

Two New Species of *Passiflora* (Passifloraceae) from French Guiana

Christian Feuillet

Orstom & Department of Botany, NHB-166, Smithsonian Institution,
Washington, D.C. 20560-0166, U.S.A.

ABSTRACT. Two new species are described, *Passiflora kawensis* of subgenus *Astrophea* and *Passiflora exura* of subgenus *Passiflora*. Both species are common in northeastern French Guiana on Montagne de Kaw. *Passiflora kawensis* has an umbrella-shaped structure on the androgynophore shared with only three species from southern Brazil and Bolivia. *Passiflora exura* is easily distinguished from related species by the structure of the corona and the size of the awn on the sepals.

Studies toward the revision of Passifloraceae for a treatment in the *Flora of the Guianas* revealed several new species, especially from French Guiana. Recent collecting trips in that country have proved that one of the richest localities for species of passionflower is Montagne de Kaw, a low mountain range 30 km southeast of Cayenne (Feuillet, 1989). Montagne de Kaw is about 45 km long and reaches 400 m in elevation. It represents the remains of a lateritic table and their slopes between the villages of Roura and Kaw. It includes what Turenne (1979) called Montagnes de Roura, Montagne Gabrielle, and Montagnes de Kaw. On some maps the eastern tip of Montagne de Kaw is called Montagne Rebard. Localities along roads are noted as "Point Kilométrique" (PK) followed by the distance in kilometers from the beginning of the road. Those distances are marked along the roads by numbered signs placed every kilometer. Three new species of *Passiflora* L. occurring on Montagne de Kaw have already been described by Feuillet (1986) and Feuillet & Cremers (1984): *Passiflora crenata* Feuillet & Cremers and *P. rufostipulata* Feuillet, both of subgenus *Passiflora*, and *P. fanchonae* Feuillet of subgenus *Decaloba* (DC.) H. G. L. Reichenbach (= subg. *Plectostemma* Masters). Two additional species are described here: *P. kawensis* in subgenus *Astrophea* (DC.) Masters and *P. exura* in subgenus *Passiflora*.

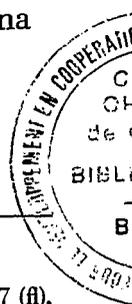
***Passiflora kawensis* C. Feuillet, sp. nov. TYPE:**
French Guiana. Montagne de Kaw, road from
Roura to Kaw, PK 39.5, 50 km SE of Cayenne,

NOVON 4: 236-241. 1994.

4°33'N, 52°09'W, 400 m, 29 Mar. 1987 (fl),
C. Feuillet 4250 (holotype, US; isotypes, AAU,
B, BR, CAY, COL, FI, G, HUA, K, LPB, MG,
MO, MPU, NY, P, PORT, TEX, U, UPBC,
VEN). Figure 1.

Species haec in subg. *Astrophea* pertinet; liana lignosa vel frutex ad 1.5-1.8 m altus cum ramis gradatim dependentes et procumbentes, juventute erectus et non capreolatus ad 0.8-1.2 m altus; flos candidi hypanthio campanulato; coronae filamenti ultra triseriati; androgynophorum altitudine oris hypanthii annulum umbraculiformem lobulatum atrovinosum ferens.

Liana climbing to more than 20 m with long thick tendrils, all parts but the flowers covered with short curved hair, the juvenile plant with a stout unbranched erect stem without tendrils up to 0.8-1.2 m high, then curving and developing tendrils, the young stems making an angle at each node; if the plant does not have a support to climb on the main stem develops several branches, the habit of the plant being then 1.2-1.8 m high, weeping and creeping on the ground. Tendrils not reaching a support fugacious except for their basal part remaining as a spinelike structure. Leaves simple; stipules minute, less than 1 mm long; petiole (10-)16-22 mm long; lamina unlobed, with two glands at the very base between the midrib and the margin, 10-15 × 4-5.5 cm, margin entire, apex sharply acute to long acuminate with a short mucro, round-asymmetric at base, shining above, tomentose on veins. Blooming on climbing, weeping, or creeping stems; cauliflory not observed. Flowers solitary or two per leaf axil; bract and bracteoles not verticillate, 0.7-1.3 mm long, serrate, pilose; peduncle 1.8 cm long, articulate near base, green, pilose; hypanthium 1.3 cm long, 0.7-1.1 cm diam. at base and top, green outside, yellowish white inside; sepals pale green outside, white inside, 3.5-4 cm long, 0.7 cm wide; petals white, 3.5 cm long; 0.5 cm wide; corona in several rows, outer two rows of filaments yellow, the outermost subdolabriform, 1 cm long, verrucose at apex, the inner capitate, 0.5 cm long, then a 4-5 mm zone with rows of little tubercules, and finally the innermost row of short filaments ca. 1 mm long; operculum lacinate, yellowish, forming a dome clos-



Fonds Documentaire ORSTOM
Cote: B* 13119 Ex: 1

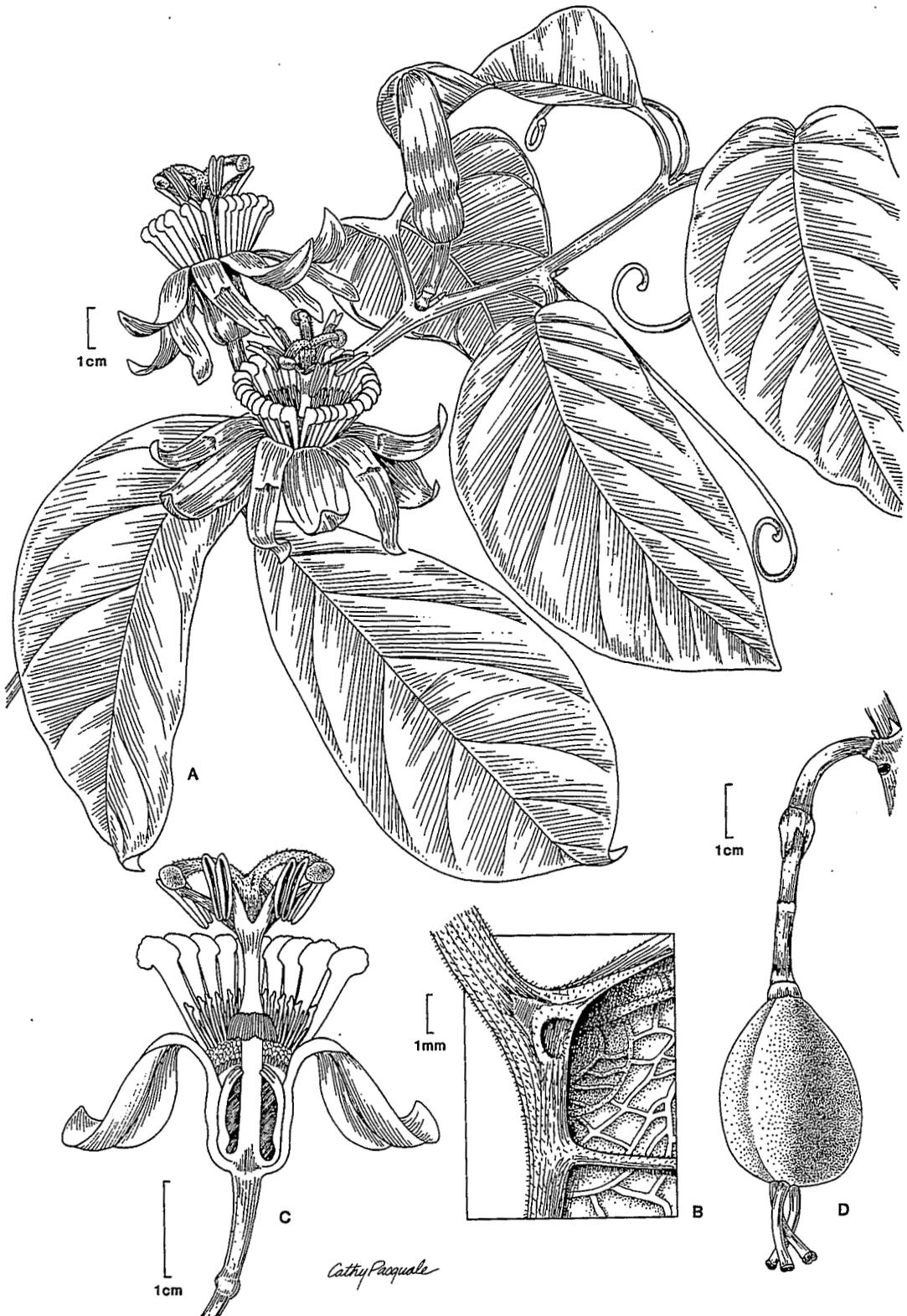


Figure 1. *Passiflora kawensis* C. Feuillet. —A. Flowering branch. —B. Gland at the base of the under surface of the leaf lamina. —C. Flower (longitudinal section). —D. Fruit. Note the scars or remains of the calyx tube, the umbrella and the stamens. A-C, Feuillet 4250 (US); D, from photograph of Feuillet 4176.

ing the hypanthium cavity just over the middle; androgynophore 2 cm long, white at base, becoming green 1.3 cm from base, where bearing an umbrella-like structure, dark red, lobulate, 2 mm long, nearly closing the mouth of the hypanthium; stamens erect, filaments flat, 6 mm long, green, anthers dorsifixed about $\frac{1}{3}$ from base, versatile, hanging upside down when mature, rounded at apex, 2-toothed at base, 7 mm long, green, pollen yellow; ovary angled, 4 mm long, green, densely rufo-tomentose; styles curved, 8 mm long, green, pilose; stigmas 3 mm diam., yellowish, glabrous. Fruit subspherical, 3 cm diam., never observed mature.

Etymology and distribution. The epithet "kawensis" refers to the collecting locality, Montagne de Kaw, where this species occurs abundantly; more than 50 plants were observed along 10 km of roadside in 1987. One sterile collection has been made 10 km north of Montagne de Kaw along the Cayenne-Régina road. So far the plant has been collected only on lateritic soils.

Phenology. Flowers and young fruits have been collected, or seen by the author, only from December to March.

Paratypes. FRENCH GUIANA. Montagne de Kaw, road from Roura to Kaw, PK 39.5, 65 km SE of Cayenne, 4°33'N, 52°09'W, 400 m, 1 Dec. 1985 (fl), *C. Feuillet 2911* (CAY), 25 Dec. 1986 (fr), *C. Feuillet 3980* (CAY), 3 Mar. 1987 (st), *C. Feuillet 4096* (CAY), 4 Mar. 1987 (st), *C. Feuillet 4144* (CAY), 5 Mar. 1987 (fr), *C. Feuillet 4176* (CAY), 8 Mar. 1987 (fl), *C. Feuillet 4184* (CAY).

This new species was referred to as *Passiflora* sp. nov. 1 in Feuillet (1989), and by Escobar (1994) as "P. sp. nov. *" in the key and "A new species from Montagne de Kaw . . ." in a footnote. *Passiflora kawensis* belongs to subgenus *Astrophea* sect. *Pseudoastrophea* (Harms) Killip, but the other species of this section in French Guiana, *P. candida* (Poeppig & Endlicher) Masters, *P. citrifolia* (A. L. Jussieu) Masters, and *P. costata* Masters, do not have this umbrella-shaped ring on the androgynophore. That kind of unusual structure was not mentioned by Killip (1938) or Tillett (1988), but is present in three other species (L. K. Escobar†, pers. comm.): *P. pentagona* Masters from the State of Rio de Janeiro (Brazil), *P. rhamnifolia* Masters from the States of Rio de Janeiro and Minas Gerais (Brazil), and *P. venosa* Rusby from the Department of La Paz (Bolivia). These three species are easily distinguished from *P. kawensis* by having only two rows of filaments in the corona, and by occurring only south of the 15th parallel in the Southern Hemisphere. The umbrella ring might be considered another manifestation of the trochlea, although it has

a more distal position on the androgynophore. Consequently, it does not combine with the operculum to form a two-part protective barrier enclosing the nectar chamber. In contrast, it constitutes with the operculum a series of two distant barriers, the lower one (operculum) being in contact with the androgynophore and closing the tube, the upper one (umbrella) only reducing the opening of the tube, therefore limiting access to smaller pollinators.

In young plants still growing as shrubs, a stem becomes woody and branches very soon after blooming. For that reason, the peduncles of the immature fruits observed were pushed by the development of the axillary stem. This creates fissures in the early bark still bearing the now dry, broken, and brown epidermis of the fruiting stem. Figure 1D shows one fissure with the axillary stem and the fruit coming through it. The stipule-like structures are other little pieces of broken or old tissues (tendrils, second peduncle, bark?), not the real stipules, which are minute and no longer present at that stage. The figure does not show the distal part of the fruiting stem.

KEY TO THE NEW SPECIES. The new species *Passiflora kawensis* should be placed in Killip's (1938: 74) key between species #330 and 331:

- 1a. Peduncles filiform, 3–4 cm long; outer corona filaments smooth at margin (Guyana) . *P. deficiens*
- 1b. Peduncles stout, not more than 2 cm long; outer corona filaments verrucose on one side toward apex.
 - 2a. Leaves sharply acute to long acuminate; androgynophore bearing a dark red umbrella-shaped ring (French Guiana) *P. kawensis*
 - 2b. Leaves subacute, rounded or emarginate at apex; androgynophore without an umbrella-shaped ring.
 - 3a. Androgynophore bearing an ovoid swelling near base (from the Guianas and Amapá to Amazonian Peru) *P. costata*
 - 3b. Androgynophore bearing no special structure below the stamens (lower Amazonian Brazil) *P. feroana*

***Passiflora exura* C. Feuillet, sp. nov.** TYPE: French Guiana. Montagne de Kaw, road from Roura to Kaw, PK 48, 70 km SE of Cayenne, 4°32'N, 52°04'W, 400 m, 5 Mar. 1988, *C. Feuillet 4675* (holotype, US; isotypes, B, CAY, DUKE, G, HUA, MO, NY, P, U). Figure 2.

Species haec in subg. *Passiflora* pertinens; folia 3-lobata; stipulae foliaceae, cochleares; bractae involucretae, librae, integrae, foliaceae, cordatae, sessiles; flores lilacini; sepala longicornuta; operculum decurvatum; stili virides.

Liana climbing to more than 15 m with tendrils, glabrous throughout. Leaves simple; stipules folia-



Figure 2. *Passiflora exura* C. Feuillet. —A. Flowering branch. —B. Stipules. —C. Flower (longitudinal section). —D. Flower bud (bracts removed). A, from photograph of Feuillet 4675; B-C, Feuillet 4721 (CAY); D, from photograph of Feuillet 4721.

ceous, 3 cm long, hemicordate (a half being very reduced) and acuminate, with a serrulate margin; petiole (1.5–)8–11 cm long, bearing one or two pairs of small stipitate glands near the apex; lamina cordate and shortly peltate at base, 3-lobed, median lobe (5–)8–11 cm along the vein, (2–)4–4.5 cm wide, lateral lobes (4–)7–9 × (1.5–)3–4 cm, margin entire, apex of the lobes acute and shortly mucronate, glaucous green, paler beneath. Flowers blooming acropetally on the apical part of new growth, two flowers per leaf axil, this part with leaves and internodes regularly decreasing in size and often hanging and looking like an inflorescence. Peduncle 3.5 cm long (5–6 cm in fruit), bearing three bracts 0.5 cm below the flower; bracts ovate, verticillate, sessile, entire, cordate, acute and mucronate at apex, 2.5–2.7 × 1.5–2 cm; hypanthium swollen at the base, 0.7 cm long, 1.3 cm diam. at the base and 2 cm diam. at the throat, whitish; sepals thick, green outside, lilac inside, 4 cm long, 1.2 cm wide, bearing a long subterminal awn, 2.5 cm long and 2–3 mm diam.; petal thin, white, of the same size as the sepals; corona in several rows, outside rows (3–4) of pale lilac filaments from 3 cm long (outside) and laterally flattened at base to 0.8 cm (inside) and terete, innermost row of white flat triangular processes 1 cm long; operculum decurved, bright yellow; trochlea white, bulky; androgynophore 1 cm long, obtusely 5-angled, greenish white; stamens decurved, filaments flat, 1.2 cm long, green with purple spots, anthers medio-dorsifixed, versatile, transversal when mature, all five forming a circle, rounded at apex, emarginate at base, 1 cm long, pale green, pollen yellow; gynophore terete, greenish white, 0.5 cm long; ovary obscurely trigonous, 7–8 mm long, 5–6 mm diam., yellowish white, bearing at the top three styles 1.5 cm long, spotted with purple, with stout greenish stigmas. Fruit (from *Larpin 919*, US) ovoid, 10 × 7.5 cm, green, white pruinose, soft due to a spongy mesocarp 1.5–2 cm thick; seeds elliptic, coarsely reticulate, 7 × 3 mm, nearly flat, 1.0–1.2 mm thick at margin and 1.5–1.7 mm thick in the middle, dark brown.

Etymology. The epithet “*exura*” (= ended in a tail) refers to the long subterminal awn of each sepal.

Distribution. The species has been collected from Montagne de Kaw, from Route de Bélizon (Montagnes Tortue), from Montagnes Cacao, and from Saül (Eau Claire). In addition, the author observed it in several instances inside the area defined by these collection localities. Although probably rather common in northeastern French Guiana, *P. exura* thrives mainly in disturbed and cut forest like roadsides or farms.

Phenology. The blooming season seems to be short: flowers have been collected only three times, in March 1987 and 1988, on the often-visited Montagne de Kaw. Fruits have been seen only twice, in May 1989 (Montagne de Kaw, O. Delanoe, photograph only) and May 1992 (Montagnes Tortue, only living seeds collected). Plants grown from the seed collection are cultivated in greenhouses by the author and by members of the “Passiflora Society International.” All of them were produced vegetatively from one seedling. The only preserved fruiting specimen, *Larpin 919*, has been collected in April 1990 (Station des Nouragues) near the Arataye River.

Paratypes. FRENCH GUIANA. Montagnes Cacao, 2 km from the village of Cacao, 40 km SSW of Cayenne, 4°33'N, 52°27'W, 300 m, 29 Mar. 1986 (st), *C. Feuillet 3682* (CAY); Montagne de Kaw, road from Roura to Kaw, PK 38, 65 km SE of Cayenne, 4°33'N, 52°09'W, 400 m, 3 Dec. 1985 (st), *C. Feuillet 2920* (CAY); PK 39, 5 Mar. 1987 (fl buds), *C. Feuillet 4182* (CAY); PK 45, 400 m, 29 Mar. 1987 (st), *C. Feuillet 4502* (CAY); PK 50, 250 m, 19 Mar. 1988 (fl), *C. Feuillet 4721* (B, BR, CAY, INPA, MY, NY, P, PORT, U, US); Régina, Piste forestière de Bélizon, PK 8, 70 km S of Cayenne, 4°30'N, 52°10'W, 100 m, 19 Feb. 1988 (st), *C. Feuillet 4564* (CAY, US); PK 12, 28 Mar. 1987 (st), *C. Feuillet 4237* (CAY); Saül, route de Bélizon, Eau Claire, 3°37'N, 53°12'W, 250 m, 13 Feb. 1993 (st), *G. Cremers et al. 12991* (CAY, US); Station des Nouragues, 4°3'N, 52°42'W, Apr. 1990 (fr), *D. Larpin 919* (CAY, US).

The flower buds of *P. exura* are characteristic of this species. They are 8.5 cm long from the base of the bracts to the tip of the awns, which top the sepals by 2 cm. The peduncles are hanging and curved at a right angle just below the bracts, spreading the buds horizontally. The sepals develop much earlier than the petals, and the chamber formed by the sepals in the bud is full of liquid and, in some cases, asymmetrical. The corolla is always symmetrical during its development. The shape of the calyx might be due to the weight of liquid twisting the base of the lower sepals when the flowering branch is exposed to frequent wind. All parts of the new species blacken when drying, and herbarium specimens have leaves thinner than all related species.

For two years, numerous plants of this species have been checked for an open flower on Montagne de Kaw (about 10 plants between PK 44 and 51 on the dirt road from Roura) and along the Montagnes Tortue road (more than a hundred between PK 12 and 17) where they grow usually on the roadside, creeping on the ground, or in the secondary roadside vegetation, climbing on shrubs and on small trees. Considering its distribution, *P. exura* is

probably able to reach the canopy and survive in the forest like the other species of its group in French Guiana.

This species belongs to *Passiflora* subg. *Passiflora* (lectotype: *P. incarnata* L.) and in Killip's (1938) classification should fit the species #259-290 group: "ser. *Lobatae*" (nom. nud.: without type and without Latin description). It can be inserted into Killip's key near *P. rubroincta* Killip (sp. #267) and *P. spectabilis* Killip (#268) if one considers that the leaves are "peltate at least 5 mm from lower margin," or with *P. pallens* Poeppig ex Masters (#270) and *P. elegans* Masters (#271) if one considers them as "not peltate or only slightly so." *Passiflora exura* differs from *P. elegans* and *P. pallens* in being much larger in all parts of the plant but the stipules. *Passiflora rubroincta* has smaller leaves with glandless petioles and very short lobes (holotype studied at US). All of these other four species have a different corona structure, missing the inner rank of triangular processes. By mistake, *Passiflora spectabilis* is in this part of Killip's key, "sepals. . . with a foliaceous awn 5 mm long, or more." Its awns are clearly less than 5 mm long according to Killip (in text "0.5 to 1 mm" and in key p. 66, not in key p. 65), which was confirmed by the study of the holotype at US. *Passiflora spectabilis* should be with species #282-284 of Killip's key, *P. pennellii* Killip, *P. stipulata* Aublet, and *P. aristulata* Masters.

KEY TO THE NEW SPECIES. *Passiflora exura* can fit in Killip's key (1938: 66) as follows:

- 1a. Bracts petiolate, rounded at apex . . . *P. picturata*
- 1b. Bracts sessile, usually acute or subacute at apex.

- 2a. Innermost filaments obtriangular in shape, flat in section *P. exura*
- 2b. Innermost filaments of various shapes, filiform, capitate or not, liguliform, bifid or reduced to tubercules but not obtriangular.
 - 3a. Leaves peltate at least 5 mm from lower margin *P. rubroincta*
 - 3b. Leaves not peltate or only slightly so species #268-281

Acknowledgments. It is a pleasure to thank here my friend Georges Cremers, curator at CAY, who sent me *Cremers et al. 12991* and *Larpin 919* when I was completing the manuscript. I also thank Cathy Pasquale for the fine illustrations that reflect her talent and personal interest in passionflowers.

Literature Cited

Escobar, L. K. 1994. Two new species and a key to *Passiflora* subgenus *Astrophea*. *Syst. Bot.* 19: 203-210.

Feuillet, C. 1986. Etudes sur la Flore des Guyanes. 22: Deux Passifloraceae nouvelles et quelques espèces rares en Guyane française. *Candollea* 41: 173-178.

———. 1989. Diversity and distribution of Guianan Passifloraceae. Pp. 311-318 in L. B. Holm-Nielsen, I. C. Nielsen & H. Balslev (editor), *Tropical Forests, Botanical Dynamics, Speciation and Diversity*. Academic Press, London.

——— & G. Cremers. 1984. Studies on the Flora of the Guianas. 6: Passifloraceae nouvelles ou méconnues de Guyane française. *Proc. Kon. Ned. Akad. Wetensch. C* 87: 377-386.

Killip, E. P. 1938. The American species of Passifloraceae. *Publ. Field Mus. Nat. Hist., Bot. Ser.* 19: 1-613.

Tillett, S. S. 1988. *Passionis Passifloris*. II. Terminologia. *Ernstia* 48: 1-40.

Turenne, J. F. 1979. Sédimentologie. 2 unnumbered pages and pl. 6 in *Atlas des Départements d'Outremer: IV La Guyane*. CNRS-ORSTOM, Paris.

