NOTES ON CANARIUM (BURSERACEAE) IN THE SOLOMON ISLANDS

P. W. LEENHOUTS

AN INTERESTING NEW CANARIUM FROM THE SOLOMONS

Canarium liguliferum Leenh., *sp. nov.* — **Fig. 1.**

Arbor c. 13 m alta. Ramuli c. 8 mm diam. dense ferrugineo-puberuli, glabrati; medulla fasciculis vasorum multis pro parte peripheralibus suffulta. Stipulae in basi petioli insertae, liguliformes, c. 1 cm longae, parte inferiore angustate et ± applanata, c. 5 mm longa, parte superiore ovata, c. 5 mm longa, 3 mm lata. Folia 3- vel 4-jugata, c. 40 cm longa; petiolus c. 9 cm longus, sicut rhachis et petioluli sparse breviter pilosus; petioluli laterales 1—1¼ cm longi; petiolulus terminalis 3—4½ cm longus; folioli lanceolato-ovati, subconvexi, 20—22 cm longi, 5—7 cm lati, chartacei, supra in costa, subtus in costa, nervis venisque subdense breviter ferrugineo-pilosi; basi oblique rotundata; margine paullo revoluta et integra; apice gradatim acuminato, acumine acuto c. 1 cm longo; costa supra prominula, subtus prominente, utroque latere nervis c. 20 patentibus vel subtransversis, paullo curvatis, praeter marginem abrupte arcuato-conjunctis, supra planis, subtus prominulis, venis utrinque reticulato-prominulis. Infructescentiae axillares, anguste thyrsoideae, usque ad 9 cm longae, ramulis lateralibus transversis, usque ad 1 cm longis, cymas 1—3-floras gerentibus; calyces fructigeri infundibuliformes, trilobati, ¾ cm diam., disco trilobato denseque ciliato. Fructus (immaturi) fusiformes, sectione transversa rotundati vel triangulati, 2¾ cm longi, 1¼ cm diam., parte apicali dense pilosa excepta glabri; pyrena laevis, valvis c. 2 mm crassis, loculis 3 aequalibus.

Tree, *c.* 13 m high, girth 1.20—1.50 m, with up to *c.* 75 cm high thick buttresses. *Branchlets c.* 8 mm thick, densely appressed ferruginous hairy, late glabrescent; pith with several vascular strands, partly arranged in a peripheral cylinder, the central ones either scattered or partly forming a second cylinder; central pith apparently rather soon disappearing. *Leaves* 3—5-jugate. *Stipules* attached at or on the base of the petiole, spoon-shaped, about 1 cm long, the lower half parallel-sided, narrow, flattish, grading into the narrowly ovate blade which is *c.* 5 by 3 mm. *Petiole* terete but for the slightly flattened base, 8—12 cm long, rather densely short-hairy as are the rachis and the petiolules; lateral petiolules 7—12 mm long, terminal one 3—4 cm. *Leaflets* lanceolate-ovate, slightly convex, 20—22 by 5—7 cm, chartaceous, rather densely ferruginous short-hairy, above mainly on the midrib, beneath moreover on all nerves and veins; base ± rounded, oblique; margin entire, slightly revolute; apex tapering acuminate, acumen *c.* 1 cm long, slender, acute; midrib slightly raised above, strongly so beneath, nerves about 20 per side, spreading to nearly transverse, slightly curved, strongly bent and distinctly joined quite near the margin, hardly prominent to slightly sunken above, prominulous beneath, reticulation sloghtly raised on both sides. *Inflorescences* (only ♂ known) axillary, narrowly thyrsoid, 8 cm long, lateral branches nearly transverse, up to 1 cm long stalked, terminated by a 3- or 2-flowered cyme, short-hairy, glabrescent; bracts caducous; pedicels *c.* 3 mm. *Flowers* only ♂ buds known, these ellipsoid, closed. *Calyx* 3½ mm high, outside rather densely appressed short fulvous-hairy, inside densely appressed hairy. *Corolla* in bud *c.*

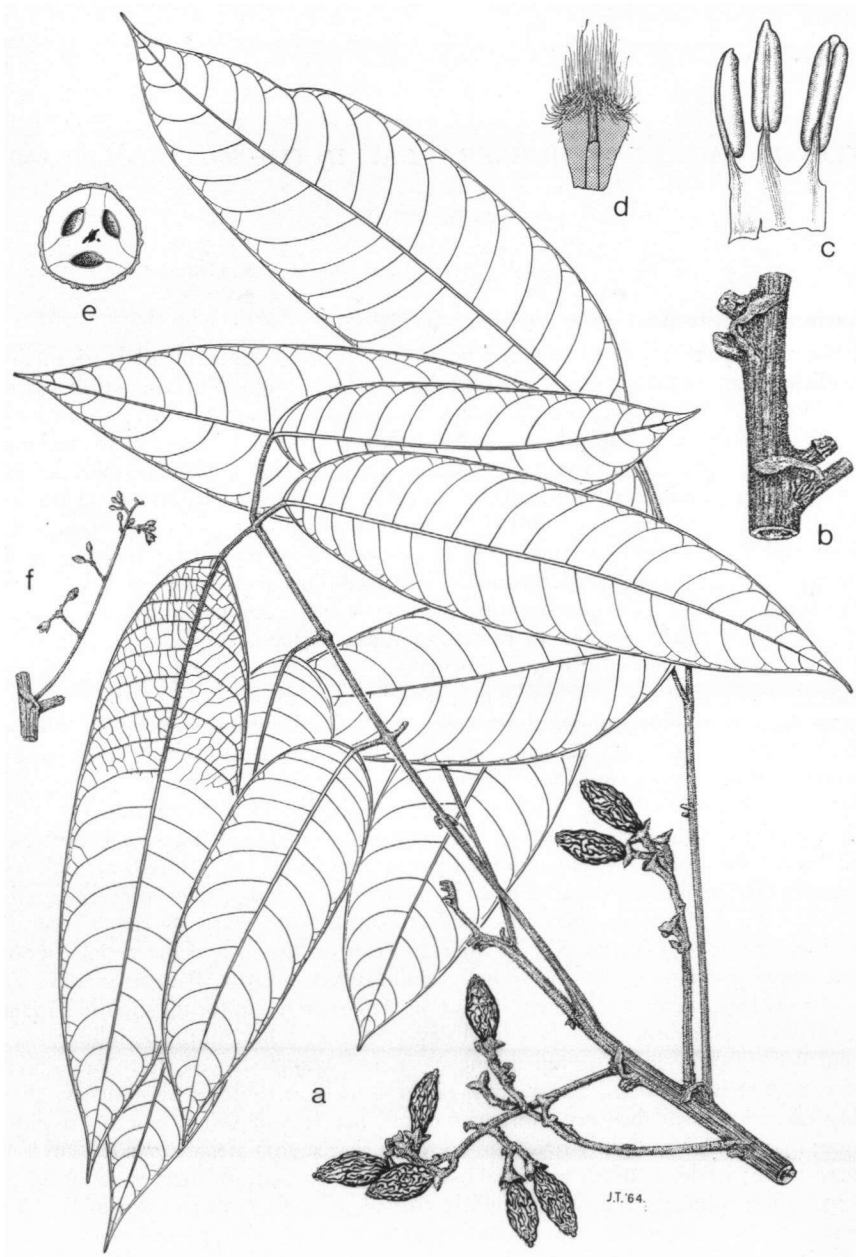

Fig. 1. *Canarium liguliferum* Leenh. — a. Fruiting twig (× $\frac{2}{5}$); b. part of twig with leaf bases and stipules (× $\frac{4}{5}$); c. part of staminal tube from inside (× 8); d. disk and pistillode in ♂ flower, longitudinal section (× 8); e. fruit, cross-section (about natural size); f. inflorescence (× $\frac{2}{5}$) (a, b, and e from *BSIP 5365*; c, d, and f from *BSIP 5366*).

4 mm, outside densely appressed hairy the margin and the base excepted. *Stamens* 6; filaments glabrous, in bud less than halfway up connate; anthers 2 mm long, connective slightly hooked at the apex. *Disk* obovoid-cylindrical, 1½ mm high, the thickened upper half in- and outside pilose; pistillode *c.* ½ mm. *Infructescences* up to *c.* 9 cm long; calyx funnel-shaped, 3-lobed, ¾ cm diam., with a 3-lobed, ciliate disk. *Fruits* (not yet fully developed) spindle-shaped, in cross-section orbicular to triangular, 2¾ by 1¼ cm, near the apex rather densely hairy, furthermore glabrous; kernel smooth, lids *c.* 2 mm thick, all 3 cells equally well developed.

SOLOMON ISLANDS. Rob Roy I. SE. of Choiseul: *Whitmore's collectors BSIP 5365* (L, type), yfr. 11-3-1964, and *5366* (L), ♂ buds 11-3-1964.

Ecology. Ridge top, alt. 35 m; well drained primary forest.

Notes. 1. The systematic position of this new species is the first point of special interest. It belongs doubtless to sect. *Pimela*, and more especially to the *asperum*-group. In this group its nearest relatives seem to be on one side *C. vrieseanum* (Philippines, Celebes) and somewhat more remote *C. acutifolium* (especially var. *celebicum* from Celebes and var. *aemulans* from New Guinea, New Britain, and the Solomons), on the other side *C. vanikoroense* (New Hebrides, Fiji) and slightly more remote *C. chinare* (E. New Guinea, Admirality Is, Solomons). These alliances place *C. liguliferum* among the more primitive members of the *asperum*-group. Indeed, some of its characters are among the most primitive in this group: the stipules (see note 2), the presence of a tiny pistillode in the ♂ flowers, the fruits with 3 about equally well developed cells (the number of seeds could not yet be established in these immature fruits). More advanced characters in this relationship are the connate stamens and possibly the hollow twigs.

After thus having put *C. liguliferum* in its proper place in the system — a place which by the way is quite good in accordance with its geographical position — it seems worth while to go somewhat further into the systematical position and geography of its alliance. In this I link up with my former reflections on the mutual relationships as part of my revision of the genus (Blumea 9, 1959, especially pp. 323—324 and fig. 13). There I proposed a derivation of the *asperum*-group from the *oleosum*-group, more especially stressing the apparent relationship between *C. vrieseanum* and *C. balsamiferum*, the latter being probably the most primitive species of the *oleosum*-group. The area of distribution of *C. balsamiferum* is disjunct (Sumbawa, Celebes, Moluccas, Milne Bay Distr. of E. New Guinea, Louisiada Is); the gap is bridged, however, by the cohering area of distribution of the closely related *C. oleosum*. These facts — the areas of distribution of its most primitive species — may point to E. Malesia (Celebes, Moluccas, New Guinea and some adjacent islands, eastern Lesser Sunda Is) as the old centre of the *oleosum*-group. The in my opinion most primitive members of the *asperum*-group are scattered along the borders of that same area: Celebes (*C. acutifolium* var. *celebicum*, *C. vrieseanum*, the latter also in the Philippines), Solomon Is (*C. liguliferum*), the slightly more derived *C. acutifolium* var. *aemulans* known from some scattered localities in the north and east of New Guinea and from New Britain. Apparently, they occupy relic-areas nowadays, the gap being filled up, and the total area widened by the 'younger' forms with the more derived characters.

2. The stipules of *C. liguliferum* are its most distinctive and most interesting character. They throw a new light on the possible derivation (or one of the derivations possible?) of the subulate stipules of sect. *Pimela*. In my former revision (Blumea 9, 1959) I concluded, p. 281, that the stipules in this section are derived from a lower pair of leaflets, more in special from the petiolules of these leaflets. This conclusion was reached mainly by the

study of some abnormalities and by the comparison with the 'foliolar pseudo-stipules' of *C. decumanum*, *Dacryodes laxa*, and *Garuga* spp. But this is the first case which comes to my knowledge that stipules with the appearance of strongly reduced complete leaflets seem to be normal in a species of this section (the systematic position of *C. decumanum*, and hence its meaning for the comparative morphology, is uncertain; it seems to be a relic-species). Moreover, it casts a new light on the, hitherto not well understandable, flattened and ribbon- or tongue-shaped stipules of *C. chinare* and *vanikoroense*, and, to a lesser degree, *C. vrieseanum*. These may represent the next step in the evolution from normal leaflet to really subulate stipule.

NEW DELIMITATION OF CANARIUM VITIENSE A. GRAY

Among the Canariums collected by the Forestry Department, Honiara, Solomon Islands, which I received occasionally for identification, several were named by me either *Canarium chinare* Grutt. & H. J. Lam, or *C. acutifolium* (DC.) Merr. var. *aemulans* (Laut.) Leenh., though in either case with some hesitation. A new careful study of the whole set of specimens revealed that they are all closely alike, distinctly different from both species mentioned, however. As there was no reason to doubt their belonging to the *asperum*-group of sect. *Pimela*, I compared these specimens with the other species of that group. The nearest allies turned out to be *C. smithii* Leenh. from the Fiji Is and *C. schlechteri* Laut. from E. New Guinea and the Bismarck Archipelago. The material from the Solomon Is bridges the gap between these two as well geographically as morphologically. In fact, the delimitation to both sides is vague, and the differences between the two 'species' turned out to characterize only the ends of a range of clinal variation.

Two more species, *C. vitiense* A. Gray from Fiji and *C. samoense* Engl. from Samoa and Tonga, were already known to be only vaguely delimited against *C. smithii*. This feeble delimitation faded completely away against the widened variability of the combination comprising *C. schlechteri*, the new collections from the Solomons, and *C. smithii*. The synonymy is now as follows:

Canarium vitiense A. Gray, U.S. Expl. Exp. Bot. 1 (1854) 373. — *C. samoense* Engl. in DC. Mon. Phan. 4 (1883) 134. — *C. schlechteri* Laut. Bot. Jahrb. 56 (1920) 328. — *C. smithii* Leenh. Bish. Mus. Bull. 216 (1955) 12. — *C. bacciferum* Leenh. Bish. Mus. Bull. 216 (1955) 19.

Distribution: the eastern half of New Guinea, the Louisiade Archipelago, the Admiralty Is, the Bismarck Archipelago, the Solomon Is, Fiji, Samoa, and Tonga.

Though the area of distribution is rather wide, long-stretched, and consists of many islands sometimes separated by wide gaps, the characters are mostly grading from west to east, hence making a subdivision in infraspecific taxa hardly possible. As a whole the western races are more hairy, and have the bigger leaflets and fruits, the latter with the 1 or 2 sterile cells only slightly reduced; the forms from Fiji, Samoa, and Tonga are glabrous or nearly so, have the smaller leaflets and fruits, the 2 sterile cells of which are strongly reduced. Other characters seem to vary more freely; examples are: the place of insertion of the stipules, the length and hairiness of the flowers, the coalescence of the stamens in the ♂ flowers (whether hardly or up to nearly halfway), the disk in ♂ flowers (mostly up to 3 mm high and tubular, sometimes only ½ mm and cupular), the hairiness of the pistil in the ♀ flowers (rarely fully glabrous). The fruits are variable as to the shape of the kernel (longer or shorter spindle-shaped, roundish or about 6- or 3-angular in cross-section, smooth, ribbed, or rugose), the thickness of the wall, and the size and shape of their fertile cells. Only these fruit characters seem to be more or less restricted to local races.