

ing relatively difficult, a few counts at the first or second anaphase, and more numerous counts at the first metaphase (fig. 1)⁷ and the second metaphase (fig. 2).

As Strasburger's⁴ figures indicate, the chromosomes are very small. Dark granules, sometimes resembling the chromosomes, were often troublesome, and spoiled some preparations, but some metaphase groups were individually decisive. With Mediterranean Sweet (that is, one of the apogamic progeny from a species cross in which this variety was seed parent), the case was finally put beyond the possibility of reasonable doubt. The chromosomes in two groups of pollen mother cells at the second division were countable in a large proportion of the cases, and 24 positive counts of 9 chromosomes were made here; in four of these cells, both groups were countable and each group consisted of 9 chromosomes. The few apparent counts of 8 in these groups were plainly to be classed with those of still smaller numbers; that is, they obviously were cases where not all the chromosomes of the normal complement were distinguishable. It is also significant that apparent counts of 10 are rare.

Since three varieties of Citrus have been found to have 9 pairs of chromosomes, and two of these varieties belong to one of the species which Strasburger studied, it seems probable that 9, not 8, is the usual haploid number in Citrus. At least, it is certain that the number is not uniformly 8.

BOTANY.—*New plants from Central America.*¹ PAUL C. STANDLEY,
U. S. National Museum.

In the course of work recently begun upon a flora of the Panama Canal Zone, several new species have been detected, and descriptions of them are published here. Two of the species described were recognized a few years ago by the late Prof. W. W. Rowlee, while revising the Scitaminales for the proposed Flora of Central America.

Most of the species here described belong to the large family Rubiaceae, and particularly to the genus *Hoffmannia*. This genus finds its greatest development in Mexico and Central America, and consists of a large number of species, most of which seem to be extremely local in their distribution.

⁷ The figures were drawn with the aid of a camera lucida, at a magnification of about 3065 diameters, and are reduced one-fourth in reproduction.

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***Calathea hirsuta* Standl., sp. nov.**

Plants 0.5 to 1 meter high; leaves all basal, long-petiolate, the sheaths 15–20 cm. long, membranaceous, densely short-hirsute, the petioles 3 cm. long or less, hirsute, the blades oblanceolate-oblong to oval, 19–41 cm. long, 11–12.5 cm. wide, rounded or broadly cuneate at base, abruptly short-acuminate at apex, thin, green, sparsely short-pilose above or glabrate, beneath soft-pilose or in age glabrate; scape 54–66 cm. long, slender, hirsute; spike 6–12 cm. long, 1–2 cm. thick, the bracts 4 or 5, spirally imbricate, rather lax, broad, thin, 2.5–4 cm. long, acute to rounded and apiculate at apex, densely hirsute; corolla glabrous, exserted 2–3 cm. beyond the bracts.

Type in the U. S. National Herbarium, no. 1,165,835, collected at Alajuela, Panama, August 18, 1923, by F. L. Stevens (no. 1131). Also collected in damp woods on Ancón Hill, Canal Zone in 1923, *Standley* 25163.

A very distinct species, not closely related to any other known from Central America.

***Calathea panamensis* Rowlee, sp. nov.**

Plants small, 20–40 cm. high, with few or numerous, erect or spreading basal leaves; petioles 8–16 cm. long, sheathed for nearly their whole length, minutely pilose or glabrate; leaf blades obovate to oval, 11–20 cm. long, 5–10 cm. wide, rounded and abruptly short-acuminate or apiculate at apex, rounded or obtuse at base, thin, glabrous above except along the puberulent costa, puberulent beneath; peduncles one or several, 3.5 cm. long or less, the spikes sometimes sessile; bracts numerous, the outer ones ovate to lance-oblong, 4–7 cm. long, membranaceous, acute or acuminate, sparsely short-pilose; corolla yellow, equaling or exceeding the bracts, the segments sericeous outside.

Type in the U. S. National Herbarium, no. 863124, collected in deep woods near Juan Díaz, Province of Panama, Panama, near sea level, Sept. 30, 1917, by Ellsworth P. Killip (no. 3078). The following additional specimens represent the same species:

PANAMA: Near Tapia River, edge of forest, *Maxon & Harvey* 6664. Matías Hernández, *Pittier* 6806. Chepo, Province of Panama, *Pittier* 4564.

COSTA RICA: Matambú, Nicoya Peninsula, alt. 600 m., *Cook & Doyle* 710.

***Myrosma panamensis* Standl., sp. nov.**

Plants acaulescent, small, usually 30–40 cm. high, with few or numerous basal leaves; petioles 12–18 cm. long, with broad green sheaths nearly their whole length, glabrate; leaf blades elliptic or oval, 16–30 cm. long, 7–13 cm. wide, obtuse or acute at apex, rounded or broadly cuneate at base, thin, glabrous above except along the puberulent costa, beneath slightly paler, thinly short-pilose or puberulent; scapes equaling or shorter than the petioles, bearing at apex a large long-petiolate leaf; racemes 2–4 from the axil of the leaf, 4–6 cm. long, on peduncles 1.5–4 cm. long; bracts numerous, lax, spreading, rather remote, broadly ovate, about 2 cm. long, obtuse, scarious, glabrous; sepals oblong-lanceolate, 1 cm. long; ovary glabrous.

Type in the U. S. National Herbarium, no. 1,153,506, collected in wet forest along the Río Tapia, Province of Panama, Panama, near sea level, December, 1923, by Paul C. Standley (no. 26219). The following additional collections belong here:

PANAMA: Río Tecumen. *Standley* 26738. Near the big swamp east of Río Tecumen, *Standley* 26608. Along the Corozal Road, near Panama, *Standley* 26845.

Pleiostachya pittieri Rowlee, sp. nov.

Plants a meter high or more; petioles about 75 cm. long, glabrous, the callus terete, glabrous, 4 cm. long, with a distinct collar at its junction with the petiole; leaf blades elliptic, about 45 cm. long and 15 cm. wide, green and glabrous on both sides, acute at each end; spikes 2, sessile, linear, 15–19 cm. long, 1.3 cm. wide, slightly compressed; bracts ovate, 2.2 cm. long, acute, coriaceous, closely appressed, glabrous; flowers white, exerted; spikes subtended by a large petiolate leaf and by an obtuse oblong bract 3 cm. long inserted opposite the leaf.

Type in the U. S. National Herbarium, no. 679566, collected on hills of Sperdi, Puerto Obaldía, San Blas Coast, Panama, altitude 200 meters or less, September, 1911, by H. Pittier (no. 4409).

Pleiostachya pruinosa (Regel) Schum., the only similar species, differs in its usually pedunculate, broader, more compressed spikes, with larger thinner bracts, and in the dark red lower surface of the leaves.

Aristolochia panamensis Standl., sp. nov.

Stems erect or decumbent, simple, 30–100 cm. high, stout, the young branches densely pilose with short subappressed hairs; petioles stout, about 1 cm. long; leaf blades obovate-oval to oblong-obovate, 9–21 cm. long, 5–12 cm. wide, acute to rounded at apex, acute at base, thick, pinnate-nerved, glabrous above, beneath very glaucous, finely soft-pubescent, the venation prominent-reticulate; flowers borne near the base of the stem; peduncles slender, simple, in fruit 3–6 cm. long; calyx about 3.5 cm. long, densely pilose, the basal portion narrow, the throat inflated into a large sac 1.8 cm. broad, the limb apparently broadly ovate and acuminate; capsule oval, about 3 cm. long and 1.5 cm. in diameter, 6-celled, tomentose or glabrate, 6-costate.

Type in the U. S. National Herbarium, no. 1,154,510, collected in moist forest along the Río Paraíso, above East Paraíso, Canal Zone, Panama, Jan. 7, 1924, by Paul C. Standley (no. 29906). The following additional specimens belong here:

PANAMA: Vicinity of San Felix, eastern Chiriquí, alt. 120 meters or less, *Pittier* 5463, 5750. Río Pedro Miguel, Canal Zone, *Standley* 29950. Las Cascadas Plantation, Canal Zone, *Standley* 25740, 29515.

The plant is abundant locally in wet forests about the Canal Zone. It is quite unlike any of the other Central American species.

Aristolochia sylvicola Standl., sp. nov.

Stems very slender, scandent, glabrous; petioles slender, glabrous, 6–8 cm. long; leaf blades broadly rounded-deltoid, 12–17 cm. long, 10–15 cm. wide, acuminate or somewhat abruptly acute, at base subcordate or subtruncate, thin, dark green and glabrous above, beneath glaucescent and thinly puberulent, palmately 5-nerved; inflorescence 4-flowered, borne on the naked corky-angled stems, glabrous, the pedicels about 6 mm. long; immature capsules oblong, 6-angled, 3 cm. long, glaucescent, glabrous.

Type in the U. S. National Herbarium, no. 1,153,853, collected in wet forest on hills north of Frijoles, Canal Zone, Panama, Dec. 19, 1923, by Paul C. Standley (no. 27469).

The stems were tightly wrapped about the trunk of a large tree. Only one plant was found. Although without flowers, the plant is so distinct from all known Central American species of *Aristolochia* that it seems best to describe it as new.

Calderonia klugei Standl., sp. nov.

Tree; young branchlets sparsely hispid with short hairs; stipules triangular-ovate, 7 mm. long, brown, puberulent outside along the costa; petioles about 3 mm. long, hispid; leaf blades broadly ovate, 4–6.5 cm. long, 2–4.5 cm. wide, narrowed to the obtuse apex, usually deeply cordate at base, glabrous above, hispidulous beneath along the costa; capsule subglobose, 2.5–3 cm. long, glabrate, 2-celled, loculicidally bivalvate; seeds numerous, horizontal, semiorbicular, strongly compressed, winged at one end, the seed with its wing 2.5 cm. long.

Type in the U. S. National Herbarium, no. 1,206,424, collected near Chepo, Province of Panama, Panama, in 1924, by H. C. Kluge (no. 19).

The type material forms part of a small but interesting collection of timber trees obtained by Mr. Kluge in the neighborhood of Chepo. The collector states that this tree does not reach a great size and that it grows usually on overflowed land. The vernacular name is "palo colorado."

The flowers are not at hand, and when they are collected it may be found that the tree belongs to some other genus, but the fruit is so distinctive that it seems probable that it belongs to the genus *Calderonia*, recently described² from Salvador. *Calderonia salvadorensis* is distinguished from the Panama tree by its large leaves, rounded or obtuse at base.

Manettia estrellae Standl., sp. nov.

Suffrutescent or woody vine, the stems villosulous; stipules 1–1.5 mm. long, dentate; petioles 3–24 mm. long, villosulous; leaf blades ovate to oblong-elliptic, 3.5–6.5 cm. long, 1.5–3 cm. wide, acute, obtuse or acute at base, thin, villosulous on both surfaces, more densely so beneath; eymes axillary, few-flowered, pedunculate, the pedicels stout, 2.4 mm. long, villosulous; hypanthium densely short-villous, the 4 calyx lobes oblong-oblancoelate, foliaceous, 4–5 mm. long, acute; corolla pinkish white, thinly villous outside, the slender tube 1 cm. long, the lobes of about the same length; capsule obovoid, 5 mm. long.

Type in the U. S. National Herbarium, no. 1,153,146, collected in wet forest, La Estrella, Province of Cartago, Costa Rica, March 27, 1924, by Paul C. Standley (no. 39224). No. 39425 from the same locality is of this species.

Among the North American species this is easily recognized by the copious pubescence upon all parts of the plant.

² This JOURNAL 13: 290. 1923.

***Hamelia storkii* Standl., sp. nov.**

Branches glabrous; stipules subulate from a narrowly triangular base, 10–12 mm. long, ciliate; leaves opposite, the petioles 1.5–5 cm. long, glabrous; leaf blades elliptic, 12–22 cm. long, 4–9 cm. wide, acuminate, acute at base, sparsely barbate beneath in the axils of the lateral nerves, elsewhere glabrous; inflorescence terminal, the branches often 10 cm. long in age, glabrous, many-flowered, the flowers secund, sessile or nearly so; calyx glabrous, the lobes triangular-oblong, 1.5 mm. long, obtuse, longer than broad, erect; corolla yellow, 2.5–3 cm. long, tubular, slightly widened above, the throat 4 mm. broad; fruit oblong, 1 cm. long, 3 mm. thick.

Type in the U. S. National Herbarium, no. 1,166,466, collected in western Panama, August 1, 1923, by H. E. Stork (no. 38). Also collected in the Changuinola Valley, Panama, Jan. 14, 1924, by V. C. Dunlap (no. 326).

Related to *H. calycosa* Donn. Smith, of Guatemala, which has smaller, mostly ternate leaves, a few-flowered inflorescence, and smaller corolla, besides much larger calyx lobes.

***Hamelia rowleei* Standl., sp. nov.**

Branches thinly pilose with long spreading hairs; stipules subulate, about 1 cm. long; leaves opposite, the petioles 1.5–4.5 cm. long, sparsely pilose; leaf blades elliptic-obovate, 15–19 cm. long, 7–8 cm. wide, abruptly short-acuminate, cuneate-attenuate at base, villosulous above along the costa but elsewhere glabrous, beneath copiously pilose with stiff spreading hairs; inflorescence terminal, many-flowered, the branches pilose, the flowers secund, sessile or nearly so; calyx pilose, the lobes deltoid, about as broad as long, 1.5 mm. long; corolla tube puberulent, 28 mm. long, 5 mm. wide above the base, the lobes broadly ovate, spreading.

Type in the U. S. National Herbarium, no. 1,080,249, collected at Livingston, on the Reventazón River, Costa Rica, in 1920, by W. W. Rowlee and H. E. Stork (no. 75).

Probably related to *H. magniloba* Wernham, of Nicaragua, which has smaller flowers and nearly glabrous leaves.

***Hoffmannia asclepiadea* Standl., sp. nov.**

Stems simple, herbaceous, green, 1.5 meters high, villosulous; leaves opposite, the petioles stout, 2.5–4 cm. long, villosulous; leaf blades ovate-elliptic, about 20 cm. long and 8 cm. wide, long-acuminate, cuneate at base, glabrous above, copiously short-villous beneath, especially along the nerves; cymes sessile, shorter than the petioles, many-flowered, the branches densely short-villous; calyx short-villous, the lobes ovate-deltoid, obtuse, 1 mm. long; corolla ovoid and acutish in bud, greenish yellow, densely short-villous.

Type in the U. S. National Herbarium, no. 1,153,122, collected in wet forest at Las Nubes, Province of San José, Costa Rica, altitude about 1,900 meters, March 20–22, 1924, by Paul C. Standley (no. 38349).

Among the Costa Rican species this is well marked by the copious pubescence.

Hoffmannia amplexifolia Standl., sp. nov.

Stems simple, herbaceous, glabrous, sharply quadrangular, 1–1.5 meters high; leaves ternate, sessile, oblanceolate or oblong-obovate, 23–35 cm. long and 8–13 cm. wide or larger, long-acuminate, long-attenuate to the deeply cordate, clasping base, glabrous above, beneath minutely puberulent along the nerves; cymes clustered in the leaf axils, many-flowered, 3–8 cm. long, the branches densely villosulous, the flowers slender-pedicellate; calyx reddish, short-villous, the lobes narrowly triangular, obtuse; corolla greenish yellow, puberulent or villosulous, in bud 5 mm. long, the lobes longer than the tube; fruit red.

Type in the U. S. National Herbarium, no. 1,153,192, collected in moist forest near Orosi, Province of Cartago, Costa Rica, March 30, 1924, by Paul C. Standley (no. 39869). Nos. 39717 and 39809, from the same locality are also of this species.

Readily distinguished from other species of the genus by the clasping bases of the leaves.

Hoffmannia josefina Standl., sp. nov.

Shrub 3 meters high, with few branches, the stems terete, glabrous; leaves opposite, the stout glabrous petioles 1–1.5 cm. long; leaf blades obovate or oblong-obovate, 13–22 cm. long, 5.5–9 cm. wide, acute or abruptly short-acuminate, cuneate-attenuate at base, glabrous; cymes few or many-flowered, pedunculate, longer than the petioles, the branches glabrous, the pedicels 1–3 mm. long; calyx glabrous or with a few short scattered hairs, the limb 2 mm. long, the lobes narrowly triangular, acute, green; corolla in bud ovoid, acute, in anthesis 11 mm. long, glabrous, the lobes shorter than the tube; fruit subglobose, 6 mm. long, dark red.

Type in the U. S. National Herbarium, no. 1,152,900, collected in moist forest between Aserrí and Tarbaca, Province of San José, Costa Rica, altitude about 1800 meters, February 12, 1924, by Paul C. Standley (no. 34143).

Hoffmannia hamelioides Standl., sp. nov.

Shrub 1.5 meters high, the branches glabrous; leaves opposite, the petioles stout, 1–3 cm. long, sparsely puberulent or glabrous; leaf blades obovate-elliptic or oblanceolate-elliptic, 12–21 cm. long, 4.5–7 cm. wide, abruptly acuminate, cuneate-decurrent at base, glabrous above, villosulous beneath along the nerves; cymes sessile, few or many-flowered, about equaling the petioles, the branches short-villous; calyx short-villous, the lobes 1–1.5 mm. long, narrowly triangular, acutish; corolla in bud ovoid, acutish, 4 mm. long, greenish white, short-villous; fruit dark red, 7–8 mm. long.

Type in the U. S. National Herbarium, no. 1,152,904, collected in moist forest between Aserrí and Tarbaca, Province of San José, Costa Rica, altitude about 1,800 meters, February 12, 1924, by Paul C. Standley (no. 34149).

Related to *H. josefina*, but distinguished by the pubescence of leaves and inflorescence.

Hoffmannia macrophylla Standl., sp. nov.

Shrub 3 meters high, with few branches, glabrous throughout, the stems green; leaves sessile or nearly so, the blades decurrent to the base, oblong-obovate, 21–35 cm. long, 8–10 cm. wide, abruptly acute, long-attenuate to the base, bright green; cymes sessile or pedunculate, 3–4 cm. long, laxly few-flowered, the pedicels 3–8 mm. long; calyx red, the limb shallowly lobate, the lobes rounded-deltoid, 1.5 mm. long; corolla in bud cylindric, obtuse, 6 mm. long, red outside, the lobes yellow, twice as long as the tube.

Type in the U. S. National Herbarium, nos. 1,152,957–8 (from the same plant), collected in wet forest, Cerro de la Carpintera, Province of Cartago, Costa Rica, altitude about 1700 meters, February, 1924, by Paul C. Standley (no. 35636).

Hoffmannia leucocarpa Standl., sp. nov.

Shrub about 2 meters high, simple or with few branches, glabrous throughout; leaves opposite, the petioles stout, 3–5.5 cm. long, the blades elliptic or lance-elliptic, 15–24 cm. long, 6–12 cm. wide, acuminate, acute or cuneate at base; cymes axillary, equaling or often much exceeding the petioles, laxly few-flowered, the flowers on slender pedicels 5–12 mm. long, the branches bright red; calyx limb 2–3 mm. long, red, the lobes deltoid, acute; corolla red, in bud 7 mm. long and acute, the lobes longer than the tube; fruit subglobose, about 1 cm. long, white.

Type in the U. S. National Herbarium, no. 1,153,121, collected in wet forest at Las Nubes, Province of San José, Costa Rica, altitude about 1600 meters, March 20–22, 1924, by Paul C. Standley (no. 38340). No. 38703 from the same locality belongs to this species.

Hoffmannia pallidiflora Standl., sp. nov.

Shrub 1–2 meters high, with simple quadrangular glabrous stems; leaves opposite, the slender petioles 2–4 cm. long, glabrous, the upper leaves often sessile; leaf blades elliptic or obovate-elliptic, 15–25 cm. long, 7–9 cm. wide, acuminate, abruptly long-decurrent, glabrous; cymes few-flowered, long-pedunculate, equaling the petioles, the branches glabrous, the flowers partly sessile and partly pedicellate; calyx pale green, the lobes triangular, obtuse or acute, 1–1.5 mm. long; corolla pale green, narrow and acute in bud, in anthesis 8 mm. long, the lobes nearly twice as long as the tube; fruit oval, red, 1 cm. long.

Type in the U. S. National Herbarium, no. 1,153,101, collected in wet forest at La Hondura, Province of San José, Costa Rica, altitude about 1500 meters, March 16, 1924, by Paul C. Standley (no. 37877). The following collections also belong here:

COSTA RICA: La Hondura, *Standley* 37780, 37837. El Muñeco, south of Navarro, Province of Cartago, alt. about 1400 meters, *Standley* 33435, 33951.