

The littoral species of *Sesbania* (*Leguminosae*) in the South Pacific islands and its relatives

M.-H. SACHET †

Summary : Discussion of the history, occurrence, and typification of *Sesbania coccinea* (L. f.) Poiret, of Polynesia and New Caledonia, followed by a review of *Sesbania* sect. *Agati* (Adans.) Baker, recognizing six species, two of them new, one of these, *Sesbania mannii* proposed here as new, the other remaining unnamed, for lack of adequate specimens. The identity of *Sesbania formosa* (F. Muell.) Burbidge is clarified. *Sesbania coccinea* is analyzed in detail recognizing two subspecies, subsp. *coccinea* from the western Pacific (Fiji, Tonga, and New Caledonia) and subsp. *atollensis*, from eastern Polynesia. Within subsp. *atollensis* are recognized five varieties, *atollensis*, *marchionica*, *quaylei*, *parkinsonii*, and *tuamotensis*. Keys are provided for the species of subg. *Agati*, and for the subspecies and varieties of *Sesbania coccinea*. *Sesbania tomentosa* is treated only briefly and traditionally, as it is the subject of research by Miss Winona CHAR, in Hawaii.

Résumé : L'historique, la distribution et la typification de *Sesbania coccinea* (L. f.) Poiret, de Polynésie et de Nouvelle-Calédonie, sont discutés et suivis d'une révision de *Sesbania* sect. *Agati* (Adans.) Baker. Six espèces sont reconnues parmi lesquelles deux sont nouvelles : *Sesbania mannii* Sachet est décrit tandis que l'autre espèce demeure innommée en raison de l'absence de matériel suffisant. L'identité de *Sesbania formosa* (F. Muell.) Burbidge est clarifiée. *Sesbania coccinea* est étudié en détail ; deux sous-espèces sont distinguées : subsp. *coccinea* du Pacifique ouest (Fiji, Tonga, Nouvelle-Calédonie) et subsp. *atollensis* de l'est de la Polynésie. Cinq variétés sont reconnues au sein de la sous-espèce *atollensis* : var. *atollensis*, var. *marchionica*, var. *quaylei*, var. *parkinsonii* et var. *tuamotensis*. Des clés de détermination des espèces du sous-genre *Agati* et des sous-espèces et variétés de *Sesbania coccinea* sont données. *Sesbania tomentosa*, dont l'étude à Hawaii constitue le sujet de recherche de M^{lle} W. CHAR, est ici traité de manière brève et classique.

Marie-Hélène Sachet †, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560, U.S.A.

HISTORICAL INTRODUCTION AND TYPIFICATION OF *SESBANIA COCCINEA*

The plants of the South Pacific islands were first brought to the notice of European botanists by scientific voyages, one of the earliest being Capt. James COOK's first expedition in the Endeavour (1768-1771). Joseph BANKS and Daniel SOLANDER were the botanists, and Sydney PARKINSON one of the artists. He drew and painted almost 1,000 portraits of plants.

Why the botanical results of the expedition were not published as a flora, with descriptions of many new species, has been explained many times, and lately in a volume devoted to PARKINSON's work and its significance (CARR, 1983). The chapter on the Society Islands

plants by F. R. FOSBERG and myself (1983, pp. 76-107) includes nomenclatural information on the paintings chosen to be reproduced in the volume. How some of the manuscript names applied to collections of the first voyage were published by the botanists of the second voyage (J. R. & G. FORSTER) and by others (e.g. SEEMANN) has also been discussed repeatedly in botanical literature.

One of the most beautiful PARKINSON paintings from the Society Is. (CARR, 1983, pl. 79) represents a leguminous shrub or small tree which must have been fairly common on coral strands in the Tuamotu and Society Islands, and for which SOLANDER's manuscript name is *Aeschynomene speciosa*. It has large pea-flowers of vivid orange and red combinations of colors, often an orange background marked with a wash, spots or streaks of bright red. It is also illustrated in a sketch by G. FORSTER, preserved in the British Museum (Nat. Hist.), and labelled *Aeschynomene coccinea*, from Raiatea local name "owaij".

This plant was still common in the Tuamotus at the time of the Bishop Museum Mangarevan Expedition (in 1934) and can still be found on some atolls. I collected it on Rangiroa in 1963 and in Takapoto in 1974. It has not been reported from any of the high islands of the Society group in recent years, but survived in Tetiaroa in 1973 and in Tupai Atoll where it was collected in 1974 and 1983, and observed in 1981.

The names used for this plant have been discussed by H. ST. JOHN (ST. JOHN & PHILIPSON, 1962, pp. 184-186), who renamed it *Sesbania atollensis* St. John, followed by A. C. SMITH (1978, pp. 401-402). Curiously, both these authors mention the name *Sesbania coccinea* (L. f.) Poir., but do not explain what it is, nor why they do not apply it to the plant in question. Earlier, E. D. MERRILL (1954, p. 347) had also discussed and dismissed this name. The epithet "*coccinea*" is so singularly appropriate for this plant, besides being the earliest (1781), that it appeared necessary to study it anew. It was used on some of the collections made during COOK's first voyage as well as on the second (by the Forsters) and in G. FORSTER's Prodrumus (1786, p. 51, n. 273).

LINNAEUS filius first published the epithet *coccinea* in 1781 (Suppl. pl. : 330) as follows :

*"Coccinea aeschynomene arborea, foliis pinnatis ; foliolis numerosis linearibus obtusis pulverulentis, leguminibus compressis aequalibus.
Habitat in Nova Zeelandia. Eques Bäck.
Flores maiores, rubri."*

Here appears the first element of confusion : No plant that could correspond to this description occurs in New Zealand. It seems obvious that it is an error for New Caledonia : G. FORSTER used this name in 1786, giving the locality as "*Societatis insulae, Botanicaeque insula*" (Botany island is a small coral island between New Caledonia and Isle of Pines, considered to be the same as Amere I.), and it appears in FORSTER's hand on collections from the Society Islands and New Caledonia. MERRILL had noted that "New Caledonia was intended".

Another element of confusion arises from the fact that many authors have considered LINNAEUS f.'s name as synonymous with *A. grandiflora* (L.) L. (= *Sesbania grandiflora* (L.) Poir.). MERRILL (1954) maintained this disposition, repeating his remarks of 1917 (p. 267). The alleged synonymy involves RUMPHIUS names' and plates and will be discussed below.



Pl. 1. — *Sesbania coccinea* subsp. *coccinea* : Forster herbarium sheet, no. 144 (Paris). By courtesy of Laboratoire de Phanérogamie, Muséum, Paris.

The really curious thing is that while G. FORSTER mentioned one of these plates, "Toeri-Mera. Rumph. amb. I. t. 77", he discounted in the next sentence the possibility of *Aeschynomene coccinea* applying to the same plant as *A. grandiflora* (L.) L.: "*Differentia specifica A. grandiflorae emendanda, ut ab hac distinguatur*", but no one seems to have noticed this. In any case, the relevant facts about the application of *A. coccinea* L. f. are that LINNAEUS f. described a new species from New Zealand [= New Caledonia], undoubtedly using a FORSTER manuscript name, and cited a specimen from the Bäck herbarium, and that this specimen, which is the type of his species, is extant. It is a FORSTER collection, from "N. Zeeland" in the J. E. SMITH Herbarium, no. 1208.5, at the Linnean Society. How some of the Forsters' duplicate collections came into A. BÄCK's herbarium, were described by LINNAEUS f., and ended up in the J. E. SMITH's herbarium at the Linnean Society rather than in the BÄCK or Linnean Herbaria is documented by JUEL (1924), and discussed further by EXELL (1931).

I have seen many specimens of the Polynesian plant, and collected it on several atolls but until late 1981 I had never seen a specimen of the strand *Sesbania* from New Caledonia, and had not paid too close attention to FORSTER's "Botanicesque insula" because the localities for many of the Forsters' plants include several island groups and specimens cannot always be found to match all the records. It is well recognized that the first botanists (and zoologists) in the tropics, overwhelmed by the unbelievable numbers of "novelties" they encountered, tended not to recollect something they thought had already been preserved, or even to discard "inferior" specimens for "better" ones found elsewhere, which may or may not have been the same thing.

Then I was asked to name a plant from Lifou Island (Loyalty Is. near New Caledonia) by the collector, Dr. Maurice SCHMID (no. 1033), and I called it *Sesbania coccinea* (L. f.) Poir. In the herbarium at Kew, I found another specimen from the Loyalty Is., *Däniker 2214* from Ouvéa. These two are very similar, with leaves crowded at the tip of the twigs and folioles crowded and thickened as in halophytes. They have the same habitat, a rocky limestone strand exposed to sea spray. Other specimens at Kew and in the BM Herbarium have the same habit, and they are all from the New Caledonia area, collected on COOK's second voyage. They match the SMITH Herbarium sheet, so that the type of *Sesbania coccinea* (L. f.) Poir. var. *coccinea* must be from that area, Botany Island or Isle of Pines. I have seen no collections made between COOK's second voyage (1774) and DÄNIKER's exploration (1924).

At Kew and in the BM Herbarium, there is also a good series of specimens from Polynesia, most of them from the first two COOK voyages. They have the light feathery habit of the beautiful PARKINSON painting and are matched by 19th and 20th centuries collections, including my own. In addition to habit, these two groups differ in details, which will be described below. If they are considered different species, names are available, *Sesbania coccinea* (L. f.) Poir. for the New Caledonia group and *S. marchionica* F. Brown for the Polynesian one.

A. C. SMITH (1978) has reported the species as *S. atollensis* St. John from the Lau Islands of Fiji, but curiously, it is not known from other coral islands such as the Cook Is. or Niue. It may well occur on some of them, however, since it is nowhere very common and can easily be missed.



Pl. 2. — Painting of *Aeschynomene speciosa* (= *Sesbania coccinea* var. *parkinsonii*) drawn and painted on Captain Cook's first voyage around the world, by Sydney PARKINSON, from living plant, at Tahiti. By courtesy of the Trustees of the British Museum (Natural History), London.

THE GENUS *SESBANIA* ADANSON

SESBANIA Adans. *corr.* Scopoli.

Intr. : 308 (1777), *nom. cons.* ; DC., Prodr. 2 : 264 (1825) ; BAKER, Fl. Brit. India 2 : 114 (1876) ; GILLETT, Kew Bull. 17 (1) : 91-159 (1963).

— *Sesban* ADANS., Fam. 2 : 327 (1763) ; POIR. in LAM., Encycl. Méth. 7 : 126 (1806).

— *Agati* ADANS., Fam. 2 : 326 (1763) ; DESVAUX, Jour. Bot. 1 : 120, t. 4, f. 6 (1813) ; DC., Prodr. 2 : 264 (1825).

SCOPOLI did not propose a new name but only latinized ADANSON's orthography, therefore combinations in *Sesban* are valid in *Sesbania* (ICBN 75.1, 75.3, 1983).

Trees, shrubs or herbs ; leaves pari-pinnately compound, leaflets usually numerous ; stipules present, small, usually caducous ; stipels present or absent ; inflorescence axillary, racemose, bracteate and bracteolate ; flowers very zygomorphic ; calyx campanulate to somewhat gibbous, variously lobed or subtruncate ; corolla with petals tending to be clawed, vexillum subequal with wings and keel, with or without appendages near base ; stamens diadelphous, vexillary free ; ovary with many ovules, stigma small ; fruit linear, transversely septate.

Many species in tropical, subtropical and warm temperate regions ; two or more native and several introduced in Pacific oceanic islands. The Indo-Pacific species are regarded here as belonging to two subgenera following BAKER (*l. c.*), subg. *Sesbania* and subg. *Agati*.

STATUS OF SUBGENUS *AGATI* (Adanson) Desvaux ex Baker

ADANSON's genus *Agati*, typified by *Robinia grandiflora* L., is cited above as a synonym of *Sesbania* but was accepted and maintained as a genus by most botanists for the first hundred years after its publication. DESVAUX (1813) placed 4 species in *Agati* : *grandiflora*, *coccinea*, *cannabina* and *virgata* " which used to be s, " but DE CANDOLLE (1825) kept only the first two : *cannabina* he placed in *Sesbania*, and *virgata* in his new genus *Coursetia*. BAKER (1876) reduced *Agati* to subgeneric rank under *Sesbania* and placed only *Sesbania grandiflora* in it, considering *S. coccinea* as a synonym or at most as a name for a redder form. This disposition of *Agati* has been followed in recent treatments by GILLET (1963), BURBIDGE (1965) and others. No one however, has stated clearly the differences between these two subgenera.

BURBIDGE placed two species in subg. *Agati*, *S. grandiflora* and *S. formosa*. *S. coccinea* (L. f.) Poir., *S. tomentosa* H. & A. and its allies endemic in Hawaii, and two close relatives of *S. grandiflora* described below, also belong here. The species of subgenus *Agati* will be briefly described and discussed, as they have been confused or not satisfactorily separated. *Sesbania coccinea*, extending from New Caledonia eastward across the south Pacific to eastern Polynesia will be treated here in detail.

Subgenus *Agati* has been vaguely considered to include the large-flowered members of *Sesbania*, BAKER adding that the flower buds are curved rather than straight. The pods

have not been used in defining the two subgenera discussed here. (Two more subgenera include only African or American species). Most *Sesbania* descriptions do not mention whether or not the pods are dehiscent, or simply say that they are (POLHILL & SOUSA, 1981 : 284). However, in none of the specimens of *S. coccinea* or *S. tomentosa* and in only two or three of the scores of sheets examined of *S. grandiflora*, I have seen dehiscent pods and these only very tardily so. There is no published information on the ripe pods of the Australian *S. formosa* (F. Mueller) Burbidge, but through the courtesy of Dr. Colin WOODROFFE, I have received nearly mature pods (*Woodroffe 598*, US). They do not seem to dehisce spontaneously, but some of the more mature ones split when sharply bent. These pods are thinner and less stiff than those of the other three species and may be more spontaneously dehiscent when older. In any event, the tendency toward indehiscence of the pods can be accepted as a feature of subgenus *Agati*.

Contrasting characters of the two subgenera in the Indo-Pacific region follow :

Subg. *Sesbania*

Flowers usually less than 3 cm long.
Flower buds straight or slightly curved.
Pods dehiscent (so far as known to me).

Chromosomes $2n = 12$, occasionally $2n = 24$.
Plants tending to be herbaceous or becoming woody below, occasionally shrubs.

Subg. *Agati*

Flowers large, 3 cm or more in length.
Well developed flower buds strongly curved.
Pods indehiscent or valves separating only very tardily as when bent or under pressure.
Chromosomes $2n = 24$, larger.
Plants woody, up to tall trees.

This comparison shows how the subgenera are set apart and at the same time supports their disposition as subgenera rather than genera.

The chromosome numbers cited above for subgenus *Sesbania* are summarized from tables in GILLET (*l.c.*, pp. 96-97) and various atlases of chromosomes numbers. For subgenus *Agati*, we were fortunate to obtain seeds of three species, and Mr. Royce OLIVER made counts on root tips as follows : *Sesbania grandiflora* (*J. Florence s.n.*, Arue, Tahiti, 17 July 1984) ; *S. formosa* (*Woodroffe 599*, Old Kapalga Floodplain, N.T., Australia) ; *S. coccinea* subsp. *atollensis* (*Sachet 2036*, Takapoto Atoll, Tuamotu). All have $2n = 24$. The number reported for the *S. tomentosa* group from Hawaii is also 24 (W. CHAR, personal communication ; CARR, *Amer. Jour. Bot.* 65 : 236-242, 1978).

Besides *S. coccinea* and *S. formosa*, two other species have been confused or lumped with *S. grandiflora*. They have apparently never been described and named. One of these is described here and named *mannii*. The other is described and discussed following *S. grandiflora* which it resembles except for smaller flowers and bilabiate calyx. I do not propose a name for it because of the inadequacy of the single available specimen.

The five (or six) species of this subgenus may usually be distinguished by the following key. Material available to me of the Javanese plant is so poor that it should not serve as type of a new species, at least until an effort is made to relocate the plant. We have seen very little of *S. mannii*, but it is well-enough characterized that a name should be made available for it and attention directed to it.

KEY TO SPECIES OF SESBANIA SUBG. AGATI

1. Calyx opening by a circumscissile dehiscence or splitting irregularly or into 2 unequal triangular lobes or along convex side *S. grandiflora*
1. Calyx not opening by circumscissile dehiscence, margin of mature calyx with 5 definite lobes or bilabiate 2
2. Calyx bilabiate *Sesbania sp.* (from Java)
2. Calyx with 5 triangular lobes or somewhat acuminate teeth 3
3. Calyx in bud with a differentiated apical portion with 5 tomentose ridges joining in an acute point *S. formosa*
3. Calyx in bud fusiform, apex merely pointed, not differentiated or ridged 4
4. Calyx 1.5-3 cm long, cylindric, narrower than long *S. mannii*
4. Calyx about 1-2 cm or less long, more or less campanulate 5
5. Plants appearing notably hairy, vexillum strongly reflexed, pods rarely reaching 20 cm long *S. tomentosa (s.l.)*
5. Plants green, leaves usually sparsely strigose, young growth often densely so or sericeous, vexillum only somewhat reflexed, mature pods mostly well over 20 cm long.. *S. coccinea*

DESCRIPTION OF SPECIES

***Sesbania grandiflora* (L.) Poir.**

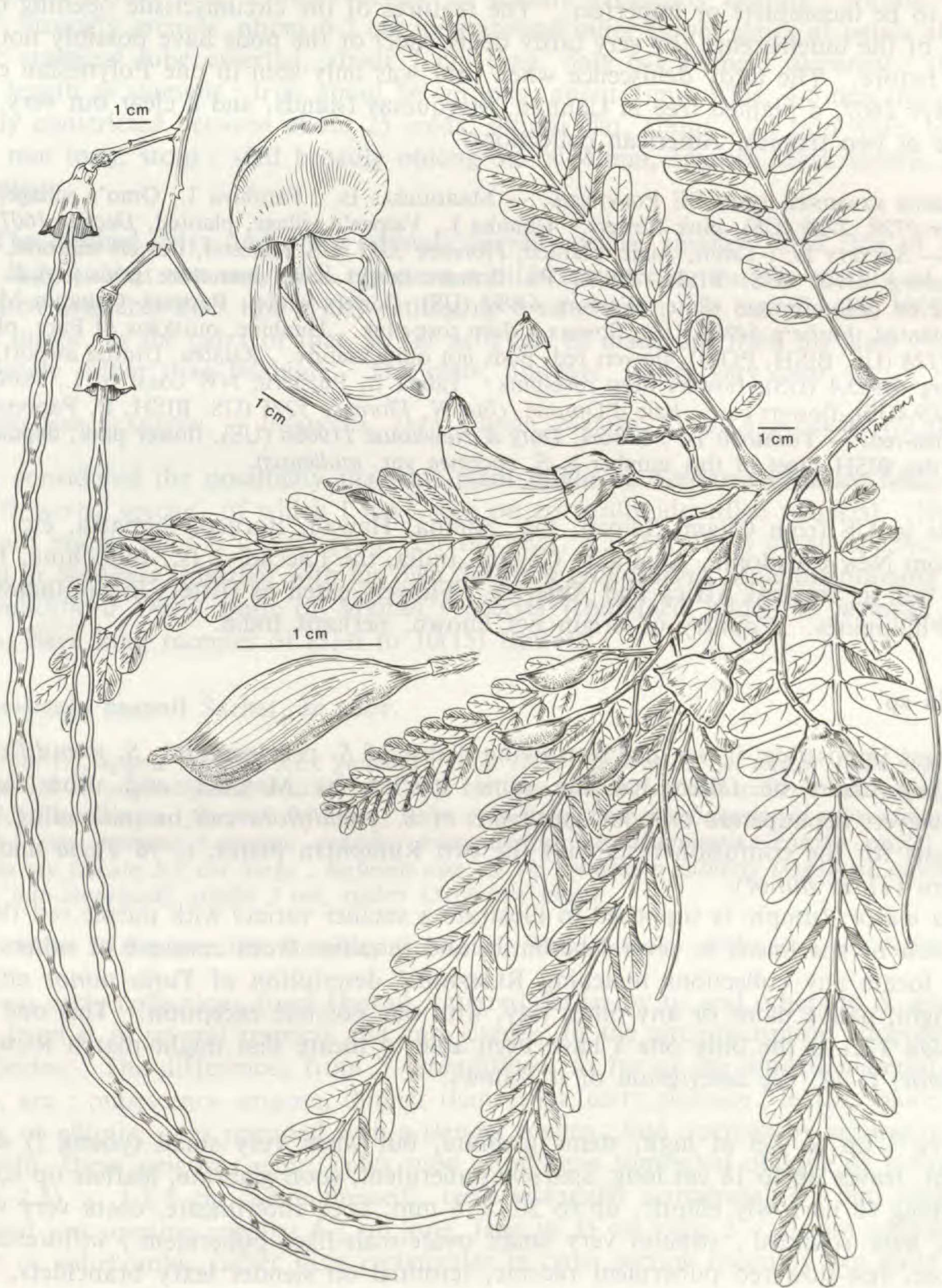
Encycl. Méth. 7 : 127 (1806), as *Sesban* ; PERS., Syn. 2 : 316 (1807), as *Sesban*.

— *Robinia grandiflora* L., Sp. Pl. : 722 (1753).

— *Aeschynomene grandiflora* (L.) L., Sp. Pl., ed. 2 : 1060 (1762).

— *Agati grandiflora* (L.) DESV., Jour. Bot. 1 : 120, t. 4 (1813).

Small or medium trees, loosely branching, very young parts densely tomentose, soon glabrate ; leaves about up to 30 cm long, with 15 to 20 pairs of leaflets, these oblong to elliptic, apices rounded to subtruncate or slightly emarginate, (2.5)-3 to 4(-4.5) × (0.8)1 to 1.5(-1.8) cm, pairs opposite but rarely a few distal ones alternate ; stipules small, ovate, thin, caducous when very young ; racemes axillary, 5 to 9 cm long not counting flowers, few-flowered with small ovate-acuminate bracts subtending flower-buds, these bracts caducous when very young ; flowers 9 to 11 cm long, buds arcuate ; calyx closed in young buds, fusiform, apex acuminate, tomentose, not differentiated, either splitting longitudinally along the convex side making a spathe-like calyx, or irregularly or into 2 unequal triangular lobes, or breaking in a circumscissile manner, the distal portion remaining like a cap on the end of the bud almost until the flower opens, leaving the cylindric to campanulate lower part of the calyx thus irregularly truncate or irregularly toothed, rather than regularly 5-toothed or 2-lobed, 1-2 cm long ; flower white or rose-pink to red, opening tardily ; vexillum somewhat to quite reflexed, without calli ; keel-petals with a sharp lobe near base of the concave margin ; staminal tube about 10-12 cm long, geniculate or auriculate near base ; anthers bluntly lanceolate, 4-4.5 mm long ; pods hanging vertically on elongate inflorescence rhachises, stiff, indehiscent (rarely tardily splitting especially if bent or twisted), rectangular in cross-section, to 63 × 0.7 × 0.4 cm including the 3-5 cm stipe and 2-3 cm beak ; seeds 8 × 4-4.5 mm, oblong, slightly curved, ends rounded, dull brown.



Pl. 3. — *Sesbania grandiflora* : Habit, young bud showing undifferentiated apex, older buds showing circumscissile dehiscence of calyx, open flower and mature fruit. Drawing by Alice TANGERINI.

Unfortunately satisfactory collections of this species are not abundant and descriptions are likely to be incomplete or imperfect. The features of the circumscissile opening of the calyx and of the indehiscence (or very tardy dehiscence) of the pods have possibly not been described before. The tardy dehiscence when bent was only seen in one Polynesian collection, *Decker 1607*, a planted tree in Uahuka, Marquesas Islands, and a clear but very tardy dehiscence in two tropical American collections.

SPECIMENS EXAMINED FROM SE POLYNESIA. — MARQUESAS Is. : Fatuhiva I., Omo'a village, planted, *Decker 2728, 2729* (US), pink flowers. Uahuka I., Vaipae'e village, planted, *Decker 1607* (US), dry pods. — SOCIETY Is. : Tahiti, Auae, planted, *Florence 3381* (US 2 sheets), flowers maroon, young pods ; *Fosberg 63109* (US, BISH, POM, P), flowers bright rose, immature pods ; *A.E. Wolf (Sachet's) 2704* (US), flowers white ; *Fosberg 64992* (US), flowers white ; Papeari, Gauguin Museum grounds, planted, *Fosberg 64988* (US), flowers a deep rose-pink. Huahine, outskirts of Fare, planted, *Fosberg 61128* (US, BISH, POM), flowers red, pods not quite mature. Raiatea, Uturoa airport, planted, *Fosberg 64985A* (US), flowers deep rose-pink. Tahaa I., Pueheru, NW coast of I., *Fosberg & Sachet 63409* (US), flowers rose ; baie d'Otuone, côte W, *Florence 5275* (US, BISH, P, Papeete), flowers purplish-red. — TUAMOTU Is. : Raroia, *Doty & Newhouse 11906b* (US), flower pink, depauperate specimen (the BISH sheet of this number is *S. coccinea* var. *atollensis*).

Sheets in US from Guam, Saipan, Fiji, Samoa, Hawaii, Borneo, Sumatra, etc. Also known from New Caledonia, Australia, Ceylon, India, the Laccadive Is., Indochina, Philippines, as well as tropical Africa and America. Flowers eaten as fritters in Southeast Asia and the Philippines. Country of origin not known, perhaps India.

Sesbania sp.

It seems impossible, if one has seen living plants of *S. coccinea* and *S. grandiflora*, to believe they could be taken for the same species, as MERRILL and other authors did. However, depauperate or poor specimens of *S. grandiflora* can be misleading. Part of the basis for the confusion rests with the two Rumphian plates, t. 76 *Turia* and t. 77 *Toeri-Mera (Turia minor)*.

Turia minor Rumph. is supposed to illustrate a smaller variety with purple red flowers. Examination of specimens in several herbaria, and inquiries from curators of others, have failed to locate any collections matching RUMPHIUS' description of *Turia minor* either in looks, origin, native name or any other way, with one possible exception. This one sheet, *Angarwulan 172*, is the only one I have been able to locate that might match RUMPHIUS' *Turia minor*, t. 77. A description of it follows.

“ Tree ” up to 2.5 m high, stems glabrate, but when very small (young ?) densely puberulent, leaves up to 18 cm long, sparsely puberulent, soon glabrate, leaflets up to 14-15 pairs, oblong to narrowly elliptic, up to 20 × 6 mm, apex subtruncate, costa very slightly apiculate, base rounded ; stipules very small ovate-scale-like, puberulent ; inflorescence a small loose, few-flowered puberulent raceme, terminal on slender leafy branchlets, lateral on twigs, rhachis zig-zag, several cm long, inflorescence branches of several short internodes, then a very short pedicel expanding into a turbinate receptacle, this and calyx glabrous ; calyx somewhat bilabiate, slightly inflated, tube about 1 cm long and wide, cylindrical or sub-ventricose, lower lobe about 2.5 mm long, acute or slightly dentate, slightly recurved, upper

lobe about 6 mm long, broadly obtuse or slightly irregularly dentate ; corolla “ purplish red ”, strongly arcuate, about 6-7 cm long around outer curve, claws of petals about 2 cm long ; staminal tube exerted, about 7 cm long, only 6-7 stamens apparent ; style about same length as stamens ; fruit about 36 cm long, about 7 mm wide, 4-5 mm thick, laterally slightly constricted between about 25 seeds, sutures flat, about 2-2.5 mm wide, beak about 4-4.5 mm long, stout ; seed broadly oblong 6.5×4 mm, smooth, dark brown, ends subtruncate.

The bilobed calyx and more strongly curved corolla, smaller than that of *S. grandiflora* suggest that this may well represent a different species, but the quality of the single specimen available does not justify setting up a new taxon. It can scarcely be RUMPHIUS' *Turia minor*, as the calyx of that, so far as it can be made out from his plate 77, seems to be dentate rather than bilabiate. The plate, however, is not very clear.

SPECIMEN EXAMINED. — INDONESIA, JAVA : Jiwan, Madiun, 63 m, *Angarwulan 172* (L).

I considered the possibility that this plant might be *Sesbania javanica* Miq., a rather large-flowered species, of which I have seen no critically identified material. However, it does not match MIQUEL's description (Fl. Ind. Bat. 1 : 288, 1855) of his species, which he placed in *Sesbania* (together with his own *Sesbania grandiflora*) while maintaining *Agati* for *A. grandiflora* Desv. Both of MIQUEL's species (combined under *S. javanica* in recent works) have long racemes of (5)-6 to 10(15) flowers.

***Sesbania mannii* Sachet, sp. nov.**

Arbor (?), sparse strigosa mox glabrata ; folia 10-15 maxime 25 cm longa, 11-20 jugata, foliola oblonga vel oblongo-elliptica, maxime 4×1.2 cm, mucronata ; racemi axillares laxi pauciflori, pedicellis 3-3.5 cm longis ; flores 8 cm longi ; calyx cylindricus basi subobliquus vel subventricosus $1.5-2.5 \times 1-1.5$ cm, margine 5-dentati, dentibus triangularibus vix acuminatis ; corolla vexillo recurvato-carinato vix falcato 5-7 cm longo ; legumen non vel vix torulosum subteres transverse subrhombicum, suturis non-incrassatis, stipite 5 cm, rostro 13-14 mm longo.

TYPE : *Mann & Brigham 589*, Hawaiian Is., Kauai, Waimea (holo-, GH ; iso-, US, BISH).

Two early collections from Hawaii, referred earlier by us and others to *S. grandiflora*, differ from it in several respects and can scarcely fit the circumscription adopted here for this species. The differences from *S. grandiflora*, so far as the limited material available shows, are : pubescence strigose, thinner than usual, early glabrate ; leaflets more narrowly oblong or elliptic, apex rounded with a slender mucro ; bud opening by separation of definite teeth, these strigose, acute, calyx tube at anthesis somewhat oblique or subventricose, $1.5-2 (-2.5) \times 1-1.5$ cm (when pressed), teeth triangular acuminate, 3-5 mm long, mature buds and just opening corollas 6-7 cm long, fruit to 35 cm long, 5×3 mm wide and thick, elliptic or subrhombic rather than rectangular in cross section (possibly not quite mature).

This could be included in the broadest circumscription of *S. grandiflora* by ignoring the peculiar calyx dehiscence of *S. grandiflora* and the more slender and differently shaped pods of the MANN & BRIGHAM collection. Such a course would hide these very real differences. It would be desirable to have for examination a broader sample of *S. grandiflora*.

flora, in order to be certain that this curious Hawaiian plant was not, as is likely, an introduction from elsewhere. One very incomplete specimen, *Gaumer 670* from Yucatan, has the calyx similar to that described here but somewhat smaller. It may be the same. Perhaps the present account will serve to call attention to the problem.

SPECIMENS EXAMINED. — HAWAIIAN IS. : " Sandwich Island " : *U.S. Exploring Expedition* (US).
Kauai : Waimea, *Mann & Brigham 589*, type.

***Sesbania formosa* (F. Mueller) Burbidge**

Austr. Jour. Bot. 13 (1) : 103-141 (1965).

— *Agati formosum* F. MUELLER, *Fragm.* 2 : 88 (1860).

Agati formosum, like *Sesbania (Agati) coccinea*, was denied an identity of its own by Australian botanists and confused with *S. grandiflora* until BURBIDGE examined it closely. Both species are trees, and have very large flowers. Beyond this, their differences are clear.

The following description is based on specimens examined, but amplified in a few places from that of BURBIDGE (*l.c.*).

Tree to 10 m tall, with rough, furrowed bark, young growth glabrous to somewhat appressed pubescent, glabrate with maturity ; leaves to 40 cm long, with up to 18 pairs of opposite to subopposite leaflets, these narrowly ovate to elliptic or broadly lanceolate, with slender subulate mucros, stipellate or stipels obsolete ; stipules ovate or ovate-lanceolate, curled and involute on drying, caducous ; racemes to 12 cm long, loose, few-flowered, pedicels to 3 cm long at anthesis, bracts (bracteoles) small, early caducous, buds ovoid fusiform, from the first showing a broadly ovoid 5-angled terminal portion set off by a slight constriction, the angles notably tomentose, opening gradually with the corolla pushing out and spreading the very distinct triangular calyx lobes, these with thickened margins tomentose-ciliate, calyx when mature campanulate broader than long, lobes broadly triangular, apex obtuse, but abruptly mucronate ; flower said to be white or creamy, or cream-green ; corolla in bud curved distally, to 12-14 cm long measured around the convex side, vexillum broadly obovoid, strongly clawed, base of blade cordate, without calli, wing petals asymmetrically elliptic, clawed, curved, tips connate, keel petals strongly curved, with a long claw, and a sharply acuminate lobe near the base of the concave margin, convex margins connate to near the narrow tips ; staminal column subequal with or slightly exceeding the corolla, strongly " auriculate " or geniculate near base, anthers broadly linear, about 3.5 mm long, style slightly exceeding stamens, stigma minute, oblique, slender ; fruit to 60 cm long, stipe to 5 cm long, beak 3-5 cm, in cross section somewhat rhombic ; seeds narrowly oblong, 5-7 × 2 × 1.5 mm, dull black, hilum circular, hilar side of seed not at all concave, hilum with a white ring and a black pit inside it, ends of seed rounded to subtruncate.

This species, by some authors united with *S. grandiflora*, differs clearly from that species in the ovoid 5-angled limb of the bud, differentiated from very early into the 5 tomentose-margined broadly triangular calyx lobes, broadly campanulate calyx, more strongly cordate vexillum, wing-petals connate distally, sharply acuminate rather than acute



Pl. 4. — *Sesbania formosa* : Habit, young bud showing differentiated apex, older buds showing lobed calyx limb, open flower, and mature fruit (fruit from material sent by Colin WOODROFFE, Darwin, N. T., Australia). Drawing by Alice TANGERINI.

lobes on keel-petals, and in the much more slender fruit, rhombic rather than rectangular in cross-section, valves thinner with much less thickened margins ; seeds much narrower. In both species, the calyx remains at the base of the young pod but eventually breaks off and slides down the pod and off.

Sesbania formosa was described from the Northern Territory of Australia, and is endemic to the tropical area of northwestern Australia (Northern Territory and Western Australia) with a record from Cape York, Queensland. It is found on river banks and wide alluvial plains or swamps.

SPECIMEN EXAMINED. — N.W. AUSTRALIA, *s.l.* : von Mueller *s.n.* (P), one pod only (very probably this rather than *S. grandiflora*). — WESTERN AUSTRALIA : between the Ashburton and DeGray rivers, Dr. E. Clement *s.n.* in 1897 (P) "cork wood" (part of a leaf with a few folioles, quite a few buds in different stages of growth, showing the toothed calyx very well). Banks of the Lower Ashburton River, Alex Morrison *s.n.*, 12.10.1905 (P, 2 sheets ; US, 2 sheets). King Leopold Ranges, 22 mi SSW of Mt. House Station, Kimberleys, M. Lazarides 6457 (US) "Commonly fringing stream channels with *Eucalyptus camaldulensis* and *Imperata cylindrica* var. *major*" (under this number, photos showing habit of tree with hanging flower clusters, and detail of corky deeply fissured bark). — NORTHERN TERRITORY : Old Kapalga Floodplain, South Alligator River, N.T., Woodroffe 598 (US, immature pods only) and 599 (US, seeds only) ; same locality, seasonally fresh water inundated "black soil" plains, Woodroffe 699 (US), flowering twigs. Near Wavehill Police station, N.T., sandy river bank near water, R. A. Perry 2241 (US). Near Buffalo Hill, 9 mi NNW of Leguna Station, N.T., estuarine plain with *Melaleuca sp.*, *Themeda sp.* and *Heteropogon sp.*, R. A. Perry 2600 (US).

Sesbania tomentosa Hook. & Arn., *s.l.*

Bot. Beechey Voy. : 286 (1841) [1838].

— *Agati tomentosa* (Hook. & Arn.) NUTT. ex A. GRAY, Bot. U.S. Expl. Exped. 15 (1) : 409-410 (1854).

I have used this name, *sensu latissimo*, for the complex of taxa endemic to the Hawaiian Islands, because although some have been differentiated and named as varieties or even species, recent work involving the whole complex has not been published as yet (W. CHAR, pers. comm.). *Sesbania tomentosa s.s.* was described from "Acapulco" but in fact is from Oahu Island, the collector, G. T. LAY, who remained on Oahu while the Expedition went to the North Pacific, being too ill to travel to any other island. In Hawaii, the ship Sulphur stopped only in Oahu and Niihau (BEECHEY, 1831, 1 : 231-234, 2 : 410-411).

There are taxa in this group from all or most of the volcanic islands, from Necker to Hawaii, and they vary in stature, habit, tomentum and other characters ; their differences usually appear greater than those separating the varieties in *Sesbania coccinea* subsp. *atolensis*.

I offer here a short description of *S. tomentosa* in the traditional sense, to place it in subgenus *Agati*. A detailed treatment, distinguishing a number of segregate species will be published by Winona CHAR, of the University of Hawaii.

Sesbania tomentosa Hook. & Arn., *sensu lato* :

Prostrate to erect shrubs and small slender trees, from usually notably tomentose or sericeous, to strigose or rarely almost glabrous ; leaves (6-) 8-15 (-20) cm long, varying from

scattered along several dm of branchlet to congested on the distal few cm, with 6 to 12 (-15) pairs of leaflets, these oblong, 1-2.5 × 0.5-1.2 cm, rounded at both ends, mucronulate; stipules linear-lanceolate, acuminate, caducous; racemes axillary, slender, few flowered, much shorter than leaves; young buds densely sericeous, fusiform, apical portion somewhat differentiated, acute, lobes early becoming separated; older buds straight to somewhat curved; calyx cup-shaped, usually as broad as long or broader, slightly but not conspicuously inflated, sharply lobed or toothed, teeth acute to almost subulate; flowers at anthesis 4-5 cm long, vexillum reflexed, usually bearing two prominent calli on the inner surface of the claw below the base of the blade (W. CHAR, pers. comm.); fruit 10-15, rarely to 20 cm long, at maturity becoming subterete, somewhat torulose, straight to somewhat arcuate, about 4 mm wide, 2.5-3 mm thick, stipe 5-8 (-15) mm, beak 10-15 mm; seed oblong, 4-5 × 2.5 × 3 mm, smooth, brown, ends rounded, hilum side slightly concave.

Sesbania coccinea (L. f.) Poir.

Encycl. Méth. 7 : 127-128 (1806); SEEM., Fl. Vit. : 54 (1865).

- *Aeschynomene coccinea* L. F., Suppl. Pl. : 330 (1781); FORST. F., Prodr. : 51 (1786); MURRAY, Syst. Veg. ed. 14 : 671 (1784).
- *Coronilla coccinea* (L. f.) WILLD., Sp. Pl. 3 : 1146 (1802).
- *Sesbania coccinea* (L. f.) POIR., Dict. 7 : 127 (1806), as *Sesban*.
- *Agati coccinea* (L. f.) DESV., Jour. Bot. 3 : 120, t. 4, f. 6 (1813); DC., Prodr. 2 : 266 (1825); GUILLEMIN, Zephyritis Taitensis : 62-63 (1837).
- *Aeschynomene speciosa* SOL. ex SEEM., Fl. Vit. : 55 (1865).
- *Agati tomentosa sensu* NADEAUD, Enum. Pl. Ind. Tahiti : 79 (1873), non (H. & A.) NUTT. ex GRAY, Bot. U.S. Expl. Exped. 15 (1) : 409-410 (1854).
- *Sesbania speciosa* F. BROWN, Bishop Mus. Bull. 130 : 110 (1935), nom. illeg., non *S. speciosa* TAUB. ex ENGLER 1894.
- *Sesbania marchionica* F. BROWN, Bishop Mus. Bull. 130 : 109-110 (1935).
- *Sesbania atollensis* ST. JOHN, Trans. R. Soc. N. Z. Botany 1 : 184-186, f. 9 (1962); SMITH, Allertonia 1 : 401-406 (1978).
- *Sesbania grandiflora sensu* auct., non (L.) POIR., Encycl. Méth. 7 : 127 (1806).

Shrub or small slender tree to 6 m tall; leaves with many pairs of leaflets, up to several cm long; stipules linear or lanceolate-subulate, stipels none; calyx campanulate, with 5 triangular teeth; corolla 3-4 cm long, rather falcately curved, vexillum becoming somewhat reflexed or recurved, subequal with or slightly shorter than keel, claw subequal with calyx, blade broadly elliptic to oval or slightly obovate, yellow to usually orange and dark red mixed, or red; fruit linear, up to 25-30 cm long, sharply beaked, somewhat stipitate, terete to somewhat compressed and slightly swollen between septa; seed suborbicular to oblong, hard, glossy.

Type from Botany Island, New Caledonia (said in error to be from New Zealand), coll. Forster [labelled in FORSTER'S hand, published as *Eques Bäck*] (LINN). Range from New Caledonia to Henderson Island, eastern Polynesia. Its closest relationship appears to be with *S. tomentosa s.l.* of the Hawaiian Islands.

Sesbania coccinea is a variable species and may be interpreted as comprising a number of geographically more or less well-separated infra-specific taxa. The plants from the western part of the range are here treated as subspecies *coccinea*. Collections are too few and inadequate to warrant its segregation into varieties, though the Fiji and Tonga plants may turn out, with more collections, to be separable. Subspecies *atollensis* occurs from the Society Islands eastward and northward.

GUILLEMIN (1837, p. 63) quotes an excellent description of "*Agati coccinea* Desv." from "Forst. mss". This is presumably from a manuscript by J. R. FORSTER in the Bibliothèque Centrale of the Paris Museum, kindly brought to my attention by Dr. H. HEINE, who says that in the manuscript there is a note "varietas in insula arenosa prope Novam Caledoniam". GUILLEMIN gives the locality as "Ins. Societ. (Forst.)", but the statement in the quoted description "*Legumen pedicellatum cylindraceum*" clearly indicates subspecies *coccinea*, from New Caledonia. The note by FORSTER seems to indicate that he realized that there were two varieties in *Aeschynomene coccinea*, the New Caledonia one and the one collected and sketched in the Society Islands (see var. *parkinsonii*).

The type specimen of *Aeschynomene coccinea* L. f. is a single branch with leaves and inflorescences congested distally, pubescence scanty, appressed, leaves with 5-11 pairs of pinnae, these apparently rather thick, oblong, base somewhat contracted, obtuse, apex truncate to very slightly emarginate, very slightly apiculate, midrib prominent, lateral veins not evident, petiolule short but evident, rachis thickish, appearing rather stiff; no flowering racemes evident, but one damaged crumpled flower, calyx lobes triangular, slightly strigose, pods narrow-linear, appearing oblong in cross-section, 3-4 times as long as leaves, held erect, beak slender, sharp.

A dissection of a flower of *Schmid 1033*, from the Loyalty Islands, kindly done for me by J. LEWIS of BM, showed two round appendages (or better calli) at the base of the vexillum, with little ledges near their bases, a character which he had not seen before in the genus. A. C. SMITH (*in litt.*, 1982) mentioned obtusely deltoid appendages on the Fijian plant. He pointed out that ST. JOHN did not mention such appendages on *S. atollensis* and wondered if ST. JOHN could have simply missed them. However, on a pickled flower of *Sachet 2007*, from Takapoto, and some from Tikehau Atoll, Tuamotu Islands, as well as on fresh flowers from Tikehau plants cultivated in Tahiti, there are no such calli, whatever. The wing and keel petals of *S. speciosa* var. *tuamotensis*, as illustrated by F. BROWN (1935, p. 111), have each a single projection ("auricle"), but the vexillum has none. The presence or absence of calli on the vexillum is one of the characters separating the New Caledonia-Fiji plants from the SE Polynesian ones, as seen in the following key:

KEY TO SUBSPECIES AND VARIETIES OF *SESBANIA COCCINEA*

1. Basal few mm of peduncle with hairs appressed, leaflet blade noticeably sparsely strigose, vexillum with 2 calli within toward base, pod very terete (subsp. *coccinea*)
1. Basal few mm of peduncle with hairs usually spreading, leaf blades usually only obscurely sparsely strigose, plant very rarely completely glabrous, vexillum lacking calli, pod more or less compressed (subsp. *atollensis*)



Pl. 5. — *Sesbania coccinea*, two subspecies showing different habit : *Forster sheet* (Uppsala). Right hand plant, subsp. *coccinea* ; left hand plant, subsp. *atollensis*. By courtesy of the Botanical Museum, Uppsala.

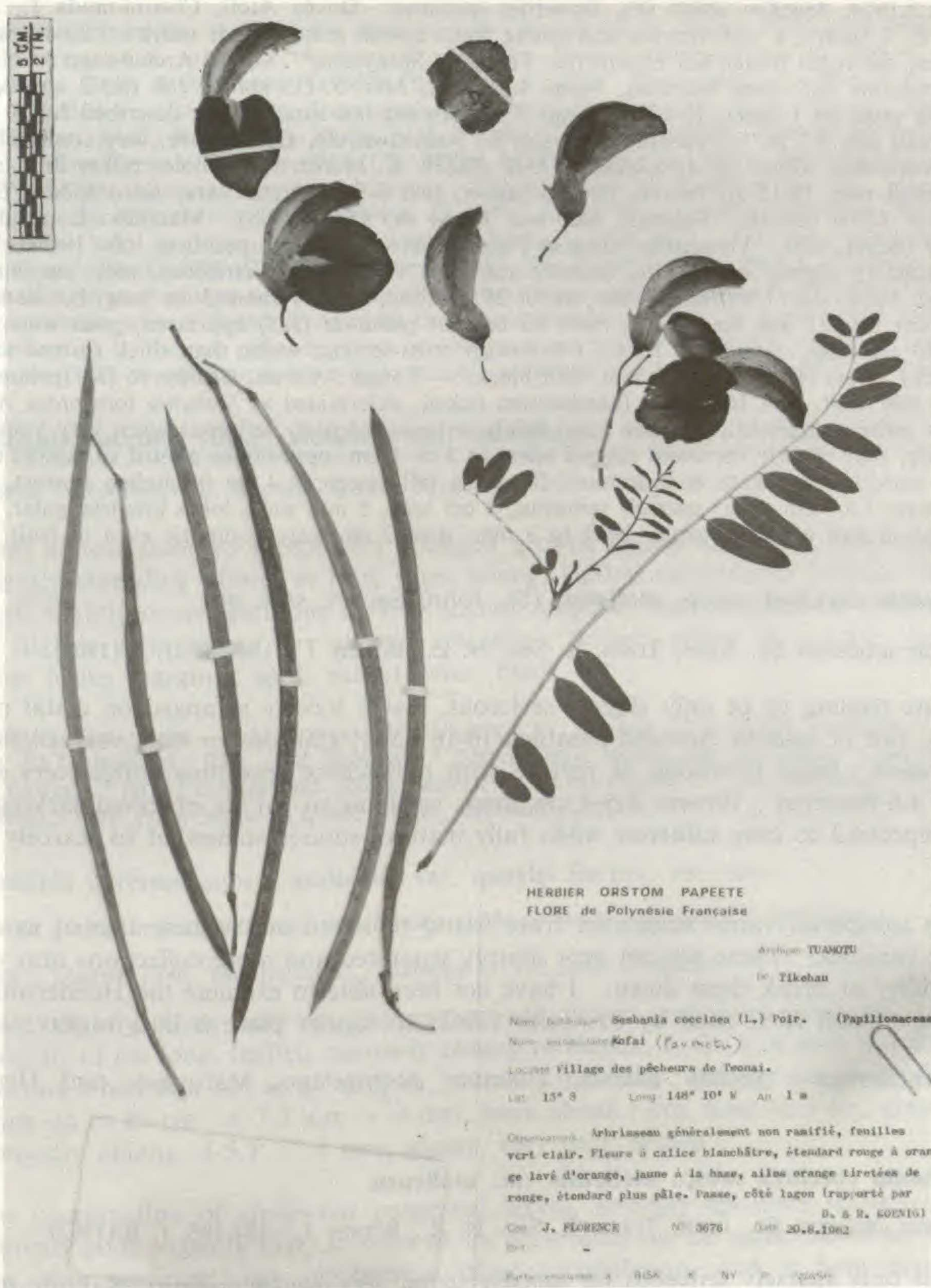
- 2. Leaflets at apex rounded to subtruncate or emarginate..... 3
- 3. Apiculus conspicuous, plant glabrous except for base of peduncle var. *quaylei*
- 3. Apiculus inconspicuous, young growth, at least, pubescent 4
- 4. Flowers yellow, leaflet slightly emarginate at apex, seeds black, orbicular. var. *marchionica*
- 4. Flowers orange to maroon, leaflet rounded at apex, seeds greenish-yellow, oblong or sub-cylindric var. *parkinsonii*
- 2. Leaflets narrowly ovate or oblong-ovate, tapering somewhat toward apex, apex somewhat pointed, slightly or markedly apiculate..... 5
- 5. Leaf-tips notably apiculate (apiculus approaching 1 mm), leaflets ovate, 3.5-5 cm long, essentially glabrous var. *tuamotensis*
- 5. Leaf-tips slightly apiculate (apiculus usually 0.5 mm or less), leaflets elliptic to ovate or broadly lanceolate, mostly less than 3.5 cm long, usually sparsely and inconspicuously strigose, or very rarely plant entirely glabrous var. *atollensis*

Sesbania coccinea (L. f.) Poir. subsp. **coccinea**

Shrub or small tree, 0.4-7 m tall, young growth tending to be sparsely strigose or sericeous to minutely tomentulose or pulverulent, leaves and racemes congested in the distal 7-8 cm of the branchlets, leaves to 10 cm long, shortly petiolate, pinnae 10-16 pairs suboppositely arranged, 10-15 mm apart, petiolule 1 mm or less long, blade oblong 15-20 × 5-7 mm, subfleshy or subcoriaceous, apex truncate or subtruncate to very slightly emarginate, minutely mucronulate, base rounded to subtruncate, very slightly asymmetric, upper surface very sparsely strigose, lower glabrous or almost so; racemes among leaves, 3-5-flowered, shorter than leaves, the basal internode (peduncle) more or less strigose or sericeous, pedicels curved, 8-12 mm long, flowers 2.5-4 cm long; calyx cylindro-campanulate, 6-8 × 5-6 mm, teeth slightly acuminate to very broad and obtuse to almost lacking; vexillum with 2 calli at base of blade; young fruit strigose, when mature terete (Tonga collection subterete but possibly not quite mature), 5-6 mm or more suture to suture, to 8 mm wide, not or scarcely constricted between seeds; seed oblong with rounded ends, dull to subglossy black to brown, 5-7 × 2.5-4 × 1.7-2 mm.

DISTRIBUTION : New Caledonia, Loyalty Islands, Fiji, and Tonga.

SPECIMENS EXAMINED (described in some detail to identify individual sheets). — “ N. Zealand ” [New Caledonia] : *s. coll.* [G. Forster] (FORSTER’S hand) 1208.5 (LINN), holotype. — [New Caledonia], *s.l.* : *Herb. Pallas*, G. Forster (BM) labeled “ *Aeschynomene coccinea* a Cat. Forsters ”, (one leafy branch, with 2 pods, one with chewed-up flowers). *G. Forsters Herbarium* (BM) labeled on front of sheet : “ 166 [Forster’s no.] ” “ 273. *Aeschynomene coccinea*-foliis succulentibus ” (273 is *Prodromus* no., p. 51). *Forster 144* (P) mounted on typical FORSTER paper, identified as *Aeschynomene coccinea* in the border frame and as *Agati* on sheet (one leafy branch with a pod, and fragments). — “ Society Island, et Botany Island ” : *Forster* (UPS, *Herb. Thunberg 17139*), labeled *Aeschynomene coccinea* (2 leafy twigs, the one on the right with congested leaves and inflorescences, 2 pods, is very similar to all the above; the other is probably var. *parkinsonii*). Botany Island near New Caledonia, *Forster Herb.* [from Liverpool] (K) determined as *Aeschynomene coccinea carnosula* Willd. (Very like COOK specimen, very long pods 30 cm long). — “ Nova Caledonia, 1775, Capt. Cook (Botany Island) ” (BM) (top of woody branch, with many leaves in good condition, inflorescences of several large buds, one with small buds, 3 pods). “ New Caledonia, Isle of Pines, W. Anderson [in] 1774 ” (BM) (2 twigs; 1 with young buds, 2 young pods; 1 with young buds, 2 poor flowers, 1 ripe ? pod). — Loyalty Islands : Lifou, au sud de Kode, fin de la route, *M. Schmid 1033* (BM, P, US) “ Arbuste 4-5 m ; fleurs jaunes [or orange] ; au pied de la falaise au bord de la mer ;



Pl. 6. — *Sesbania coccinea* var. *atollensis*: Tuamotu Archipelago, Tikehau Atoll, J. Florence 3676, showing leaves, flowers, and fruits. By courtesy of Jacques FLORENCE.

buissons tabulaires isolés ; sur sol peu profond". (Tips of branch with leaves in good condition, 1 young pod, flowers in pocket in poor condition ; the US sheet has buds and a thick mature pod). Lifou, 21.2.1974, *MacKee* 28285 (P), flowering specimen. Ouvéa Atoll, Civa-ni-muda I., *Däniker* 2214 (K, Z, 7 sheets, 4 with flowers and young fruit, 3 with mature pods only) ; " 30-40 cm hohes Sträuchlein, mit roten Blüten auf exponierten Felsender Sprayzone ". — Fiji Archipelago : Lau Group (raised limestone and coral beaches), Naiau I., beach, *Mrs. J. D. Tothill* 103 (K, 2 sheets, a few leaves, two pods on 1 sheet, 15-17 cm long) " flowers red but smaller than described for *S. grandiflora*. Small tree 5-7 m ". Yacatha (Yathata) I., Naberawavula, Cakandrove, very common coastal plant, *Koroiveibau (Dept. of Agriculture)* 15540 (BISH, K, branch tip, folioles rather long, 2-3 flowers) " small tree, 12-15 ft, flowers pinkish yellow, pod 6-8 ". Vatu Vara, *Koroiveibau (Dept. of Agriculture)* 17708 (BISH). Fulanga, near sea, *Bryan* 443 (BISH, US). Marambo I., sand beach, *Bryan* 517 (BISH, US). Vernacular name in Fijian " vai vai ". Fiji specimens have leaflets oblong, apex truncate to slightly emarginate, scarcely apiculate, very sparsely sericeous, more on under side than upper, leaves on 17708 rather close, about 20 cm long, flowers about 3 cm long, but damaged, a better flower on 517 less than 3 cm, hairs on base of peduncle (517) appressed, pods when mature (443) 13-20 cm long, completely terete, 6-8 mm in cross-section, wider than thick (suture to suture called thick), seeds oblong, 4 × 6 mm, dull black. — Tonga : Vavau, *Crosby* 46 (K) [printed label] " Islands July 1891, Mrs Hanson " [handwritten ticket], determined as *Sesbania tomentosa* A. Gray, has leaves rather congested, to 23 cm long, thinly sericeous (densely sericeous when very young), leaflets oblong, only slightly narrowed toward apex, to 3 × 1 cm, opposite or almost so, apices obtusely rounded, scarcely mucronate or apiculate ; flowering inflorescences 4 cm (excluding flower), fruiting 7 cm, flowers 3.5-4 cm, calyx sparsely sericeous, 1 cm long, 5 mm wide, lobes low triangular, fruit to 18 cm long, 6 mm wide, subterete, beak to 3 mm, stipe 2 cm, calyx cylindrical even in fruit.

Sesbania coccinea* subsp. *atollensis* (St. John) Sachet, *stat. nov.

— *Sesbania atollensis* ST. JOHN, *Trans. R. Soc. N. Z., Botany* 1 : 184-186, f. 9 (1962).

Plants tending to be only slightly sericeous, leaves loosely arranged on distal parts of branches, not or seldom crowded ; leaflets 10-16 pairs, glabrous or only very slightly strigose beneath ; basal internode of raceme with pubescence spreading, often very sparse ; racemes 4-6-flowered ; flowers 3.5-4 cm long, vexillum so far as observed lacking calli ; fruit compressed to only subterete when fully mature, sutures somewhat to scarcely thickened.

This subspecies varies somewhat from island to island and is here treated as comprising five varieties. These are not very sharply separated and more collections may confirm their validity or break them down. I have not been able to examine the Henderson Island specimen, *Lintott H-1*, cited by ST. JOHN (1962) so cannot place it in a variety.

DISTRIBUTION : Society Islands, Tuamotu Archipelago, Marquesas and Henderson Island.

Sesbania coccinea* subsp. *atollensis* var. *atollensis

— *Sesbania atollensis* ST. JOHN, *Trans. R. Soc. N. Z., Botany* 1 : 184-186, f. 9 (1962).

Plant only sparsely sericeous (or densely so on very young growth), glabrate or rarely glabrous ; leaflets elliptic to broadly lanceolate or sub-ovate, apex rounded with mucro about 0.5 mm or less long, very sparsely strigose or glabrate beneath, seeds oblong, olive to dark brown or black.

Found, so far as known, in western or west-central Tuamotu atolls, type from Raroia Atoll.

SPECIMENS EXAMINED. — TUAMOTU ARCHIPELAGO : Raroia Atoll : Tetou, *Doty & Newhouse 11835* (BISH, holotype of *S. atollensis*, A, isotype) ; Oneroa, *Doty & Newhouse 11559* (BISH) ; Ng[arumaoa] Village, *Doty & Newhouse 11906 b* (BISH sheet only). Touamotu, s.l., *Barrau* in 1955 (P) “plages coralliennes ... très belles fleurs écarlates ... kofai”. Rangiroa Atoll, Avea I., *Sachet 1380* (US). Tikehau Atoll, *Barrau (MacKee's) 3125* “kofai” ; Teonai village, *Koenig (Florence's) 3676* (Papeete) ; Motu Teonai, *Florence 6953* (US, BISH, P, NY, Papeete) ; Motu Temaruopapahia, Teoa, *Florence 6952* (P, Papeete), flowers red orange ; Tahiti, Musée de Tahiti et des Iles, planted from seeds of *Koenig (Florence's) 3676*, *Fowler 15* (US), fallen flowers only. Mataiva Atoll, Motu Tamiano, June 1985, in flower and fruit, *Delesalle (Sachet's) 2706* (US). Tahanea Atoll (near Anaa), *Whitney Exped. [Beck] 2000* (BISH) ; *Whitney Exped. [Beck] 2004* (BISH, BKL). Takapoto Atoll, S side of Atoll, between village and first pass (Paopao) Orapa, along lagoon, *Sachet 2036* (US, BISH, P), only specimen seen of *Sesbania coccinea* that is completely glabrous ; a plant grown from a seed of this collection is likewise glabrous, even on the youngest growth. Another specimen from Takapoto (*Sachet 2007*) seems intermediate between var. *atollensis* and var. *tuamotensis*, see below.

Sesbania coccinea subsp. *atollensis* var. *marchionica* (F. Brown) Sachet, *stat. nov.*

— *Sesbania marchionica* F. BROWN, Bishop Mus. Bull. 130 : 109-110 (1935).

Plant almost glabrous except very youngest growth slightly sericeous, base of peduncle very slightly spreading pilose, at least when young, leaflets narrowly to broadly oblong to elliptic or slightly ovate, glabrous or very slightly strigose, apex rounded or subtruncate to usually slightly emarginate, very shortly apiculate ; flowers yellow to orange ; pods with somewhat heavy margins ; seeds suborbicular, black.

SPECIMENS EXAMINED. — MARQUESAS IS., UAHUKA I. : *Quayle 1710* (BISH, holotype of *S. marchionica*, BKL, isotype) ; BKL field label says “Shavay Bay, barren islet off coast,” 150 m alt. tree 5-6 m. flowers “large, orange and yellow, odorless, orchid-shaped”. Ilot Hemeni, *Thibault 146* (US, BISH) ; Fatu Iva : Motu tu'i, 400-450 m, *Thibault 32* (US).

Sesbania coccinea subsp. *atollensis* var. *quaylei* Sachet, *var. nov.*

Foliola glabra anguste oblonga vel elliptica valde apiculata, fructus 7.5 mm latus.

TYPE : *Quayle 1848*, Marquesas Is., Uahuka I., s.l. (holo-, BISH).

Plant slightly pilose only on youngest growth, leaves somewhat congested at tips of branches, to 13 cm long, leaflets narrowly oblong to elliptic, to 21 × 6 mm, minutely dark-red punctate when dry, not at all strigose, mucro 1 mm long ; flowers not available ; fruits when ripe up to 25 cm × 7.5 mm × 4 mm, beak about 1 cm, stipe to 2 cm, gray-brown ; seeds broadly oblong, 5-5.5 × 4 mm, glossy, very dark brown.

The combination of somewhat congested leaves, strongly apiculate leaflets and unusually broad pods suggests that, in spite of its occurrence on the same island as var. *marchionica*, this specimen may represent a distinct population, and is here described as such. So little is known of var. *marchionica* that this may be premature, but as the characters separating these two are similar to those separating other varieties in this species, attention should be called to this one.

Sesbania coccinea subsp. **atollensis** var. **parkinsonii** Sachet, var. nov.

Ab var. atollensis planta partibus juvenibus sericeis glabratis, foliolis sparse strigosis vix ovatis ad apicem basimque rotundis vel subtruncatis vix mucronatis, differt.

TYPE : Sachet 1956, Tupai Atoll, east side of atoll, near pass (holo-, US ; iso-, BISH, BM, A, CHR, MO, Z).

Small tree, young growth sericeous, glabrate ; leaves loose to somewhat crowded, leaflets elliptic to slightly ovate, or oblong, slightly sericeous or pilosulous especially toward base, base apex rounded or subtruncate, very shortly apiculate ; base of peduncle spreading, pilose ; flower orange and dark maroon mixed ; fruit up to 25 cm × 4.5 mm × 3.5 mm ; seed narrowly oblong, to 5 × 2-2.5 mm, greenish or black, or chestnut.

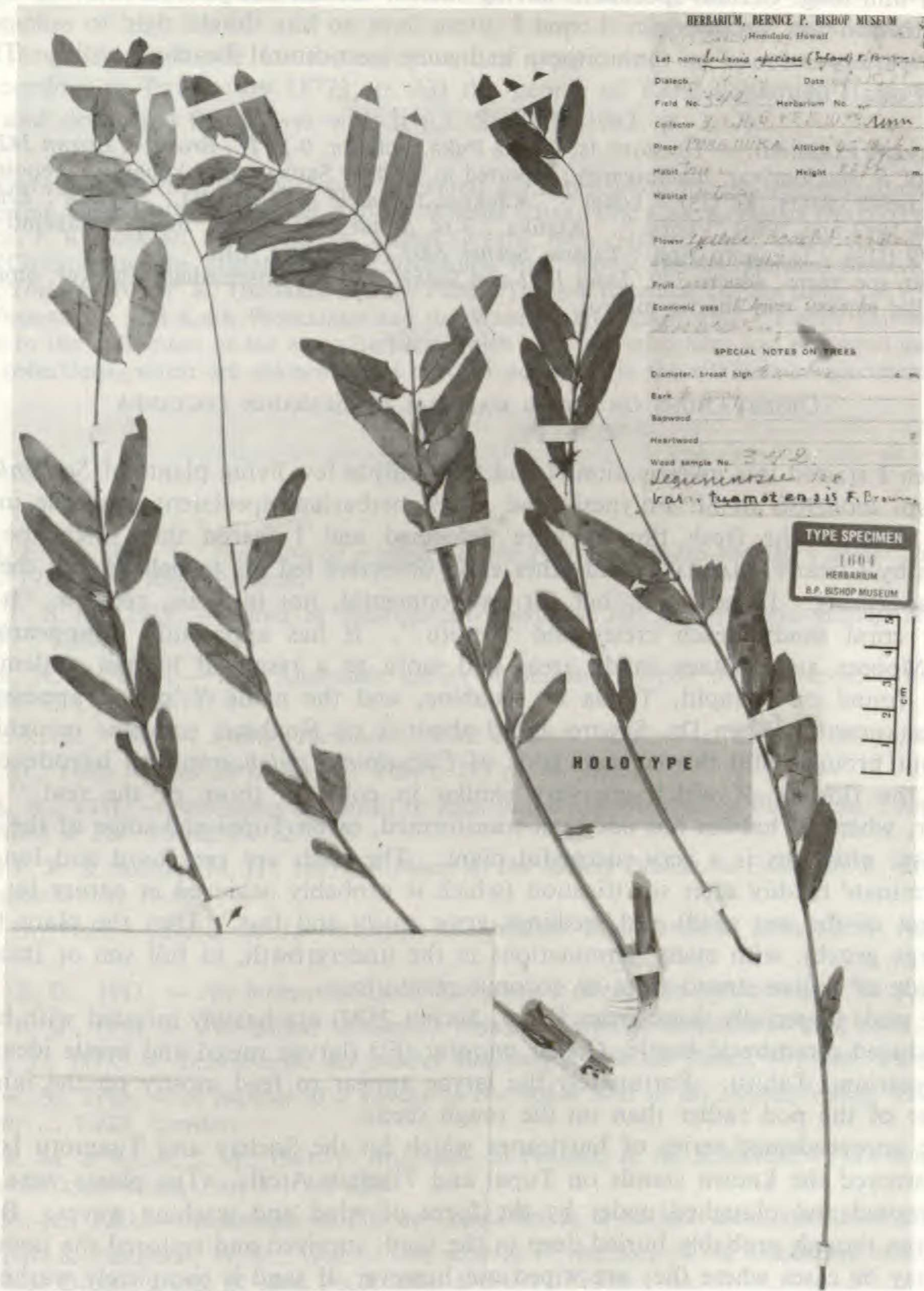
This is the form originally illustrated by PARKINSON, said to have occurred on Tahiti, and two old specimens actually so labeled, but no modern collections known from there. CUZENT, in 1860, says it was, in Tahiti, only known from Taiarapu Peninsula but on the point of disappearing completely from Tahiti and the Society Islands. Otherwise known from Moorea, Tetiaroa, and Tupai. Very close to var. *atollensis*, but more pubescent, leaflets less ovate, apex rounded or subtruncate, mucro shorter. Sydney PARKINSON's painting (BM) is this variety, which is dedicated to him.

SPECIMENS EXAMINED. — SOCIETY ISLANDS : " Tahiti, *Capt Cook* " (BM), young branchlets, leaves disarticulated, some badly damaged flowers, "*Aeschynomene speciosa*" on ticket. Tahiti, "*Banks and Solander, Cook's first voyage (Society Islands 1769)*" (BM). "*Sandy Island in oceano pacifico*" *J. R. & G. Forster* (BM), flowering branch, with scattered leaves. S.I., *G. Forster Herbarium* (BM, 2 sheet), woody branches with scattered leaves, a few folioles, a few damaged flowers, 2 pods on each, labelled "*Aeschynomene coccinea* a Cat. Forsters". " Society Island et Botany Island ", *Forster* (UPS, *Herb. Thunberg 17139*) ; the left twig on this sheet is probably var. *parkinsonii*, the right one is subsp. *coccinea*, which see. Raiatea, *Forster*, pencil drawings 198, 199 (BM), flowering branch, pod and flower dissection ; " owaij ". Moorea, *Vesco* (P) " arbuste très joli, assez rare, se trouve dans l'île Moorea dans les bois de Casuarina au bord de la mer. Cette espèce existe surtout abondamment dans toutes les îles Pomotou " " ouwai ". " Pointe sablonneuse ", *Lépine 9* (P, US) arbre de 5 à 6 mètres, " ofaii ". Taiti, *Nadeaud ? Herb. Drake* (P). Ulhieta [Raiatea], *Parkinson* painting, vol. 1, no. 22 (BM) ; native name given in Parkinson plant list as " owhaee ". Tetiaroa Atoll, Tia-raunu, E. end, *Raynal 18001* (P) ; *Quayle 190* (BISH, 3 sheets, BKL, BM), the BM sheet labelled Com. Forest Brown. Tupai Atoll, 3 ft., *Grant 4818* (BISH) ; east side of atoll, near pass, *Sachet 1956* (US, holotype, BISH, BM, A, CHR, MO, Z, isotypes) ; slender trees to 5 m or more, a few deformed flowers, young pods and a few ripe ones ; *Sachet 2582* (US), ripe pods, fertile seeds, only ; *Sachet 2549* (US), one leaf from young plant in pot brought from Tupai, growing at Papeari garden, Tahiti.

Sesbania coccinea subsp. **atollensis** var. **tuamotensis** (F. Brown) Sachet, comb. nov.

— *Sesbania speciosa* var. *tuamotensis* F. BROWN, Bishop Mus. Bull. 130 : 110 (1935).

Youngest growth sericeous, glabrate ; leaflets nearly or quite glabrous, large, 3-5 cm long, 1 cm wide or slightly wider, elliptic to usually somewhat ovate, tapering to a blunt apex with a prominent mucro or apiculus about 1 mm or more long, often lost on mature leaflets ; flowers red ; seeds oblong, khaki-brown to reddish brown or dark chestnut.



Pl. 7. — *Sesbania coccinea* var. *tuamotensis* : Holotype specimen (Bishop Museum), showing leaf-shape and mucronate apex. By courtesy of Bishop Museum, Honolulu.

Differs from var. *atollensis* in larger, tapering leaflets with ovate outline and prominent mucro, 1 mm long. Certain specimens having smaller leaflets and shorter mucros, are intermediate toward var. *atollensis*.

This variety is found on the northern and some west-central Tuamotu atolls. The type is from Puka Puka Atoll.

SPECIMENS EXAMINED. — TUAMOTU Is. : Puka Puka : interior, 0-10 ft., *Brown & Brown 342* (BISH, holotype of *S. speciosa* var. *tuamotensis*) ; reported in 1904 by SEURAT as "kohai". Tepoto : 2 m, *St. John 14348* (BISH, K, US) "kohai". Kaukura : *Quayle 2183* (BISH). Napuka : *Eric Conte* (photos in 1982 and 1985) "kofai". Aratika : 3 m, *Jones 1851* (BISH, BKL). Makemo : *H. F. Moore 349* (US). Takapoto atoll : Tararo, *Sachet 2007* (US, BISH, P).

Certain specimens, *Moore 349*, *Jones 1851* and *Sachet 2007* are intermediate with var. *atollensis* in their smaller leaflets and shorter mucros.

OBSERVATIONS ON LIVING MATERIAL OF *SESBANIA COCCINEA*

When I started this investigation, I had seen only a few living plants of *Sesbania coccinea* subsp. *atollensis* in SE Polynesia and a few herbarium specimens available in P and BISH. Most of the fresh flowers were deformed and I feared they might be sterile. Remarks by CUZENT, NADEAUD and other early observers led me to believe that the species was disappearing. Indeed it is, but for environmental, not intrinsic, reasons. It thrives only on coral sandy beach crests and "motu". It has apparently disappeared from Tahiti, Moorea and Raitaea sandy areas and motu as a result of human settlement. It was not found on Maupiti, Tahaa or Huahine, and the name "'ofai" appears to be mostly unknown. When Dr. SINOTO asked about it on Huahine, someone recognized the name, but brought him flowers and pods of *Caesalpinia pulcherrima* an introduced ornamental, the flowers of which are very similar in color to those of the real "'ofai". However, where its habitat has not been transformed, as on Tupai and some of the Tuamotus, subsp. *atollensis* is a very successful plant. The seeds are very hard and long-lived; they germinate readily after scarification (which is probably achieved in nature by the rolling effect of the wet sand) and seedlings grow easily and fast. Thus the plant tends to form large groves, with many germinations in the undergrowth, in full sun or in the dappled shade of native strand trees or coconut plantations.

The pods (especially those from Tupai, *Sachet 2582*) are heavily infested with larvae of an introduced cerambycid beetle, *Oopsis mutator* (F.) (larvae raised and beetle identified at the Insectarium, Tahiti). Fortunately the larvae appear to feed mostly on the inner pith-like layer of the pod rather than on the tough seeds.

The unprecedented series of hurricanes which hit the Society and Tuamotu Islands in 1983 destroyed the known stands on Tupai and Tikehau Atolls. The plants were defoliated, uprooted and ploughed under by the force of wind and washing waves. But some seeds, even though probably buried deep in the sand, survived and restored the populations. There may be cases where they are wiped out however, if sand is completely washed off or flooding prolonged.

Sesbania grandiflora is not cultivated as widely as it might be because it is considered to be somewhat ungainly in appearance and relatively short-lived. *S. coccinea* subsp. *atol-*

lensis is probably also short-lived, but the plants are well-shaped and their light foliage and beautiful flowers are very attractive. With the rapid development of tourist facilities on coral beaches of high islands and on atoll motu, I hope it may become popular as an ornamental shrub or small tree for the enjoyment of people and for its own survival.

According to PARKINSON (1773, p. 43) the people of Raiatea planted it around their houses and decorated themselves with it (cf. SACHET, 1983, p. 3, 7).

ACKNOWLEDGEMENTS : Finally, I wish to express my appreciation for the help and cooperation of the following individuals : C. Dennis ADAMS, Winona CHAR, Eric CONTE, Bruno DELESALLE, Jacques FLORENCE, F. R. FOSBERG, Mark FOWLER, Michel GUERIN, Heino HEINE, André INTES, D. & R. KOENIG, Peter O'CONNOR and the Bishop Museum herbarium staff, Royce OLIVER, Bernard SALVAT, Maurice SCHMID, Yosi SINOTO, W. R. THEOBALD and the Pacific Tropical Botanical Garden staff, J.-C. THIBAUT, Colin WOODROFFE, and Keith WOOLLIAMS and the Waimea Arboretum staff. I must also express my gratitude to the authorities of the many herbaria which have lent specimens and permitted me to work in their collections, which are acknowledged by their acronyms in the citations of specimens studied.

REFERENCES CITED

- BEECHEY, F. W., 1831. — *Narrative of a voyage to the Pacific ... in His Majesty's ships "Blossom" ... 1925-28*, 2 vols., London.
- BROWN, F. B. H., 1935. — Flora of southeastern Polynesia. III. Dicotyledons. *Bishop Mus. Bull.* 130 : 1-236.
- BURBIDGE, N. T., 1965. — The Australian species of *Sesbania* Scopoli (Leguminosae). *Austr. Jour. Bot.* 13 (1) : 103-141.
- CARR, D. J., ed., 1983. — *Sydney Parkinson, Artist of Cook's Endeavour Voyage*. 300 p., Canberra.
- CUZENT, G., 1860. — *Iles de la Société. Tahiti*. 275 p., Rochefort.
- EXELL, A. W., 1931. — Specimens attributed to Bäck in the 'Supplementum Plantarum'. *Journ. Bot. British & For.* 69 (825) : 227-230.
- FOSBERG, F. R. & SACHET, M.-H., 1983. — *Plants of the Society Islands*, in CARR, D. J., ed., Sydney Parkinson ... 76-107.
- JUEL, H. O., 1924. — Notes on the herbarium of Abraham Bäck. *Svenska Linne-sällsk. Aarssk.* 7 : 68-82.
- MERRILL, E. D., 1917. — *An interpretation of Rumphius's Herbarium Amboinense*. 595 p., Manila.
- MERRILL, E. D., 1954. — The botany of Cook's voyages. *Chronica Botanica* 14 (5-6) : i-iv, 161-384.
- NADEAUD, J., 1873. — *Énumération des plantes indigènes de l'île de Tahiti*. i-v, 1-86, Paris.
- PARKINSON, S., 1773. — *A journal of a voyage to the South Seas in his Majesty's ship, The Endeavour ...* 1-222, London.
- POLHILL, R. M. & SOUSA, S. M., 1981. — *Robinieae*, in POLHILL, R. M. & RAVEN, P. H., *Advances in legume systematics*, Part 1 : 283-288.
- SACHET, M.-H., 1983. — Botanique de l'île de Tupai, îles de la Société. *Atoll Res. Bull.* 276 : 1-26.
- ST. JOHN, H. & PHILIPSON, W. R., 1962. — An account of the flora of the Henderson Island, South Pacific Ocean. *Trans. R. Soc. N. Z. Bot.* 1 (14) : 175-194.
- SEURAT, L. G., 1904. — *Observations sur quelques îles orientales de l'archipel Tuamotu*. 1-11, Papeete.
- SMITH, A. C., 1978. — A precursor to a new Flora of Fiji. *Allertonia* 1 (6) : 331-414.