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Thespesia populnea (L.)
Solander ex Correa and
Thespesia populneoides
(Roxburgh) Kosteletsky
(Malvaceae)

F. R. FOSBERG

M.-H. SACHET



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*F. R. Fosberg
and M.-H. Sachet*

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ABSTRACT

Fosberg, F. R. and M.-H. Sachet. *Thespesia populnea* (L.) Solander ex Correa and *Thespesia populneoides* (Roxburgh) Kosteletsky (Malvaceae). *Smithsonian Contributions to Botany*, number 7, 13 pages, 6 figures. 1972.—The pantropical *Thespesia populnea* (Malvaceae) is shown to be clearly separable into two species: *T. populnea*, which is pantropical on seashores, and *T. populneoides* of the Indian Ocean area, extending to Hainan Island, usually, but not always, somewhat inland. Hybrids between the two species occur where their ranges touch, and in Ceylon some of these hybrids have been widely propagated vegetatively as ornamentals and "living fence-posts."

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F. R. Fosberg
and M.-H. Sachet

Thespesia populnea (L.)
Solander ex Correa and
Thespesia populneoidea
(Roxburgh) Kosteletsky
(Malvaceae)

On the basis of our experience with Pacific and Caribbean specimens, *Thespesia populnea* (L.) Solander ex Correa has always seemed a relatively uniform species, with no variations of any taxonomic significance. Hence it was with considerable surprise that we found, in a collection made by D. R. Stoddart on the Indian Ocean atoll of Aldabra, a specimen of a quite different appearing plant that had been tentatively determined at Kew as *Thespesia populnea*. It differed obviously in the shape of the leaves, in the strongly copper-colored leaves and young growth, and in the fruit with a clearly dehiscent pericarp, but with endocarp remaining intact, while the plant we know as *T. populnea* has an indehiscent fruit.

G. Ll. Lucas, expert on African Malvaceae, with whom we discussed this plant indicated that to him it was normal East African *T. populnea*, and showed us a considerable series of specimens resembling the Aldabra plant.

The senior author later had the opportunity to camp in a grove of *Thespesia* at Cinq Cases at the east end of Aldabra, and to study a substantial population in the interior "platin" area of this limestone island. Here *Thespesia* is the dominant tree in rather low-lying areas, especially near fresh to somewhat brackish pools. These trees present a rather uniform appearance, quite coppery to bronze, leaves with a very wide open basal sinus, subcordate or almost

subtruncate, rather than deeply cordate, with long-pedunculate rather drooping flowers, the fruit with outer pericarp loosened and dehiscent when completely mature and dry, and the seeds covered by crowded short, bulbous-tipped erect hairs. In all of these features this population differs from the widespread Pacific and Atlantic strand form.

At Dune Jean Louis, on the south coast of Aldabra, another population of *Thespesia* was found, this one growing at the inland base of coastal dunes and in the adjacent mixed scrub on rather rough "champignon" limestone. This population was consistently different from the inland trees described above. The general color of the trees was green, though the very young growth was somewhat coppery, due to peltate brown scales. The leaves were deeply cordate. The peduncles were short and erect (that is, diverging somewhat from the stem, but straight, not at all drooping), the fruits showed not the slightest tendency to dehisce when dry, and the seeds were covered with tightly matted long silky hair—longer, looser, and brown on the angles of the seeds. This is exactly the combination of characters that distinguishes the widespread Pacific form. Jack Frazier, herpetologist, who was camped at the time in the area, mentioned a single plant in the vicinity, but somewhat inland, that had long-stalked drooping flowers. Upon inspection, it was found to be identical with the Cinq Cases trees in general appearance, but it had no fruits. Several other plants nearby were intermediate in one or two features, suggesting some introgression of characters from the one coppery plant

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into the surrounding population of green ones. None of these plants, however, were in fruit.

Later it was possible to study another grove of *Thespesia* at Anse Porceau, on Middle Island, north coast of Aldabra, also at the inner edge of coastal dunes. These trees were all of the type with green cordate leaves, short peduncles, and indehiscent fruit.

Mr. Frazier later noticed a difference in the degree to which the style was exerted from the staminal tube in these two plants, but it was impossible to revisit substantial populations of the two to verify this, or to show, as was suggested by others later, that it was a function of age of flower. Frazier also called attention to another feature, previously unnoticed, common to both these plants. When a bud or young fruit is cut transversally a copious yellow, gummy fluid exudes from the surfaces. We had not seen this mentioned before, nor were we aware of latex in any Malvaceae. Roxburgh, however, mentioned it in his discussion of *Thespesia* (as *Hibiscus*) in the *Flora Indica*, 1832 (*vide infra*); a label on a plant collected by Lt. Speke on Europa Island (P) also describes the appearance of a canary-colored juice on cutting a green fruit; and Capuron in his recent publication of *Thespesia gummiflua* (1968: 9), in a different section of the genus, describes this production of yellow gum and bases his specific epithet on it. J. Nadeaud (1864:47) mentions that "le suc jaune qui suinte des pédoncules . . ." of *Thespesia populnea*, miro, is used against centipede bites. Dr. Paul Fryxell (in litt.) tells us that this yellow substance is mostly gossypol. It probably should not be called latex in the strict sense.

After studying these two plants growing on Aldabra Fosberg had little doubt that two species were represented. Plants collected in Aden (planted) (*Fosberg 49964*) and on the south coast of Ceylon (*Fosberg 50352*) after leaving Aldabra were all of the green indehiscent species. Convinced that two species were involved, it became necessary to determine the ranges of both species and to which one the name *Hibiscus populneus* L. [*Thespesia populnea* (L.) Sol. ex Correa] was originally applied.

Once the significant combinations of characters of the two species had been worked out, it became surprisingly easy to sort even poor herbarium material into two fairly clear entities, though with some intermediates. The distributional picture seems reasonably clear. The plant (Figures 1, 2, 5) with deeply cor-

date, green leaves, short peduncles, articulate near base and with no minute bracts at the articulation, indehiscent fruits, and matted long seed hairs is pantropical, found near the sea around the tropical parts of all three oceans. The other plant (Figures 3, 4, 6), with coppery or bronzed leaves with a very wide sinus, long peduncles articulate at base to the stem but not above and without bracts, with drooping flowers, dehiscent pericarp with a very tough, indehiscent endocarp and short, erect club-shaped or bulbous seed hairs, is essentially an Indian Ocean plant, found on most shores of that ocean, extending to the north coast, and even to the east coast of Australia, in one direction, to the Philippines and Hainan in the other, and very sparsely scattered in other parts of the tropics. The few occurrences outside the main range give the impression that the Indian Ocean plant may have been spread around somewhat by human activity, either by accident or by deliberate planting. The occurrence on Ceylon will be discussed separately later.

Van Borssum Waalkes (1966:109) has designated the specimen in the Hermann Herbarium in the British Museum as lectotype of *Hibiscus populneus* L. There is also a specimen in the Linnean Herbarium named "3 populneus" in Linnaeus' hand. Neither



FIGURE 1.—*Thespesia populnea* showing narrow sinuses at leaf bases and short pedicels.

one is a very satisfactory or complete specimen. Van Borssum Waalkes' choice of the Hermann sheet is probably the most acceptable, since *Hibiscus populneus* L. is principally based on the Flora Zeylanica reference in its protologue, as indicated by the asterisk (Wm. Stearn, conversation, 1968). The question of which of these should be type is rather academic, however, as both specimens seem to belong to the plant with deeply cordate leaves and indehiscent fruits. This is indeed fortunate, as it retains the name *Thespesia populnea* (L.) Sol. ex Correa in the sense most widely accepted throughout the tropics.

Paul Fryxell (in litt. 1969) has questioned this interpretation of the Hermann specimen, pointing out that van Borssum Waalkes (1966) mentions "nectaries" in the axils of the leaf veins, which, in Fryxell's experience, are found in the Indian Ocean species but not in the pantropical one. At our request Dr. Lucas reexamined the Hermann sheet but found no nectaries. A specimen (*Gruppe 102*) from Ceylon that seemed in other respects to be reasonably good *T. populnea* (the pantropical species) showed well-developed domatia (or nectaries), indicating to us that this character may not be very reliable. The discussion below of the possible hybrid nature of much Ceylon *Thespesia* may also have a bearing on both this specimen and the Hermann specimen.

If van Borssum Waalkes' observation should turn out to be correct, and if Fryxell's opinion that "nectaries" are only found in the Indian Ocean plant (below referred to *Thespesia populneoides*) were accepted, another name would be necessary for *T. populnea*. This would presumably have to be a combination based on *Hibiscus bacciferus* Forst. f. (type *Forster s.n.* Friendly Islands [Tonga]).¹ In light of the following observations on domatia in *T. populnea*, this combination does not seem to be necessary and will not be made here.

To settle the question of the significance of domatia or "nectaries" in the separation of these two species,

¹There is also in the Linnean Herbarium a specimen of *Thespesia populnea* labeled *Ipomoea campanulata* L. This has indeed even been regarded as the type of *Ipomoea campanulata* L. by S. J. van Oostroom (1940:568), and others. C. R. Gunn, however, has recently investigated this question very critically (in press) and has concluded that *Ipomoea campanulata* L. is best typified by "Adamboe" of Rheede, Hort. Malab. 11:15, t.56, 1692, as was suggested by Merrill (1914:133-134). Hence, this Linnean specimen is merely an early collection of *T. populnea*.



FIGURE 2.—*Thespesia populnea* showing short pedicels, flower, and mature indehiscent fruit.

we examined all the material—about 145 collections—immediately available in Washington, to determine, with the aid of a stereo-binocular, which had domatia. The domatia are pocketlike cavities occurring at the leafbase, on the underside of the blade between the bases of the main veins.

Twenty of the collections were the Indian Ocean tree, called hereafter *Thespesia populneoides*. As expected, these all have very prominent domatia, pocketlike, somewhat resembling the sori of the fern *Davallia*. Of the 125 collections referable to *T. populnea*, 23 were mounted in such a way that no undersides of leaf bases were visible. Of the remaining 102, 92 have at least some domatia, in some cases fairly inconspicuous but clearly visible with low magnification. In few cases were these as conspicuous as in *T. populneoides*, nor did they generally show the elongate, tubular form, but were shallower pits or seemingly roofed-over narrow angles between the vein bases. Ten collections seem to lack domatia entirely. On some of the 92 with domatia some leaves and some vein axils seem to lack them, on others they may be very small.

The sheets lacking domatia are all American, but 40 American sheets have them. Material from Jamaica, 5 sheets, all lacked domatia, as did 1 Florida and 4 other West Indian sheets. Central and South



FIGURE 3.—*Thespesia populneoides* showing leaf shape, broad sinuses, and flower with long pedicel.

America specimens all show domatia where the proper leaf area is visible. It should be remembered that these figures only apply to the 145 collections examined in the United States National Herbarium.

Study of this sample indicates to us that presence or absence of domatia is not a very reliable means of separating the two species under study, a conclusion that is in line with our observations of the presence or absence of these "glands" or "nectaries" in other groups, especially in certain genera of the Rubiaceae, such as *Cinchona*, *Psychotria*, and *Coprosma*.

The variability of *Thespesia populnea* has been discussed at length by a number of writers, the latest being van Borssum Waalkes (1966). Several of them, e.g., Blume (1825:73); Roxburgh (1832,3:191); Pierre (1888,3:plate 173), have proposed taxonomic arrangements. It is significant that practically all who have found serious problems with this group have been concerned with the areas around the Indian Ocean, where both *T. populnea* and *T. populneoides* are found. Unfortunately, Blume, who recognized two



FIGURE 4.—*Thespesia populneoides* showing broad sinus at leaf base and mature dehiscent fruits with long pedicels.

species, *T. populnea* and *T. macrophylla*, applied the name *T. populnea* to the wrong species, confusing most subsequent writers who considered the matter. This confusion, that of applying the older name to the plant with long peduncles and dehiscent fruit, has persisted even down to the recent discussion by van Borssum Waalkes. Even though he correctly typified the name, he interpreted the imperfect specimen as the long-pedunculata plant so-called by Blume. Because he failed to perceive the essential combinations of characters that set the two species apart, van Borssum Waalkes, as had Merrill earlier (1918:255), concluded that only one species was involved, so the misapplication made little difference in his treatment.

Hutchinson (1947:135) discusses the variation of what he calls *Thespesia populnea* Sol. He includes both *T. populneoides* Roxb. and *T. populnea* var. *acutiloba* Baker (*T. acutiloba* (Baker) Exell & Men-



FIGURE 5.—*Thespesia populnea* seeds, showing long woolly pubescence.



FIGURE 6.—*Thespesia populneoides* seeds, showing short clavate pubescence.

donça). He obviously did not study material of the four taxa (incl. *T. macrophylla* Blume) very critically and apparently missed most of the important characters. Howard (1949) has commented on some of the shortcomings of Hutchinson's paper.

The first person to define clearly the two species and to apply the name *Hibiscus populneus* L. in its correct sense was Roxburgh (1832,3:191), who used some of the characters regarded as important in the present study to separate his *Hibiscus populneoides* from *H. populneus* L. He distinguished *H. populneoides* by glands in the axils of the main veins, by the "double integument" of the fruit, the inner very tough, the outer opening from the apex exposing the inner, and by the "seeds . . . covered with brown farina" (versus "seeds downy"). Thus it is perfectly obvious that the first plant studied on Aldabra has been clearly defined since 1832 and that its correct name is *Thespesia populneoides*. This species has been ignored by most authors, or reduced to varietal status, since Roxburgh's time, but its clear distinction from *T. populnea* again demonstrates that the taxonomy of widespread strand species still presents problems worthy of attention.

Dr. Paul Fryxell has pointed out (in litt. 1969) another distinguishing character—that in *T. populnea* the peduncles are articulate and bibracteate very near the base, while *T. populneoides* bears no such articulation with bracts [although the pedicels are articulate to the stem]. Some specimens are intermediate in this character, or look like *T. populneoides* but have definite articulations. They will be discussed under Intermediates.

Systematic Treatment

Thespesia Solander ex Correa

Thespesia Solander ex Correa, Ann. Mus. Hist. Nat. Paris 9:290, 291, Tab. VIII (=Pl. 25 of volume), f.1, 1807, type *T. populnea* (L.) Sol. ex Correa, l.c. (*Hibiscus populneus* L.).²

Azanza (Moc. et Sessé ex DC.) Alef., Bot. Zeit. 19:298, 1861. Type *A. lampas* (Cav.) Alef. l.c. (*Hibiscus lampas* Cav.).

Trees or large shrubs, with a yellow sticky sap; usually cordate, palmately veined leaves, small subulate or lanceolate, early caducous stipules; axillary flowers on stout pedicels articulate either to a peduncle (which may be very short or long) or directly to the branchlet; involucre [or epicalyx] of (usually) few (3) to (rarely) many spirally arranged caducous separate usually reduced segments; calyx united, hemispheric, nearly truncate with very small abrupt teeth; corolla large, yellow, turning red in afternoon, falling; staminal column antheriferous in upper part; style caducous, unbranched, stigmas elongate, coherent; ovary 4–6, usually 5, celled, ovules several to many; fruit an indehiscent, partly dehiscent, or loculicidal capsule; seeds plump, several in a cell.

A pantropical genus of a number of species, the number depending on which of several segregate genera are recognized as distinct. Taken in a broad sense, at least including *Azanza*, it seems closest to *Lebronnecia* and *Gossypium*.

Key to Two Species of *Thespesia*

- Leaves green, deeply cordate; pedicels erect, 1–5 cm long, with a bracteate joint very near base; fruit indehiscent; seeds with long soft hair, especially on angles.....*Thespesia populnea*
 Leaves somewhat bronzed or coppery, very shallowly cordate to subtruncate; pedicels tending to droop, 5–12 cm long, without bracteate joint; outer layer of fruit dehiscent; seeds with short clavate or bulbous hairs.....*Thespesia populneoides*

² The name *Thespesia* rests on very shaky ground. It was originally published without a description, monotypic, the one species being *Thespesia populnea* (*Hibiscus populneus* L.). Since this species is not new, its description cannot be regarded as a combined generic-specific one (Code Art. 42). Because the generic name was not validly published, the combination *Thespesia populnea* was technically not legit-

imately made, either. However, *Thespesia* was conserved over *Bupariti* Duh. with *T. populnea* (L.) Sol. ex Correa as type, so both generic name and specific combination may very dubiously be considered valid and legitimate because they have been placed on the list of Nomina Conservanda, though this is not at all obvious from the wording of the Code.

Thespesia populnea (L.) Sol. ex Correa

FIGURES 1, 2, 5

Thespesia populnea (L.) Sol. ex Correa, Ann. Mus. Hist. Nat. Paris 9:290, 1807.*Hibiscus populneus* L., Sp. Pl. 694, 1753.*Hibiscus bacciferus* Forst.f., Prodr. 48, 1786.*Malva viscus populneus* (L.) Gaertner, Fruct. et Sem. 2: 253, T.135, f. 3, 1791.

Small to moderate sized tree, young growth green, only moderately brown-lepidate when very young; wood hard, heartwood dark red; leaves greenish even when young, orbicular-cordate, strongly acuminate, basal sinus usually deep and narrow; stipules lance-linear, to 1 cm long, caducous; flower stalks short, usually 1–5 cm long, erect or ascending, articulate and with 2 scalelike bracts near base, very rarely 2 such joints; flowers erect, not drooping, involucre bracts 3, lanceolate, to 1 cm long, spirally arranged but subverticillate; calyx subtruncate, remotely denticulate, hemispheric-campanulate, up to 1 cm long, densely appressed hirsute within; corolla broadly campanulate, about 5–6 cm long, bright light yellow (rarely cream yellow), turning reddish in afternoon, center red to dark maroon; staminal column included in corolla, buds and young fruit exuding yellow gum when cut; mature fruit depressed globose (to rarely subglobose or somewhat obovoid and obtusely pointed), indehiscent, irregularly crumbling in age, 4 or 5 celled, seeds several in a cell, broadly obovoid, slightly angled, covered by closely matted silky hair, this looser and more prominent on angles, seeds more loosely and abundantly hairy in American specimens.

DISTRIBUTION.—Pantropical, especially on sea-coasts, but sparingly inland, where probably planted or persisting from planted trees.

SPECIMENS EXAMINED.—NORTH AMERICA: U.S.: Florida: Brickell Hammock, Miami, *Moldenke* 5635 (NY); Cutler, *Richmond* in 1905 (NY), in 1907 (NY); Black Point, below Cutler, *Small & Carter* in 1903 (US); Miami, *Caldwell* 8770 (US); Monroe Co., Stock Island, *Killip* 41143 (US); Big Pine Key, *Killip* 32788 (US); Little Pine Key, *Small et al.* 3648 (NY); Key West, *Small & Small* 4877 (NY).

CENTRAL AMERICA: British Honduras: Belize, *Donnell Smith* 16 (US, 2 sheets) (form with imperfectly dehiscent fruits and unusually woolly seeds); Stan Creek, *Schipp* 505 (NY). Honduras: Lancetilla, *Molina* 10431 (US). Panama: C.Z., cult., *Standley* 30820 (US); C.Z., Ancon *Pittier* 2745 (US, NY); Colon, *Rose* 22044 (US); Los Santos Prov., Poori, *Dwyer* 1186 (NY).

BERMUDA: Holly Lodge, planted, *Brown and Britton* 1611 (US, NY).

BAHAMAS: New Providence, Nassau, *Curtiss* 173 (US, NY), Grantstown, *Wilson* 8221 (NY). Hog Island, *Britton & Millsbaugh* 2176 (NY); *Wilson* 8321 (NY). Inagua, cult., *Nash & Taylor* 1473 (NY). Turks Island, *Nash & Taylor* 3840 (NY).

VIRGIN ISLANDS: St. Thomas, *Morrow* 83 (US); *Eggers* 389 (NY); St. Croix, Golden Rock, *Ricksecker* 197 (US, NY); *Britton & Gowell* 23 (NY).

LEEWARD ISLANDS: St. Barths, *Questel* 128 (NY); St. Kitts, *Proctor* 18499 (US); Montserrat, *Shafer* 101 (US, NY); Guadeloupe, *Stehlé* 101 (NY), *Duss* 2779 (US, NY); Martinique, *Duss* 2024 (NY); St. Lucia, *P. Beard* 1079 (US); *Howard* 11418 (NY); Dominica, Prince Rupert Bay, *Hodge* 544 (NY); Grenada, *Broadway* in 1904 (US); Grand Anse, *Broadway* in 1904 (NY); *Becquia* (Grenadine) I., *Joseph B.* 160 (NY).

WINDWARD ISLANDS: Antigua, *Wilbur & Dunn* 7219 (US); *Box* 1040 (US); Barbados, *Dash* 291 (US, NY).

PUERTO RICO: Parguera, *Sargent* 452 (US); Isabel Segunda, *Shafer* 2392 (US, NY); Coaruo, *Goll* 751 (NY); Cayo Obispo, *Evermann* 1238 (US), 1246 (US); Fajardo, *Heller* 818 (US, NY); *Sintenis* 1135 (US); near Ponce, *Underwood & Griggs* 729 (US, NY); Bosque Insular de Guanica, *Little* 13146 (NY); Las Croabas, *Fosberg* 52278 (US, Fo).

HISPANIOLA: Dominican Republic: Barajona Prov. Beata I., *Howard* 12410 (US); Ciudad Trujillo, *Allard* 18946 (US); Santiago Prov., Las Charcas, *Jimenez* 5579 (NY). Haiti: Tortue I., *Leonard & Leonard*, 13919 (US, NY), 15350 (US, NY); Miragoane, *Eyerdam* 166 (US); near Carenage, *Ekman H.* 8578 (US); Port au Prince, *Holdridge* 1228 (NY); Caucedo, *Augusto* 1357 (NY).

CUBA: Manigua betw. Cabañas and Mar Verde, *Lopez Figueiras* 1526 (US); Santiago, *Underwood & Earle* 1660 (NY); Santiago Bay, *Clemente* 2314 (US); *Leon* 3951 (NY); Gibara to Punta Hicacos, *Shafer* 1511 (NY, US); Cienfuegos Bay, Punta Diablo, *Britton & Wilson* 6043 (NY); Cienfuegos, Soledad, *Jack* 4056 (US); 5347 (US); *Howard* 4176 (NY); Matanzas, *Britton et al.* 211 (NY); Guantanamo, *Pastor* 1811 (NY); Calicita *Combs* 522 (US, NY); Prov. Havana, Playa de Baracoa, *Leon* 8422 (NY); Playa del Rincon de Guanabo, *Leon et al.* 8493 (NY).

JAMAICA: E of Montego Bay, *Maxon & Killip* 1623 (US); Hunts Bay, *Maxon & Killip* 326 (US); Rockport, *Killip* 23 (US); Kingston, *Brown* 356 (US, NY); Bowdon, *Britton* 4017 (NY); St. Thomas, *West et al.* 572 (US); Trelawney Parish, White Bay, *Crosby & Anderson* 1161 (NY); Tolly Point, *Fredholm* 3166 (NY).

LITTLE CAYMAN I.: Blossom Point, *Kings L. C.* 70 (NY).

SOUTH AMERICA: Tobago I., *Broadway* 4383 (US). Venezuela: Near Cabo Blanco, D. F., *Pittier* 12428 (US, NY), 10271 (US); Cristobal Colon, *Broadway* 202 (US, NY); La Vela de Coro, *Curran & Haman* 662 (US); Miranda, Los Totumos, NE of Higuerote, *Steyermark* 86183 (US, NY). British Guiana: s. l., *Jenman* 5853 (NY); Georgetown, *Hitchcock* 16562 (US, NY); Demerara River, Agricola, *For. Dept. B. G. F3054* (NY); Vreedenhooop, *For. Dept. B. G. F3490* (NY). Colombia: Guajira:

Pejaro, *Cuatrecasas and Romero Castañeda* 25465 (US); Atlantico: Baranquilla, *Elias* 994 (US, NY); Bolivar: carretera Sincelejo a Tolú *García Barriga* 13468 (US, NY); Cartagena, *Grant* 10697 (US); *Heriberto* 57 (US, NY); Manga I., *Killip & Smith* 14024 (US, NY); Antioquia: Medellín, cult.; *Archer* 641 (US); Huila: Timaná, cult., *Little* 7697 (US); Facoima, *Perez Arbelaez* 2524 (US). Brasil: s.l., *Sellow* s.n. (NY).

ASIA: Arabia: Aden, planted at Airport, *Fosberg* 49964 (US). India: s.l., *Wight* 172 (NY); Hosur, Dt. Salem, "3000 ft.," *Yeshoda* 663 (NY); Bangalore, *Saldanha* *C58874* (US); South Andamans, North Corbyn's Cove, *King* in 1891 (US) (lvs. subcordate, but peduncles short, erect, articulate).

CEYLON: s.l. *Herb. Hermann* (BM); China Bay, *Amartunga* 567 (PDA). Puttalam Distr.: Wilpattu National Park, Pallugaturai, *Fosberg* 50894 (US, PDA); *Grupe* 102 (US). Galle Distr.: Hikkaduwa, 12 mi. NW of Galle, *Fosberg* 52841 (US). Hambantota Distr.: Ruhuna National Park, Patanagala, *Fosberg* 50352 (US, PDA); *Mueller-Dombois* 67082504 (PDA, US); betw. Buttawa and Yala, *Comanor* 400 (PDA, US). Batticaloa Distr.: Batticaloa, Koddaimunnai, *Robyns* 6928 (US).

INDO CHINA: Viet Nam: Annam, Nha-trang, *Robinson* 1545 (NY).

RYUKYU ISLANDS: Okinawa I.: Nago, *Wilson* 8063 (US); *Kimura & Hurusawa* 77 (US); Kunigami, *Walker et al.* 7132 (US). Miyako I.: Sugama, *Fosberg* 38154 (US). Ishigaki I.: Kabira, *Hatusima* 18901; *Smith* 91 (US); 1 km S of Nosoko, *Fosberg* 38063 (US).

HAINAN ISLAND: s.l., *Wang* 34796 (NY); *Liang* 65439 (NY).

PHILIPPINES: Luzon I.: Tayabas Prov., Guinayangan, *Escritor* 20894 (US); Prov. Principe, Baler, *Merrill* 1089 (US, NY); Tayabas Prov. Pabgila, *Gojar* 31484 (NY). Mindoro I.: Puerto Galera, *Santos* 5317 (US), 5267 (US), 5168 (US); Bo. Manual, Mansalay, *Sulit* 17103 (US); Pinamalayan, *Merrill* 2175 (US). Mindanao I.: Davao Prov., Santa Cruz, *Williams* 2784, (US, NY). Palawan I., *Fenix* 15604 (US). Sulu Arch., Sibutu Is., Sitankai-Tumindao, *Herre* 1209 (US).

BORNEO: Karimata Arch., Poelau Penebangan, *Mondi* 102 (NY); Poelau Lemoeshoelan, *Hallier* 357 (NY).

MOLUCCA ISLANDS: Amboina, *Robinson* 498 (US, NY).

MALDIVE ISLANDS: Malé Atoll, *Fosberg* 36852 (US).

ALDABRA ISLAND: Anse Porceau, 0.5 km east of Gionnet Channel, *Fosberg* 49564 (US, K); Dune Jean Louis, *Fosberg* 49384 (US, K), 49431 (US, K), 49430 (US, K, MO, NY, BISH, TI), 49432 (US), 49433 (US), 49434 (US), 49435 (US).

AMIRANTES: Remire I., *Gwynne & Wood* 868 (K, EA); *Stoddart & Poore* 1447 (K, US, EA).

AUSTRALIA: Queensland: Hayman Island, *White* 10092 (NY).

MICRONESIA:

MARIANAS ISLANDS: Pagan I.: Isthmus, *Anderson* 573 (US, BISH, NY, L). Alamagan I.: around Partido Village, *Fosberg* 31647 (US). Sarigan I.: *Kanehira* 2157 (KI, NY). Saipan I.: s.l., *Kanehira* 1019 (KI); Kagman Peninsula,

probably planted, *Courage* 34 (US); Charan-Kanoa, *Hosaka* 2974 (US, BISH); Tanapag, *Fosberg* 25260 (US, BISH); *Stephens* 26. Tinian I.: s.l., *Kanehira* 58 (KI); *Okatani* 4 (KI); Lake Hagoya, *Fosberg* 24786 (US, BISH, NY, L). Rota I.: between Rota and Tataacho Pt., *Fosberg* 24993 (US); Rota and vicinity, *Fosberg* 25078 (US, BISH, NY, L); *Necker* R106 (US). Guam I.: s.l., *Safford & Seale* 1035 (US); *Hombron* (P); *G. E. S.* 132 (US); 442 (US); *Marche* 190 (P); between Merizo & Umatac, *Necker* 48 (US); Marine Beach, *Pedrus* 11 (CG); Umatac, *Moran* 4591 (US, Fo); Oca Pt., *Glassman* 52 (Fo); Merizo, *Fosberg* 25631 (US, BISH, Fo, NY); near Ritidian Pt., *Rodin* 716 (US); Chalan Pago, *Whiting* B4 (Fo).

CAROLINE ISLANDS: Yap Is.: s.l., *Volkens* 343; Rumontô, *Hosokawa* 8949 (US). Truk Is.: s.l., *Kanehira* 617 (KI); *Wong* 131 (US); *Pelzer* 91 (US); 92 (US); Uoala, *Moore* 128 (US); Moen, *Hosaka* 2784 (US); Tumuk Village, *Fosberg & Pelzer* 26044 (US, BISH, NY, L); Eten, *Hallier* in 1903 (US); Udot, Manity Village, *Fosberg* 24484 (US, BISH, Fo); Pis, rare along beach, *Fosberg* 24684 (US, BISH). Mortlock Is.: Lukunor Atoll: Saponöch I., *Anderson* 2209 (US, BISH, Fo, NY, L); Satawan Atoll: Ta I., *Anderson* 1068 (US, BISH, NY, L); Afaran I., *Anderson* 926 (US, BISH, NY). Nukuoro Atoll: Kaujema I., *Hosaka* 3468 (US, BISH); Matakena I., *Fosberg* 26213 (US, BISH). Kapingamarangi Atoll: Hare Islet, *Niering* 699 (US); *Fosberg* 26108 (US, BISH); Nunakita Islet, *Niering* 551 (US); Werua Islet, *Niering* 587 (US); Matiro Islet, *Niering* 602 (US). Ponape I.: Langar Islet, *Glassman* 2404 (US); between Ipuak & U, U District, *Fosberg* 26331 (US, BISH, NY, L); Narlap I., *Hosaka* 3566 (US, BISH); Nanmataal, *Kanehira* 856 (KI). Pingelap Atoll: *St. John* 21, 473. Kusaie I.: s.l., *Moore* 74 (US).

GILBERT ISLANDS: Butaritari (Makin) *Catala* 51 (P).

MELANESIA:

SOLOMON IS.: New Georgia I., Tetemara, *Maenu'u* 6101 (US); Santa Ysabel I., Paehena Pt., *Beer's collectors* 7097 (US). New Caledonia: Baie Naya, *Guillaumin et Baumann* 11480 (US), 11500 (NY).

NEW HEBRIDES: Banks Group: Vanua Lava I., *Kajewski* 484 (US, NY); Eromanga I.: Dillon Bay, *Kajewski* 373 (NY), 407 (NY). Aneityum I.: Anelgauhat Bay, *Kajewski* 798 (US).

FIJI ISLANDS: Viti Levu I.: Serua: Ngaloa, *Degener* 15106 (US, NY); Mba: Mba River Mouth, *Smith* 4742 (US). Ngau I., Herald Bay, Sawaike, *Smith* 7899 (US). Kandavu I.: Namalata Isthmus region, *Smith* 180 (US, NY). Koro I., east coast, *Smith* 1092 (US, NY). Ovalou I.: *U.S. Expl. Exp.* (NY); 3 mi. N of Levuka, *Gillespie* 4504 (NY).

POLYNESIA:

TONGA ISLANDS: s.l., *Banks & Solander* in 1769 (US). Tongatapu I.: Niutoua Village, *Yuncker* 15107 (US). Eua I.: Ohonua, *Parks* 16361 (US, NY); *Yuncker* 15629 (US). Lifuka I.: Pangai Village, *Yuncker* 15746 (US).

NIUE: Mutalau, *Yuncker* 9714 (US).

SAMOA: s.l., *Vaupel* 240 (US). Upolu I.: Matafangatele,

Rechinger 1246 (US). Tutuila, Aua, *Christophersen 1206* (NY). Tau, *Garber 683* (NY).

SOCIETY ISLANDS: Matia (Meetia), *U. S. Expl. Exp.* (US).

HAWAIIAN ISLANDS: Oahu: s.l., *Curran 148* (NY); Honolulu, *Hitchcock 13848* (US); Waimanalo, *Degener 9962* (NY), *6038* (NY); Haleiwa, *Hitchcock 13892* (US); 2 mi. N of Heeia, *St. John 10136* (NY). Hawaii: Puna Distr., Pualoa, *St. John & Cowan 22292* (NY).

MARQUESAS ISLANDS: Hivaoa I., Atuona, *Chapin 753* (US).

PHOENIX ISLANDS: Canton I., planted, *Degener & Hatheway 21308* (NY).

TUAMOTU ISLANDS: Makatea, *Wilder* in 1932 (NY).

Thespesia populneoides (Roxb.) Kostel.

FIGURES 3, 4, 6

Thespesia populneoides (Roxb.) Kostel., *Allg. Med. Pharm.* Fl. 5:1861, 1836.

Thespesia populnea sensu Blume, *Bijdr.* 2:73, 1825 (non (L.) Sol. ex Correa).

Hibiscus populneoides Roxb., *Fl. Ind. ed. Carey* 3:181, 1832.

Thespesia banalo Blanco, *Fl. Filip. ed. 2*, 382, 1845.

Thespesia populnea var. *populneoides* (Roxb.) Pierre, *Fl. Forest. Cochinch.* 3:Pl. 173, 1888 (as to basionym not description).

Thespesia howii Hu, *Fl. China, Fam.* 153:69, T.22, F.3, 1955.

Small tree, young growth and leaves persistently and closely brownish-lepidote, giving a bronzed or coppery appearance; leaves generally deltoid to subcordate, or cordate with a very shallow broad sinus, tending to be caudate acuminate, usually with prominent domatia in axils of main nerves; stipules subulate to lanceolate, very early caducous; peduncles up to 10–12 cm long, ebracteate, not jointed, usually curved downward so flowers are drooping, involucrel bracts 3, reduced, very early caducous, triangular-ovate, almost verticillate, represented in all but very young buds by linear scars; calyx 8–10 mm long, truncate or with minute mucrolike teeth; corolla campanulate 5–6 cm long, yellow, center dull reddish to dark maroon; staminal column included, style exerted from staminal column but included in corolla; young fruit and buds exuding yellow gum when cut; mature fruit with two distinct layers, a smooth exocarp separated from a hard tough fluted endocarp by a loose fibrous-spongy mesocarp which partially disintegrates at maturity, the exocarp then dehiscing into 4–6, usually 5, valves, the lines of dehiscence following the median ridges of the cells of the endo-

carp; seeds several in a cell, broadly obovoid, covered by a dense short pubescence of erect bulbous hairs.

The material of this affinity in the Wallich Herbarium at Kew is filed under number 1888 and consists of 8 specimens, indicated by numbers and letters appended to the catalog number 1888. These were made available for study and the peculiarities of the numbering kindly explained by Drs. G. L. Lucas and L. L. Forman. Our interpretations are as follows:

1888.1 <i>T. populnea</i>	1888.E <i>T. populneoides</i>
1888.2 <i>T. populnea</i>	1888.F <i>T. populneoides</i>
1888.C <i>T. populnea</i>	1888.G <i>T. populneoides</i>
1888.D <i>T. populnea</i>	1888.H <i>Hibiscus tiliaceus</i>

Specimen 1888.F is marked "H. Roxb." and is labeled *Hibiscus populneoides* in Roxburgh's hand. It matches Roxburgh's description and undoubtedly should be regarded as lectotype. It is here so designated. Roxburgh's plate, *Icones Roxburghianae* No. 352 is a good representation of the species except that the leaves are drawn as crenate, wrong for anything in this affinity.

DISTRIBUTION.—Coasts of the Indian Ocean and its islands, Australia, Malaysia, Indo-China, to Hainan, very sparingly, probably introduced, in West Africa, and cultivated in Brazil and British Guiana.

SPECIMENS EXAMINED.—MADAGASCAR: s.l., *Decary 10667* (K, TAN); *Herb. du Petit-Thouars s.n.* (P, TAN); SW of Island, *Grevé 25* (P); N, Baie de Diego Suarez, *Boivin 2370* (P); Diego Suarez, *Bernier 257* (P); Mouroundava, *Grandidier s.n.* (P); *Grevé* in 1889 (K); Majunga, *Poisson 17* (P, K); *Humbert et Perrier de la Bâthie 2026* (P); *Afzelius* in 1912 (K); *Decary 2426* (P, US); Marovoay, *Bosser 8421* (P, 2 sheets, TAN); Belo sur River Tsiribihina, *Serv. For. Madag. 14129* (TAF, P); Delta de la Linta, *Humbert & Swingle 5422* (P, 2 sheets); Estuaire de la Betriboka, *Perrier de la Bâthie 8359* (P); Ankotika, Ambanja, *Serv. For. Madag. 9272* (P); Mahilaka, Ambanja, *Serv. For. Madag. 3909* (P) (fruit only); Amboanio près Majunga, *Perrier de la Bâthie 1236* (P, 2 sheets); Maintirano, *Decary 15565* (P); Dist. Fort Dauphin, Andrahomana, *Decary 10667* (P); Bao Manambobo, *Hervien* (TAN); Mango Ky, *Hervien* in 1966 (TAN); Antsaharavina, Lotobe Distr., Nossi-Bé, s. coll. 2672 (TAN) (lvs. with deep sinuses, but long peduncles, coppery scales as in *T. populneoides*); Majunga, sur la route de Amboavay, *Capuron S/NR-4* (TAF); Canton Hell-ville, Nossi-Bé Distr., *Ramamoujiro 11448* (TAF); Ambondro-Ampary, Ctn. Antonibé, Ananalava Distr., s. coll. 15,775-SF (TAF); Amparimandro, s. coll. 16135-SF (TAF); 20 km SE of Tulear, 5 km from Sarodrano, *Fosberg 52430* (US).

COMORO ISLANDS: Mohilla, *J. Kirk s.n.* (K); Anjouan, *Humboldt 1496* (P, 4 sheets); Mayotte, *Boivin 3326* (P).

MAURITIUS: Cultivated, *Grey* in 1858 (K).

COSMOLEDO ATOLL: Wizard Islet, *Fosberg & Grubb 49822* (K, US); Menai Islet, *Fosberg & Grubb 49766* (K, US).

ASTOVE ATOLL: s.l., *Ridgway 74* (Fo); *Veevers-Carter 74* (EA); *Gwynne & Wood 1297* (EA); Grand Anse, *Fosberg 49717* (K, US, MO): west side, *Stoddart & Poore 1269* (K); north of settlement, *Renvoize 1201* (US, K).

ALDABRA ATOLL: 3.5 km west of Pt. Hodoul, *Fosberg & Graham 49217* (K, US); 1 km north of Cinq Cases Camp, *Fosberg 48946* (K, US); Cinq Cases Camp, *Fosberg 48859* (US, K, MO, NY, BISH), *48851* (US, K): Cairn A to Cinq Cases, *Stoddart 728* (US).

ASSUMPTION ISLAND: s.l., *Stoddart 1082* (K).

TROPICAL EAST AFRICA: Witu, *Thomas s.n.* (K).

MOZAMBIQUE (PORTUGUESE EAST AFRICA): Nova Sofala, sand dune, *Leach & Wild 11123* (K, PRE); Mafamede Island, *Gomes e Sousa 4850* (PRE); Beira town, *Gomes e Sousa 4814* (PRE, K, 2 sheets); Beira, mangrove, *Honey 815* (PRE, K); Sante Caroline Island, 5 m, *Gomes e Sousa 1780* (K); Antonio Enes, *Gomes e Sousa 4890* (K); Luabo, *Kirk 59* (K); Rovuma Bay, *Kirk s.n.* (K).

EUROPA ISLAND: *Saboureau 1714* (P); *Speke 5* (K).

ZANZIBAR: s.l., *J. Kirk* in 1868 (K, fruit only); Massazine, sea level, *Faulkner 2250* (K, 2 sheets), *2292* (K, 2 sheets).

KENYA: Kipini District: E of Osi on Tana River, *Greenway & Rawlins 9484* (PRE, K); Mikindani District, sea-shore at Mtwara, *M. Richards 17777* (K).

MALDIVES: Hulule, *Gardiner 28* (PDA).

CEYLON: s.l., *Thwaites C. P. 1121* (K, P); seacoast about 20–50 miles north of Colombo, *Roberts 30* (K). Jaffna Distr.: 12 miles S of Pooneryn, *Fosberg et al. 53582* (US, PDA). Mannar Distr.: 24 miles N of Mannar, *Fosberg et al. 53588* (US, PDA). Pettalam Distr.: Kolankanata Beach, *Wirawan et al. 946* (US). Amparai Distr.: Waragoda Ara, 1 mile N of Panama, *Fosberg, Sachet and Jayasuria 52921* (US, PDA); south point of Arugam Bay, *Fosberg, Sachet & Jayasuria 52928* (US, PDA); crossing of Heda Oya, 4 miles S of Pottuvil, *Fosberg, Sachet & Jayasuria 53022* (US, PDA); Kumana, *Cooray 69073119R* (US).

INDIA: s.l., *Leschenault s.n.* (P); "H. Roxb." *Wallich Herb. 1888.F* (K, type); "B. H. Ham." *Wallich Herb. 1888.G* (K); "Bdedil 468 d Cal 474/1" *Herb. East India Co.* (P); "Tenasserim and Andamans," *Helper, Herb. East India Co. 468* (PDA); "Madras, June 1826. Herb. Wight," *Wallich Herb. 1888.E* (K); Calcutta, Bot. Gard., s. coll. s.n. (P); Gaudichaud in 1837 (P); India orientalis, *Herb. Desvieux s.n.* (P); Indes orient., *Jacquemont 122* (P).

BURMA: Rangoon, *Legou "11e 1a"* (P).

SIAM: Pettchapury, *Pierre 34* (P, 2 sheets).

INDO CHINA: Tonkin, Jard. bot. Hanoi, *Herb. Petelot, s.n.* (P); Haiphong, Gardens, *Balansa 1337* (P); Cochinchine, Cholon, *Poillane 40028* (P); Saigon?, *Dông 33* (*Evrard 2706*) (P, US); Rivière de Phanhiêt, *Evrard 1585* (P, US); Condor (Island?), *de Parry* in 1871 (P).

AUSTRALIA: "East and North Coasts" *Brown* in 1802–05 (NY) (sterile, sinuses very broad); Raffles Bay, *Hombrook* in 1841 (P). W. Australia: E. Kimberley Div'n., coast, *S. J. Stokes 76* (K, fruit only). N. Australia: Port Darwin, *Schomburgk 181* (K); near Darwin, *Allen 120* (K); Carpentaria, *R. Brown 5140* (K); Carpentaria, S. Bay, Bickerton I., *Specht 626* (K, US); Danger Pt., Cobourg Peninsula, *Chippendale 8275* (K); 13 miles NNE of Borroloola, salt bank near McArthur River, *Perry 1785* (K, US). N. S. Wales: *Bynoe s.n.* (K) (sinuses narrow), *Bynoe s.n.* (K) (sinuses very broad). Queensland: Stuart's River, v. *Mueller* in 1892 (P).

NEW GUINEA: Papua, Milne Bay Distr., Menapi, *Brass 21709* (US).

JAVA: s.l., *Zollinger 2787* (P); *Blume s.n.* (P) (det. *T. populnea* in Blume's hand).

PHILIPPINES: Luzon Island: Manila, *Merrill 259* (US); *Merrill, Sp. Blancoanae 33* (P, US, NY); Buinanga, Bulacan, *Loher 141* (US); Bataan Prov., Lamao River, *Ahern's collector 151* (US); Lamao River, Mt. Mariveles, *Meyer 2297* (US, NY); *Borden 2039* (US, NY); Cavite, *Foxworthy 174* (US, NY). Panay Island: Iloilo, *Serviñas 20668* (US). Mindoro Island: vic. San José, *Lambert & Brunson 76* (US). Apo Island, Mindoro Straits, *Merrill 417* (US, NY).

HAINAN ISLAND: Yaichow, *How 70921* (NY, isotype of *T. howii* Hu).

WEST AFRICA: Fernando Po, Cercle de Zagnanado, près du Poste de Zagnanado, *Chevalier 23087* (P) (sterile, leaves and indument like this species).

AMERICA: Brazil, Rio de Janeiro, Passeio Publico, cult., *Glaziou 668* (P). British Guiana, Botanic Gardens, Georgetown, cult. *Watkins 41* (K).

Intermediates

A considerable number of collections are variously intermediate between *T. populnea* and *T. populneoides*. Some of these may merely represent plants that are *T. populnea* but with leaf shapes approaching those of *T. populneoides*. Seeds, which have not yet shown any intermediate characters, are usually lacking in these specimens, perhaps because they do not form, at least in some cases. It is possible that some, if not all, of the intermediates are of hybrid origin. This seems likely at least for certain Aldabra, Ceylon, and south Indian populations. Where field observations are lacking it is difficult to support such a conclusion, though it may still be true.

Intermediate specimens are described briefly as to the characters in which they intergrade. Those that are very close to one or the other species are cited with the species, as well as being referred to here. Others that seem probably of hybrid nature are only cited here as intermediates.

A considerable range of specimens have predominantly the features of *T. populnea* but subcordate or subtruncate leaf bases, or at least wide and shallow sinuses, as in *T. populneoides*. Such specimens are: Philippine Is., *Ahern 209*, *Clark 1091*, both sterile, and *Riello 16331*, with short erect pedicels; some Ryukyu material; Solomon Is.: New Georgia, *Maenu'u 6101*; Tonga: Eua I., *Yuncker 15629*; Andaman Is.: King in 1891; Amirantes Is.: Remire I., *Stoddart & Poore 1447*, which has 2 joints near the pedicel base; New Guinea: Papua: Milne Bay Distr., Menapi, *Brass 21709*. South America: British Guiana: *Irwin 273*, *Forest Dept. B. G. F3054*, *F3420*. These plants cannot be shown to be anything but *T. populnea* with leaves somewhat approaching those of *T. populneoides*, until the populations they represent can be studied in the field.

Two Madagascar specimens, *s. coll. 16*, 315-SF and *s. coll. 2672*, cited under *T. populneoides* have leaves with deep narrow sinuses as in *T. populnea* but are otherwise like *T. populneoides*. *T. populnea* is not known to occur in Madagascar. A Ceylon specimen from between Wilpattu National Park and Anuradhapura—thus well inland—*van Beusekom 1638* (US), has leaves much like those of *T. populnea*, but pedicels variable in length, some too long for this species, and immature fruits up to about an inch in diameter.

More, but still insufficient, work has been done on intermediate plants in Aldabra Island. The population studied was part of an irregular row or narrow interrupted zone of *Thespesia* along the inner edges of the sand dune belt on the central south shore mixed with bushes and small trees of various kinds. Here, just east and inland of Dune Jean Louis, one bush of typical *T. populneoides* was found along a trail in the pavé (moderately rough limestone). Nearby and scattered to the Dune des Patates area was a population of *Thespesia*, generally resembling *T. populnea* but with a few plants rather aberrant. *Fosberg 49441* (US, K, MO, NY) is like *T. populneoides* but with leaf sinuses deep and narrow. Some pedicels are articulate very near base, others not. *Fosberg 49437* (US, K, MO) is like *T. populneoides* but has some pedicels conspicuously articulate as much as 1 cm from base. This population may represent an incipient hybrid swarm resulting from an accidental establishment of a plant of *T. populneoides* along the trail in a population of *T. populnea*, and subsequent introgression of *T. populneoides* charac-

ters into the population of *T. populnea*. This situation was noticed at the time the collections were made, but since the differentiating characters of the two species had not been worked out, a proper population sample (mass collection) was not made. This is a task for a future botanical worker at the new Aldabra Research Station.

A single intermediate specimen, collected at Point Hodoul, *Fosberg and Frazier 49597* (US, K, MO), has leaves much like those of *T. populnea*, but with unusually long petioles, young growth much more lepidote than usual for this species, and the peduncles 3–7 cm long, not articulate. When collected this was not thought to present any problem, so the characteristics of the rest of the population were not studied.

In Ceylon some material observed growing naturally along the seashore seems to be fairly normal *T. populnea*, with mature fruit and seeds (*Fosberg et al. 50894*, *Fosberg 50352*). *T. populneoides* has also been collected in Ceylon, but has not been seen there by us (see Addendum). *Thespesia*, at first sight seemingly good *T. populnea*, is a very widely planted hedgerow tree inland in Ceylon as well as along the east coast and in Colombo. Attention was directed to these planted trees by examination of a specimen collected in Batticaloa, *Hyde 1658* (C.P. 1121) (PDA), which has the leaves and scaliness of *T. populneoides* but the short erect pedicels of *T. populnea*. A visit to Batticaloa was arranged, and trees were located at Kallady, in a vacant lot in the village, *Fosberg et al. 50993*, *50994* (US, PDA, K), which have the leaf shape of *T. populneoides* as well as rather long pedicels. The pedicels varied a great deal in length, even on the same tree, and minute bractlets could be seen at or near the pedicel bases, but the articulations were generally basal. The general color of the trees was green, not the coppery bronze of *T. populneoides*. A search was made for fruits, as the seed character has generally proved to be diagnostic. No fruits were found more than about 15 mm in diameter and height. They seemed to drop off at about this size. Several collected on number *50994* dehisced on drying but had no seeds developed.

South along this coast, 5 miles south of Thylankuda, *Fosberg et al. 51010* (US, K), were similarly sterile trees, but with shorter pedicels and leaves almost as in *T. populnea*. Similar planted specimens were found in south India, at Rameswaram, on Pamban Island, Gulf of Mannar, *Fosberg 51235* (US). A specimen from "Hosur. Dt. Salem," *Yeshoda 663*

(NY), with rather broad leaf sinuses and rather long, but articulate pedicels, may also belong to this population. A similar plant was found northeast of Hambantota, Ceylon, but with strong articulations well above the pedicel bases, *Fosberg et al.* 51212 (US, PDA).

Wherever this planted population was observed, fruits were searched for, but no well-developed ones were seen. All were aborted before they had reached more than 12–15 mm diameter. The most reasonable interpretation of this situation seems to be that one or, more likely, several vegetatively propagated hybrid clones make up the planted populations of *Thespesia* in Ceylon and south India, while the naturally occurring stands include local populations of the parent species.

Addendum

After the above was written, the authors had an opportunity for further study of the relationship of these two species in Ceylon. *T. populneoides* was discovered in two areas on the island, both somewhat inland, touching the coast at one place. Occasional populations were seen in the northwestern part, between Jaffna Lagoon and Mannar, in low semiopen swampy areas somewhat inland (*Fosberg* 53582, 53588). Back of Arugam Bay and south to Panama, in the southeastern part of the island, in open areas around wet depressions and tanks (reservoirs), it was also common (*Fosberg, Sachet and Jayasuria* 52921, 53022), touching the coast at the south end of Arugam Bay (*Fosberg, Sachet and Jayasuria* 52928). At this latter locality, a single tree of *T. populneoides* was found in association with a population of individuals that at first sight appeared to be *T. populnea* and growing just back of the beach in a typical habitat for this latter species.

On closer examination, these plants, at least those that were examined closely (*Fosberg, Sachet and Jayasuria* 52929, 52930, 52931), proved to be variously intermediate but nearer to *T. populnea*. The fruits examined were mostly sterile, though approaching full size, but several had one or two fully formed seeds.

The *Thespesia* population in the Puttalam-Kalpitiya area (*Fosberg and Jayasuria* 52740) where the trees are very abundant, planted as living fence posts, are not or scarcely distinguishable morphologically from *T. populnea* except for occasional slightly longer pedicels, but no grown fruits were seen. Some, about half size, had no seeds developed. This is possibly a hybrid clone that has mostly *T. populnea* characters.

Literature Cited

- Baker, E. G.
1897. Notes on *Thespesia*, *Journal of Botany* 35:50–54.
- Blume, C. L.
1825–26. *Bijdragen tot de Flora van Nederlandsch Indië*. 1169 pages. Batavia.
- Borssum Waalkes, J. van
1966. Malesian Malvaceae Revised. *Blumea*, 14:1–213.
- Capuron, R.
1968. Contributions à l'étude de la flore forestière de Madagascar. Un *Thespesia* nouveau de Madagascar (Malvacées). *Adansonia*, n.s., 8:5–9.
- Gunn, C. R.
1972. Notes on *Stictocardia campanulata* (L.) Merrill & *S. jucunda* (Thw.) C. R. Gunn (Convolvulaceae). *Brittonia*, in press.
- Howard, R. A.
1949. *Atkinsia* gen. nov., *Thespesia*, and Related West Indian Genera of the Malvaceae. *Bulletin of the Torrey Botanical Club*, 76:89–100.
- Hutchinson, J. B.
1947. Notes on the Classification and Distribution of Genera Related to *Gossypium*. *New Phytologist*, 46:123–141.
- Linnaeus, C.
1753. *Species Plantarum*. 2 volumes. Stockholm.
- Merrill, E. D.
1914. An Enumeration of the Plants of Guam. *Philippine Journal of Science, Botany*, 9:17–155.
1918. Species Blancoanae. *Bureau of Science Publications, Manila*, 12:1–423.
- Nadeaud, J.
1864. *Plantes usuelles des tahitiens*. 52 pages.
- Ooststroom, S. J. van
1940. The Convolvulaceae of Malaysia. III. *Blumea*, 3:481–582.
- Pierre, L.
1879–1907. *Flore Forestière de la Cochinchine*. 5 volumes. Paris.
- Roxburgh, W.
1832. *Flora Indica*, edition 2. Edited by W. Carey. 3 volumes. Serampore.

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