia* Standl.

Cauliscent plants to 1.5 m tall bearing both basal and cauline leaves. *Leaf* blades 35–50 cm long, 14–20 cm wide, oblong-elliptic, apically rounded but with an acumen, basally rounded to truncate; surface of the blade glabrous above, minutely appressed pubescent along the veins beneath. *Inflorescence* solitary, ovoid, 5–8 cm long, the peduncles 7–21 cm long; bracts spirally arranged, broadly ovate or roundedly truncate, greenish yellow, rarely tinged with purple. *Flowers* creamy, yellowish white, never opening spontaneously. Flowering mostly in the rainy season, May through December. Guatemala south into Ecuador.

*Calathea marantifolia* is found in low wet areas along the river where it occasionally forms large pure stands. Scattered individuals also occur in secondary woods. In habit and inflorescence type this species is most similar to *C. warscewiczii* among La Selva species. A natural hybrid between these two species has been reported by Kennedy (1978: 58) from Limón Province in Costa Rica but none has been seen at La Selva.

13. *Calathea micans* (Mathieu) Koern.

Acaulescent plants to 10–20(30) cm tall. *Leaf* blades (4)6–8 cm long, 1.5–2.5(3) cm wide, elliptic, apically acute to acuminate, basally acute; surface of blade glabrous except hirsute within the midrib above with trichomes 1 mm long, sometimes lighter colored along the midrib above, often burgundy tinged beneath petioles (2)4–10 cm long. *Inflorescence* solitary, ovoid, about 1 cm long, borne on a slender peduncle 5–12.5 cm long, often exceeding the leaves; cleistogamous inflorescences borne at base of plant; bracts spirally arranged, ovate, apically acuminate, dark purple. *Flowers* white, opening spontaneously or cleistogamous. Flowering throughout the year. Mexico through northern South America.

*Calathea micans* is mostly restricted to forest trails. Its small size alone distinguishes it from all our other Marantaceae. It is our only *Calathea* with truly cleistogamous flowers. Populations at La Selva are quite variable in leaf coloration; some individuals have leaves that are solid dark green, others are solid grayish green, and some are dark green with a lighter band along the midrib.

The name *Calathea microcephala* (Poepp. & Endl.) Koern. has also been applied to plants of small stature from Central America. However, that species is apparently restricted to Peru and Ecuador and differs from *C. micans* in its broader, more ovate leaves (H. Kennedy, pers. comm.). Some authors have distinguished *C. microce-*

*phala* and *C. micans* on the basis of color of the outer staminode, white in the former, blue in the latter. However, staminodal color appears to vary within populations.

14. *Calathea similis* H. Kennedy

Cauliscent plants to 3 m tall, leaves mostly basal. *Leaf* blades 50–100 cm long, 18–40 cm wide, oblong-ovate, apically rounded but with an acumen, basally rounded to truncate; leaf surface pilose above with trichomes to 2 mm long, glabrous beneath. *Inflorescences* several per shoot, oblong, 15–30 cm long, 4.5–8 cm wide, the peduncles 11–36(60) cm long; bracts 2-ranked, flattened, mostly glabrous except often marginally villous, the lowest one often basally hirsute, shiny yellow orange, very fragrant. *Flowers* with yellowish orange petals and staminodes; always opening spontaneously. Flowering in the rainy season, May through August. Costa Rica and Panama.

The widely scattered *Calathea similis* is found mostly in openings in the forest, along streams, trails and in gaps. It is a species of somewhat disturbed or open areas but is found neither in open swamps nor recently abandoned pasture. It had been confused with *C. insignis* until distinguished by Kennedy. The sweet cinnamon-like fragrance of the inflorescence is remarkably strong; it can be detected from several meters away.

15. *Calathea venusta* H. Kennedy

Cauliscent plants to 1.5 m tall, all of the leaves borne above the middle of the aerial shoot. *Leaf* blades (20)23–37 cm long, (6)9–14 cm wide, often widest above the middle, apically acute to rounded but with a small acumen, basally acute; leaf surface glabrous. *Inflorescence* solitary, cylindrical, 6–11 cm long, 2.5–4 cm wide, the peduncle 13–28 cm long; bracts spirally arranged, broadly ovate with the margin often reflexed, at first bright green with a purplish margin, becoming purple throughout with age. *Flowers* with green sepals and white petals and staminodes; never opening spontaneously. Flowering has been observed in February, March, August, and September. Costa Rica and Panama.

Occasional at La Selva and restricted to streamsides and wet areas in the forest.

16. *Calathea warscewiczii* (Mathieu) Koern.

Cauliscent plants to 1 m tall, most leaves basal, forming a rosette. *Leaf* blades 25–40 cm long, 9–12.5 cm wide, elliptic, apically rounded but

with a short acumen, basally broadly acute; leaf surface glabrous above and distinctively variegated with a repeated, lighter fish-tail pattern along the midrib, very short velvety pubescent and burgundy beneath. *Inflorescence* solitary, ovoid or somewhat turbinate, 3.5–6 cm long, 2–4 cm wide, the peduncle 4–14 cm long; bracts spirally arranged, broadly ovate, the margins often recurved and purple tinged, otherwise white. *Flowers* white; never opening spontaneously. Flowering in the rainy season, June to August. Costa Rica and Panama.

*Calathea warszewiczii* is rare at La Selva and restricted to partially shaded, swampy areas at forest edges. It is similar in leaf shape and especially in details of the inflorescence to its nearest relative *C. leucostachys*, but the striking fish-tail pattern of variegation on the upper leaf surface and dark burgundy, velvety pubescent lower leaf surface make it unmistakable. A natural hybrid between this species and *C. marantifolia* has been reported (Kennedy, 1978: 58) but has not been seen at La Selva.

## 2. CTENANTHE Eichler

Cauliscent rhizomatose perennials with the aerial shoot much branched. *Leaves* often oblong, somewhat leathery. *Inflorescences* often one-sided or nearly bisymmetric, usually numerous within a larger terminal, compound synflorescence; bracts imbricate, usually persistent or rarely deciduous, green becoming tan when dry. *Flowers* with the tube short, only 1–2 times longer than wide. *Fruit* thin-walled, one-seeded capsules, the seeds small, tuberculate, with a bilobed aril. A small genus of 10–12 species ranging from southern Central America to Brazil.

This genus belongs to the *Myrosma* group characterized, in part, by a relatively short floral tube. All other Marantaceae at La Selva have comparatively long floral tubes and belong to the *Calathea* group.

### 1. *Ctenanthe* sp. nov.

Cauliscent, much branched plants to 2.5 m tall with most leaves borne above the base. *Leaf* blades 26–53 cm long, 11–20 cm wide, oblong-elliptic, apically acute to rounded with an acumen, basally broadly acute; the surface glabrous except villous in 2 lines along the midrib above and marginally villous; petiole sheath densely villous. *Inflorescences* numerous in a branching synflorescence, each inflorescence unit more or less narrowly ovoid, 6–8 cm long, 2–3 cm wide, the peduncles 0–4.5(8) cm long; rachis of the inflorescence slightly zig-zag, the nodes villous; bracts mostly 2-ranked, elliptic and folded, api-

cally acute, imbricate at first and becoming distant (villous nodes of rachis visible at or soon after anthesis) and deciduous (the bract and included flowers falling). *Flowers* with corolla and staminodes basally white, lavender-fringed or sometimes lavender throughout. Flowering mostly in the rainy season, March through September. Costa Rica.

Known from three populations at La Selva in swampy areas in the primary forest. Because of its distant bracts and its short floral tube, this species is very distinctive among the Marantaceae at La Selva. Its oblong leaves and branching habit also help distinguish it vegetatively from our other Marantaceae. These plants have never been seen to set fruit; the whole cymule falls away after it has flowered, leaving the bare rachis. Collections from La Selva and from elsewhere in Costa Rica have been annotated by Helen Kennedy as a new species distinct from *Ctenanthe dasycarpa* (Donn. Sm.) K. Schum., the only other Central American species.

## 3. ISCHNOSIPHON Koern.

ANDERSSON, L. 1977. The genus *Ischnosiphon* (Marantaceae). *Opera Bot.* 43: 1–114.

Cauliscent plants, erect and shrublike or sometimes clambering. *Leaves* 2-ranked, the blades usually narrowly ovate and eccentric. *Inflorescence* terminal and usually solitary, narrowly cylindrical; bracts tightly imbricate and persistent. *Flowers* white or pale orange (at La Selva), floral tube much longer than wide; ovary 3-locular with 2 abortive locules. *Fruit* one-seeded, the seeds arillate. A neotropical genus of about 30 species ranging from Nicaragua south into southern Brazil.

Unlike the fruits and seeds of *Calathea* species, many of which demonstrate obvious visual display, presumably to attract dispersers, those of *Ischnosiphon* remain within the inconspicuous bracts until dispersal. The presence of an oily aril does, however, suggest dispersal by animal vectors.

## KEY TO THE SPECIES

1. Delicate clambering plants; stems not pruinose, minutely appressed pubescent; inflorescence bracts green, not pruinose; flowers white. . . . 1. *I. elegans*.
1. Robust shrublike plants; stems often pruinose and hirsute at nodes; inflorescence bracts tan in age; pruinose at base; flowers pale yellowish orange. . . . . 2. *I. inflatus*.

### 1. *Ischnosiphon elegans* Standl.

Cauliscent plants with stems to 2 m long. *Leaf*

blades (12.5)15–27 cm long, (5.5)7–12 cm wide, ovate, apically acute but rounded and with an acumen, basally acute to rounded or truncate but acute at the petiole, leaf surface pubescent in the midrib and minutely pubescent along the major lateral veins above, glabrous beneath; leaf sheath pustulose. *Inflorescence* 17–33 cm long, 0.4–0.5 cm wide, the peduncle 3–9 cm long; bracts spirally arranged, minutely pubescent (trichomes to 0.4 mm long), green. *Flowers* with corolla and staminodes white. Flowering in the rainy season, July to October. Costa Rica.

This species is known at La Selva from only one locality and few individuals in the old secondary woods along the Río Puerto Viejo on the West River Road at the point where it enters the former Granjas Tropicales cacao plantation. Its clambering, almost vinelike habit, is unique among the Marantaceae at La Selva.

#### 2. *Ischnosiphon inflatus* Andersson

Plants to 3 m tall. *Leaf* blades (26)36–69 cm long, (10)16–28 cm wide, ovate-elliptic, apically acute but narrowing to a long acumen, basally rounded or truncate and slightly decurrent; leaf surface pubescent within the midrib and minutely pubescent along the major lateral nerves above, glabrous beneath; petiole sheaths villous with yellowish trichomes to 1.6 mm long. *Inflorescence* 12–36 cm long, about 1 cm wide, the peduncle 3–5.5 cm long; bracts 2-ranked, sparsely pubescent especially along the margin with yellow trichomes to 1 mm long; nodes of the inflorescence farinose. *Flowers* with petals pale yellowish orange, the staminodes a somewhat darker orange. Flowering in the rainy season, July to August. Costa Rica, Panama, and northwestern Colombia.

*Ischnosiphon inflatus* is frequently found at La Selva both in open swamps and well-drained slopes in primary forest.

#### 4. *PLEIOSTACHYA* K. Schum.

Nearly acaulescent plants to 2 m tall. *Leaves* 2-ranked, petioles broadly complanate at base of plant; leaf blades ovate, more or less eccentric. *Inflorescences* 1–several in a branched synflorescence, narrowly ovate to oblong, more or less pruinose, flattened; bracts tightly imbricate, membranaceous, densely to sparsely hirsute with yellowish trichomes. *Flowers* pale yellow with a purple staminode, floral tube much longer than wide; ovary 3-locular with 2 abortive locules.

A genus of only three species, two of them endemic to southern Central America and the third widespread in Central America and northwestern South America.

#### KEY TO THE SPECIES

1. Inflorescence bracts 5–5.5 cm long, densely villous, 4–6 bracts (on one side) per 10 cm of inflorescence; margin of bracts curved towards tip; 2–3 inflorescences per flowering shoot; petiole with a raised, usually transverse ring subtending the pulvinus; plants growing in swampy areas of primary forest. . . . . 1. *P. leiostachya*.
1. Inflorescence bracts 3.7–4.5 cm long, sparsely villous, 7–9 bracts per 10 cm of inflorescence; margin of bracts straight to the tip; commonly 6 to as many as 9 inflorescences per flowering shoot; petiole narrowing along an oblique ledge to the pulvinus; plants growing in secondary woods. . . . . 2. *P. pruinosa*.

#### 1. *Pleiostachya leiostachya* (Donn. Sm.) Hammel

Plants to 2 m tall. *Leaf* blades 47–67 cm long, 17–24 cm wide, ovate-elliptic, apically narrowly to broadly acute, basally broadly acute; leaf surface glabrous except hirsute within the midrib above, sparsely appressed pubescent on the midrib beneath, usually dark burgundy beneath. *Inflorescence* 13–27 cm long, about 2 cm wide, the peduncles 2–3.5 cm long; bracts mostly 5–5.5 cm long, densely villous with yellowish trichomes to 2.5 mm long (or glabrous, elsewhere), yellowish tan and often pruinose. Seeds to 1 cm long. Flowering in the rainy season, August to September. Costa Rica and Panama.

Restricted to swamp forest and other wet areas in or near primary forest at La Selva where widespread, but only locally common. The elevated annulus at the base of the pulvinus and the dark burgundy lower leaf surface are sufficient to distinguish this species from the sympatric form of *Pleiostachya pruinosa*. At La Selva, *P. leiostachya* also has longer and fewer inflorescences, larger more curved and more densely villous bracts, larger more yellow flowers, and smaller leaves than the sympatric form of *P. pruinosa*.

#### 2. *Pleiostachya pruinosa* (Regel) K. Schum. (=*P. morlae* (Eggers) K. Schum.)

Plants to 2 m tall. *Leaf* blades 60–87 cm long, 20–35 cm wide, ovate-elliptic, apically broadly acute to obtuse, basally broadly acute; leaf surface glabrous except for short pubescence (trichomes less than 0.5 mm long) within the midrib above and sparsely pubescent on the midrib beneath. *Inflorescences* (4)6–18 cm long, about 2 cm wide; bracts 3.7–4.5 cm long, sparsely villous with trichomes to 2.5 mm long (densely villous to glabrous elsewhere), slightly to distinctly pruinose; greenish to tan in age. Seeds about 8 mm long. Flowering in the rainy season, July to August. Mexico south into Ecuador.



At La Selva restricted to old secondary woods. The base of the pulvinus of mature leaves is not set off by a raised annulus as in *Pleiostachya leiostachya*. This feature is difficult to evaluate on herbarium specimens but other collections

and populations from elsewhere examined in the field all seem to have the raised annulus, which helps distinguish species of *Pleiostachya* from those of *Calathea*. The raised annulus is present on young leaves of *P. pruinosa* at La Selva.