BLUMEA 36 (1991) 63–85

CONSPECTUS OF THE GENERA SCURRULA L. AND TAXILLUS TIEGHEM (LORANTHACEAE) IN THE MALESIAN REGION

BRYAN A. BARLOW

Australian National Herbarium, CSIRO Division of Plant Industry, P.O. Box 1600,
Canberra City, ACT 2601, Australia

SUMMARY

The closely related genera *Scurrula* and *Taxillus* are reviewed for the Malesian region as a precursor to a treatment for Flora Malesiana. *Scurrula* is represented in the region by 8 species, of which *S. aphodastrica* and *S. didyma* are described as new. *Taxillus* is represented by one species, *T. chinensis*. The two genera are part of a floristic element of Gondwanan derivation which has reached the region from the Asian mainland, undergoing limited species radiation, and making a limited advance eastwards across Charles' Line.

INTRODUCTION

This conspectus is presented as a precursor to a treatment of the family Loranthaceae for Flora Malesiana. In the Malesian region the family comprises 21–23 genera and more than 200 species. For a family of this size, publication of a comprehensive revision in close conjunction with a flora treatment would involve considerable duplication of information, and inflation of publication costs. In any case, the work of a previous student of the family, B.H. Danser, provides a good basis for revisionary study (see below). For these reasons, it was concluded that publication of material precursive to a flora treatment could conveniently take the form of a series of updating accounts of selected genera or groups of genera. They will deal in suitable detail with those topics relevant to a critical study of the family, but not appropriate to a concise flora treatment, including biogeography and putative phylogeny, nomenclatural issues, and the rationale for the taxonomic decisions made.

Specimen label data have been accumulated in computer files, and lists of specimens examined will only be published where they represent significant new findings or newly recognized taxa. Extracts from these files can be provided on request, and reference copies relevant to this paper have been lodged at the Australian National Herbarium.

Critical studies of the Loranthaceae relevant to the Malesian region were published by Danser between 1929 and 1941. The major works were revisions for the Netherlands Indies (Danser, 1931) and the Philippines (Danser, 1935).

Danser's work was in part directed towards resolving the uncertainty created by the studies of Van Tieghem some 30 years earlier, which had resulted in a major proliferation of generic and specific names in a family which until then had been conservatively treated. Van Tieghem was also a very critical observer, and most of the diagnostic characters used for the circumscription of genera were first recognized and applied by him. However, Van Tieghem's use of such characters in genus delineation was mechanical and repetitive, and it was Danser's intuitive and scholarly approach and painstaking reference to original materials that has produced the framework for generic classification on which the current treatment is based.

Danser's works are in widely circulated journals. Revisions and flora treatments by the present author (Barlow, 1966, 1974, 1984) are also accessible. In this conspectus the very extensive synonymy provided in these earlier revisions has not been repeated where it remains unchanged, and wherever possible reference has been made to previous species descriptions.

SCURRULA AND TAXILLUS

The two genera *Scurrula* and *Taxillus* treated here are closely related, and previous authors, including Danser, had difficulty in delineating them (see below). Their affinities are very clearly with the Afro-Indian loranths, within which they represent a relatively unspecialized element. They reach the eastern limits of their ranges in the Malesian region, where they are found mostly to the west of Charles' Line, the widely accepted variation of Wallace's Line (Audley-Charles, 1981). Here their taxonomic and biogeographic histories may have been different, because *Scurrula* has diversified to produce local endemic species and has made a limited transgression eastwards across Charles' Line, whilst *Taxillus* is represented only by a single widespread Asian species which has reached Borneo and the Philippines. See further discussion below.

It appears possible to make satisfactory decisions on taxonomic status for the Malesian representatives without full revisions of the two genera. Whilst these are highly desirable, they would delay preparation of a Flora Malesiana treatment upon which they would have little impact.

As a group, the two genera can be distinguished in the Malesian region by the following combination of characters: Indumentum of stellate or dendritic hairs sparse to dense, at least on the young parts. Epicortical runners present. Leaves decussate. Inflorescence axillary, a simple raceme or umbel. Corolla 4- (rarely 5-)merous, gamopetalous, zygomorphic with the tube curved prior to anthesis, deeply split on the inner side of the curve with the petals reflexed to the outer side at anthesis. Anthers basifixed.

KEY TO THE GENERA

1a. Fruit obovoid, club-like, distinctly stipitate, not warty; inflorescence usually a 3- to 10-flowered simple raceme, rarely a 2-flowered umbel .... **1. Scurrula**

b. Fruit ellipsoid, not stipitate, warty (in the Malesian species); inflorescence a few-flowered simple umbel (2-flowered in the Malesian species) .... **2. Taxillus**

1. SCURRULA

Scurrula L., Sp. Pl. ed.1, 1 (1753) 110. — Type: *Scurrula parasitica* L.

For descriptions and synonymy see Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 427; Philipp. J. Sci. 58 (1935) 116.

A genus of about 20 species distributed in mainland Asia from India and Indochina to southern China, Taiwan, and southwards and eastwards in the Malesian region, extending as far as the Moluccas and Timor. The species usually have low host specificity, and often colonize disturbed sites and introduced host plants.

Danser (1929, 1931, 1933) several times referred to difficulty in defining the morphological limits of *Scurrula* and *Taxillus*, and on various occasions made transfers between the two genera (Danser, 1931, 1938). A critical review of generic limits will require a study of Asian and African taxa, and is seriously needed. A robust distinction based on inflorescence structure is not possible, because the apparently simple umbel of at least some *Taxillus* species is clearly derived by reduction from the simple raceme of *Scurrula*. In the species of *Taxillus* dealt with here the two flowers and fruits can often be seen to be unequal-aged, with unequal insertion on the peduncle, and the inflorescence is sometimes prolonged into a 3- or 4-flowered raceme. Conversely, there are species with 2-flowered inflorescences which are placed in *Scurrula*, and in some cases age and insertion differences between the two flowers are not discernible.

A clearer basis for distinction of the genera may be the fruit morphology. In general, the racemose inflorescences identified with *Scurrula* appear to be correlated with long, stipitate, strongly clavate fruits, whilst the umbellate inflorescences identified with *Taxillus* are correlated with typical ellipsoid loranthoid fruits. In the absence of full revisions, however, it is not clear how sharp the differences in fruit shape are, or whether they reflect more basic differences in fruit structure or dispersal biology. Whilst it remains questionable whether the fruit character is a sufficient basis for keeping the genera distinct, more detailed and extensive studies are necessary. In the absence of additional data, the status of these two widely known and accepted genera has not been changed.

The genus *Scurrula* also presents a major source of taxonomic difficulty at the species level, even in a family such as Loranthaceae where such difficulty is common. In the Malesian region the genus is unusual in having a centre of diversity in Java, and, accordingly, Danser appears to have had a particular interest in it. However, Danser (1931) clearly had difficulty in circumscribing taxa and reported that his treatment gave him little satisfaction. He expressed uncertainty in notes under several species, and even considered the possibility that all of the variation he had seen represented a single exceedingly polymorphic species (Danser, 1935: 117). During the course of his work he changed his opinion on the status of some taxa. For this reason, and because Danser's treatment itself is very difficult to use (see below), it is necessary to review the genus in considerable detail here.

In other publications Danser made important theoretical contributions to the species concept, but in applications in his own systematic work he was probably influenced by contemporary views on historical biogeography of the Malesian region.

He frequently accepted different species for each of the major islands of the region, whereas current knowledge of the amplitude and frequency of changes in coastline and climate may have led him to different conclusions. In consequence, Danser resorted to the use of quantitative characters for distinguishing the species of *Scurrula* he recognized, along with subtle differences in indumentum colour and persistence which do not appear to be valid. His descriptions no longer accommodate all of the variation found in later collections, and his keys are almost unworkable.

The taxonomic difficulty in *Scurrula* is probably in large part a consequence of recent rapid diversification, as the genus has occupied new territory towards the east. The somewhat 'weedy' nature of the species has probably facilitated establishment and segregation in both climax and subclimax communities, contributing to the generation of new biotypes. It is striking that the greatest diversity in the genus is at the margins of its area (see below).

The sympatric species in each island usually differ in corolla length. The differences probably represent coadaptation with different pollinators, and may be an important aspect of the restriction of species gene pools. These differences are sometimes the most substantial ones evident, so that pollinator partitioning may be an early stage of the speciation process.

The strongest indications of hybridization are in the Javanese uplands, involving putative parent species with broadly overlapping corolla length. The entity treated below as *S.* × *montana* is considered to be a hybrid derivative of *S. lepidota* and *S. oortiana.*

Eight species of *Scurrula* occur in the region. Highest species densities are at the southern margins of the area, notably in Java (7 species), the Lesser Sunda Islands (6, including 3 in Bali and 3 in Flores), and Sumatra (5). Lowest densities are in Malaya, the Philippines, Celebes and the Moluccas (each with 2 species).

In the Malesian region the closest affinities of *Scurrula* are with *Taxillus, Dendrophthoe,* and *Helixanthera.* The broader affinities of these genera are with other Asian and African genera which share a basic chromosome number of n = 9, relatively small chromosomes (Barlow, 1983; Martin, 1983), and simple umbellate or racemose inflorescences in which the flowers are not produced in triads. Their differentiation has occurred on the African and Indian blocks before and after the fragmentation of Gondwana (Barlow, 1990). The ancestor of *Scurrula* presumably reached Asia with the Indian block, and the genus has subsequently extended its range eastwards in southern Asia and has reached continental islands from Taiwan to Timor.

The complex variation pattern of *Scurrula* in Malesia suggests that much of the differentiation is relatively recent. The widespread species are common in lowland habitats and have presumably dispersed at times of lowered sea level, especially in the Quaternary (Barlow, 1991). Maximum opportunity for dispersal across Charles' Line to the Moluccas and islands of the Outer Banda Arc, where *Scurrula* now has its geographic limits, has probably occurred in the last 2 million years (Barlow & Hyland, 1988). Bird dispersal across the smaller sea gaps is not unrealistic, and establishment in new sites is facilitated by the very low host specificity. Some of the local variation in the widespread species is probably the result of increased isolation as sea levels have risen.

The greatest species richness in the region is found in Java. The only Malesian species of *Scurrula* which does not occur in Java is *S. aphodastrica*, endemic to Flores. The altitudinal zonation of the Javanese species (fig. 1) reveals that the local endemics (*S. didyma, S.* × *montana, S. oortiana*) occur in the uplands, where they have probably originated. The widespread species (*S. atropurpurea, S. ferruginea, S. parasitica*) are generally of lowland occurrence. The remaining species, *S. lepidota*, is most common in the Javanese uplands, and probably originated there, but does extend to lower elevations, and is also found in Sumatra and Borneo. The general pattern of species occurrence in Sumatra is similar, indicating that dispersal between the mountain blocks of Java and Sumatra is just as likely as it is within either island. The topographic diversity in Java/Sumatra is clearly related to the species diversity in *Scurrula*.

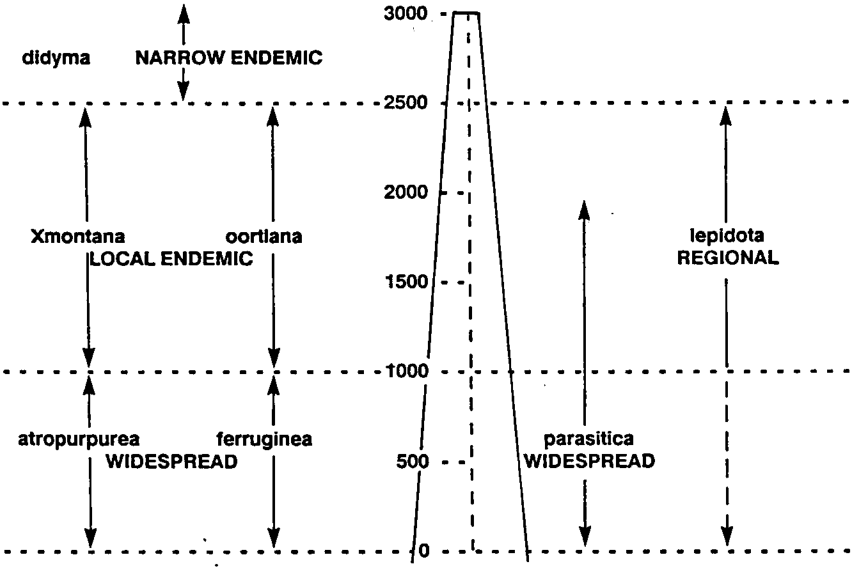

Fig. 1. Altitudinal zonation of *Scurrula* species in Java.

KEY TO THE SPECIES

Note: The key primarily takes account of the normal range of variation of the species. It does not take into account some of the infrequent extreme variation, apparently resulting from hybridization, which is expressed as intermediacy between the species, and which would make construction of a practical key very difficult. This variation is discussed under the relevant species.

1a. Corolla less than 20 mm long 2
b. Corolla more than 20 mm long 5
2a. Indumentum of the corolla dense, with a layer of longer dendritic hairs above the shorter ones 3
b. Indumentum of the corolla sparse to dense, lacking a layer of longer dendritic hairs above the shorter ones 4
3a. Corolla in the mature bud robust, obtuse, mostly 8–14 mm long. (Occurrence predominantly below 1000 m; rarely to 1850 m) . . . . **4. S. ferruginea**
b. Corolla in the mature bud slender to moderately robust, clavate, acute, mostly 12–24 mm long. (Occurrence above 1275 m) . . . . **6. S. × montana**
4a. Indumentum generally pale coloured, predominantly cream, less often a greyish or dark ochre; leaf lamina 5–10 cm long; corolla mostly 13–20 mm long **2. S. atropurpurea**
b. Indumentum very variable in colour from cream to dark reddish brown but predominantly of darker hues; leaf lamina 3–7 cm long; corolla mostly 8-16 mm long . . . . **8. S. parasitica**
5a. Bract ovate or obovate, concave, longer than and enclosing the ovary **7. S. oortiana**
b. Bract linear to narrowly ovate or deltoid, flat or concave, mostly shorter than and not enclosing the ovary 6
6a. Leaf lamina less than 3 cm long; inflorescence of 2 equal-aged flowers, resembling a simple umbel . . . . **3. S. didyma**
b. Leaf lamina more than 3 cm long; inflorescence of 2 or more unequal-aged flowers, racemose 7
7a. Corolla in the mature bud robust, not or only weakly clavate towards the apex, 8–14(–23) mm long . . . . **4. S. ferruginea**
b. Corolla in the mature bud slender, gradually and distinctly clavate towards the apex, 19–45 mm long 8
8a. Inflorescence a subumbellate raceme, with a short axis bearing 2 or 3 nearly equal-aged flowers near the apex; corolla obtuse; leaf lamina folded; indumentum creamy white . . . . **1. S. aphodastrica**
b. Inflorescence distinctly racemose, with an axis usually 12–20 mm long bearing more than 3 flowers developing successively; corolla acute; leaf lamina flat; indumentum ochre to reddish brown 9
9a. Corolla up to 24 mm long, its indumentum with a layer of longer dendritic hairs above the shorter ones . . . . **6. S. × montana**
b. Corolla mostly more than 24 mm long, its indumentum lacking a layer of longer dendritic hairs above the shorter ones . . . . **5. S. lepidota**

1. Scurrula aphodastrica Barlow, *spec. nov.*

Species nova *S. atropurpureae* similis, sed foliis brevioribus angustioribus costis plicatis, inflorescentiis fasciculatis, subumbellatis axibus brevissimis, prope apicem flores 2–3 aequiveteres praeditis, floribus multis longioribus differt. — Holotypus: Lesser Sunda Islands, Flores, West Manggarai, Nangalili, Pela, 50 m, 10.iii.1972, *Schmutz 2895* (L 277714).

Slender shrub; young parts clothed with a dense creamy white indumentum of short stellate and dendritic hairs, becoming sparse on adult stems, leaves and corollas. *Stem internodes* slender, terete, 3–4 cm long. *Leaves* opposite; lamina narrowly elliptic, 4–6 cm long, 1.5–2.4 cm wide, thinly coriaceous, often infolded along the midrib, attenuate at the base to an obscure winged petiole 3–4 mm long, obtuse to shortly rounded at the apex; venation obscure except for the midrib and a few lateral veins visible on both sides. *Inflorescences* in clusters at the nodes, arising successively on a raised placenta-like swelling 2–3 mm in diameter, each a raceme of 2 or 3 flowers borne subumbellately near the end of a short peduncle 1–2(–5) mm long (the entire cluster of inflorescences thus resembling a sessile many-flowered umbel); pedicels slender, 2–4 mm long; bract deltoid, erect, shortly rounded at the apex, c. 1 mm long. *Ovary* narrowly funnel-shaped, c. 2.5 mm long; calyx limb short, inrolled. *Corolla* in the mature bud slender, 22–30 mm long, narrowly clavate, obtuse at the apex; tube at anthesis with a single slit in the upper c. 12 mm and petals separating in the upper c. 6 mm. *Anther* 0.7–1 mm long, recurved; free part of the filament flat, striate, 1.5–2 mm long. *Style* 23–31 mm long; stigma knob-like, twice as wide as the style. *Fruit* 12–15 mm long including a gradually widened stipe 6–10 mm long, 3.5 mm wide, shortly contracted and truncate at the apex.

Endemic to Flores, recorded at elevations from 50 to 500 m (fig. 2; 5 collections seen). Habitat details are poorly known, but recorded hosts include *Helicteres isora* and *Bridelia* sp. The flower colour is described as grey outside and dark purple inside.

Scurrula aphodastrica is a distinct and relatively homogeneous species. In indumentum colour and density it resembles *S. atropurpurea*, but its flowers are much longer. In this respect it is similar to *S. lepidota*, but differs from this species in its

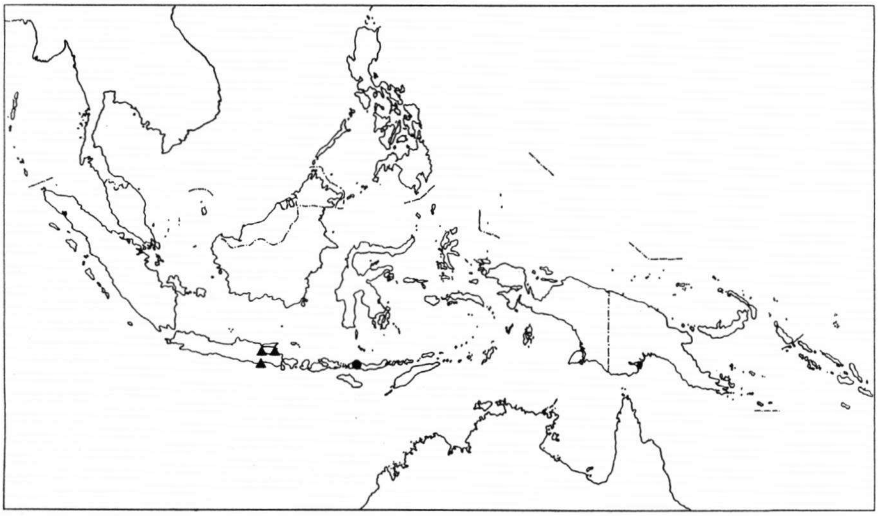

Fig. 2. Distribution of *Scurrula* species. Symbols show recorded occurrence in 1° grid cells. — *S. aphodastrica* Barlow (●); *S. didyma* Barlow (▲).

more slender habit and its indumentum colour. It differs from both these species in its narrow, folded leaves and in its subumbellate inflorescences in distinct verticillasters, each with a short axis bearing 2 or 3 nearly equal-aged flowers near the apex. Compared with other species of the genus, the differences are rather sharp, and leave little doubt as to its specific status.

The small area of the species, apparently confined to Flores, its occurence at the southeastern extreme of the genus' range, and its apparently restricted gene pool all indicate that *S. aphodastrica* is a young species which has differentiated *in situ.* See discussion above on the historical biogeography of the genus.

The vernacular name for the species in Flores is *tai ntala* ('star droppings'). The specific epithet is derived from the Greek *aphodos* ('dung') and *astrikos* ('of the stars').

Additional specimens examined: Lesser Sunda Islands: Flores: without exact locality, 1970, *Verheijen 2710* (L); without exact locality or date, *Verheijen 4323* (L); Metjik, 500 m, 16.vi.1972, *Schmutz 2959* (L); Western Flores, southern part of Mt Ndeki, 200 m, 12.iv.1965 *Kostermans & Wirawan 170* (L).

2. **Scurrula atropurpurea** (Blume) Danser

Loranthus atropurpureus Blume, Verh. Bat. Genootsch. 9 (1823) 186. — *Scurrula atropurpurea* (Blume) Danser, Bull. Jard. Bot. Buitenzorg III, 10 (1929) 349. — Type: Java, *Blume s.n.* (holo not seen; iso L 908,127-87, -97).

Loranthus philippensis Cham. & Schldl., Linnaea 3 (1828) 204. — *Scurrula philippensis* (Cham. & Schldl.) G. Don, Gen. Hist. 3 (1834) 422. — Type: Philippines, without exact locality, *Chamisso s.n.* (holo B, not seen, presumably lost; iso P).

For descriptions and additional synonymy see Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 429 under *S. atropurpurea*, and Philipp. J. Sci. 58 (1935) 121 under *S. philippensis*. The names *Loranthus (Dendrophthoe, Scurrula) junghuhnii* have been transferred to *S. lepidota* (see below). The names *Loranthus (Dendrophthoe, Cichlanthus) repandus* have been transferred to *S. parasitica* (see below). The description is amended as follows: Indumentum generally pale coloured, predominantly cream grading to a greyish or dark ochre, often becoming sparse on the ovary or corolla. *Leaf lamina* 5–10 cm long, 2.3–5 cm wide, the larger ones more frequently obovate. *Corolla* in the mature bud (11–)13–20(–24) mm long, slender, usually acute at the apex.

Widely distributed in the region, ranging from the southeast Asian mainland (Thailand, Vietnam) to the Philippines (Luzon, Leyte, Mindoro), Java, the Lesser Sunda Islands (Bali, Sumbawa), and the Moluccas, mostly recorded at low elevations from sea level to 600 m, but also occurring at higher elevations up to 2300 m, especially in the north of the range (fig. 3; 91 collections seen). Habitat details and hosts are poorly known; host specificity is probably very low and the recorded hosts (*Acacia farnesiana, Averrhoa carambola, Grewia* sp., *Myristica* sp., *Terminalia* sp.) may be of little significance. The species can be identified by its combination of indumentum pale in colour (cream or ochre) and of uniform length, leaf lamina 5–10 cm long, and corolla of intermediate length (mostly 13–20 mm) and rather acute at the apex. The internal corolla colour has been noted as very light red and as greenish.

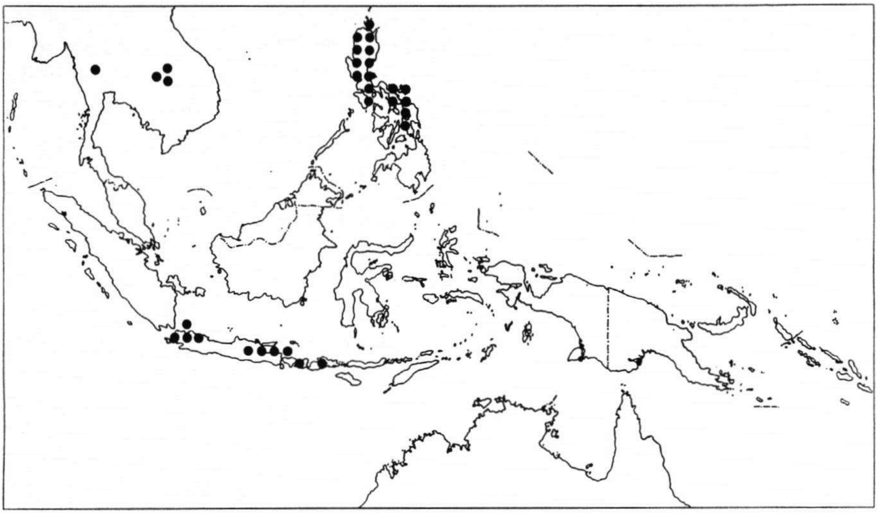

Fig. 3. Distribution of *Scurrula atropurpurea* (Blume) Danser in Malesia. Symbols show recorded occurrence in 1° grid cells.

Although Danser (1931) treated *S. atropurpurea* as a distinct species confined to Java and Bali, he did so with reservation. He considered it to be possibly conspecific with the smaller-flowered *S. fusca*, which he later (Danser, 1935) treated as synonymous with *S. parasitica*. However, *S. atropurpurea* is completely sympatric with *S. parasitica* in Java and presents a distinct facies through its larger leaves with cream or ochre indumentum persisting on the underside and the relatively longer flowers. The two entities appear to maintain their integrity to a high degree and are accordingly accepted as distinct species.

The Philippine entity treated as *Scurrula philippensis* by Danser (1935) agrees closely with *S. atropurpurea*, and the two are here considered to be conspecific. In particular they share similar pale indumentum colours, leaf dimensions and a relatively short inflorescence axis. The Philippine specimens have a similar corolla shape, but the corolla and style are slightly longer than those of the Javanese specimens. Danser (1935) recognized the difference between *S. parasitica* and *S. philippensis* in the Philippines, but considered *S. philippensis* to have a different affinity, treating it as conspecific with the Javan *S. junghuhnii*. The latter species is here considered to represent short-flowered forms of *S. lepidota* (see there).

Collections from Thailand and Vietnam, including some referred to *S. philippensis* by Danser (1938), and others from the Moluccas (locality not specific) and Sumbawa, not seen by Danser, also agree with *S. atropurpurea* as circumscribed here. The known area of the species is thus unusual, occurring at the periphery of the genus range in the Malesian region. If *S. atropurpurea* as circumscribed here is indeed a natural entity, the shape of its area suggests that it may be somewhat relictual. Its absence from central blocks such as Sumatra, the Malay Peninsula, Borneo, and

Celebes, if confirmed, may be the consequence of replacement by other aggressive species such as *S. lepidota*, *S. ferruginea* and *S. parasitica*. The natural affinity of *S. atropurpurea* may be with *S. lepidota*, which has longer flowers, a darker indumentum, and a generally more robust habit.

3. Scurrula didyma Barlow, *spec. nov.*

Species nova *S. ferrugineae* similis, sed internodiis brevioribus, foliis parvioribus, inflorescentiis floribus 2 in umbellas dispositis, floribus longioribus differt. — Holotypus: Java, Batjangvlakte (Semeroe complex), c. 2500 m, parasitic on *Vaccinium varingiaefolium*, 4.xi.1940, *ten Houten & Coert 40.28 (Herb. Coert 1570)* (L 951,326-899).

Inflorescences and young parts clothed in a short, dense, dark red brown indumentum rapidly disappearing from the leaves, especially the upper surface, but persistent on the inflorescences and flowers. *Stem internodes* short (c. 2 cm long), terete. *Leaves* opposite; petiole c. 5 mm long, flat above, rounded below; lamina elliptic to ovate, 20–25 mm long, 11–15 mm wide, coriaceous, cuneate at the base, rounded at the apex; venation obscure except for the midrib raised in the lower part on the underside. *Inflorescences* produced successively at the nodes, umbels of 2 equal-aged flowers; peduncle 1–3 mm long; pedicels slender, 4–7 mm long; bracts erect, narrow, rounded at the apex, concave, c. 1.5 mm long. *Ovary* funnel-shaped, c. 3 mm long; calyx limb very short, inflexed. *Corolla* in the mature bud c. 25 mm long, robust, slightly inflated for a few mm above the base, obtuse at the apex. *Style* c. 24 mm long; stigma knob-like, twice as wide as the style. *Fruit* (possibly immature) c. 10 mm long including a stipe c. 5 mm long, abruptly widened above the stipe to c. 4 mm wide. [Other characters not recorded; flower bud not dissected for anther details.]

Endemic to Java, apparently confined to highlands and recorded at elevations from 2500 to 2950 m (fig. 2; 3 collections seen). Habitat details are otherwise poorly known; the only recorded host is *Vaccinium varingiaefolium*.

The specimens examined show that *S. didyma* is a distinct and probably homogeneous species. Whilst it shares some characters such as dark indumentum colour and obtuse corolla bud with *S. ferruginea*, it is so distinctive that its affinities are not obvious. The inflorescence of a simple 2-flowered umbel is presumably a reduction from the simple raceme which is the basic structure in *Scurrula*. This reduction is rare in the genus, but is approached in *S. notothixoides* (Hance) Danser of Indochina and southern China, where a vestigial tip of the inflorescence axis extends above the insertion of the pair of floral pedicels. In addition to its inflorescence structure, *S. didyma* can be distinguished by its combination of short, dense, dark indumentum, short internodes, very small glabrescent leaves, and a corolla of intermediate length obtuse at the apex. Compared with other species of the genus, the differences are rather sharp, and leave little doubt as to its specific status.

An inflorescence of a simple umbel is characteristic of the closely related genus *Taxillus*, and its occurrence in *S. didyma* weakens the distinction between the two genera. The uncertainty is reflected in Danser's treatment of *S. notothixoides*, which he first placed in *Scurrula* (Danser, 1929), then included in *Taxillus* (Danser, 1931, 1933) but subsequently treated as a *Scurrula* (Danser, 1938) with no further explanation. In *S. didyma* the long fruit strongly attenuate towards the base is very characteristic of *Scurrula*, and the new species is most satisfactorily placed here.

The small area of the species, apparently confined to high elevations in Java, and its apparently restricted gene pool indicate that *S. didyma* is a young species which has differentiated *in situ*. Notwithstanding its differences from *S. ferruginea*, which is widespread in Malesia at low and middle elevations, *S. didyma* may be a young local differentiate of this stock. See discussion above on the historical biogeography of the genus.

The specific epithet is derived from the Greek *didymos* ('twin'), alluding to the inflorescence structure.

Additional specimens examined: Java: Pasoeren, Tosari, G. Semeroe, 1929, *Jeswiet s.n.* (L); Besoeki, Jang Plateau, top of Welirang (Arga), 2950 m, 16.vii.1938, *van Steenis 10970* (L, P).

4. Scurrula ferruginea (Jack) Danser

Loranthus ferrugineus Jack, Mal. Misc. 1 (1820) 279. — *Scurrula ferruginea* (Jack) Danser, Bull. Jard. Bot. Buitenzorg III, 10 (1929) 350. — Type: not seen.

For descriptions and extensive synonymy see Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 432; Philipp. J. Sci. 58 (1935) 123; Bull. Jard. Bot. Buitenzorg III, 16 (1938) 37. The description is amended as follows: Indumentum usually with long dendritic hairs visible above the shorter ones but disappearing with age, sometimes quite floccose on young parts, ochre to reddish brown or very rarely darker. *Leaf lamina* (3–)5–10 cm long, (1.5–)2–5.5 cm wide; petiole 2–6(–10) mm long. *Inflorescence* axis usually short but up to 15 mm long; pedicels 0.5–2.5(–4) mm long. *Corolla* in the mature bud (6–)8–14(–23) mm long, usually robust but sometimes relatively slender and weakly clavate, usually straight but sometimes slightly curved, mostly obtuse to rounded or truncate at the apex but sometimes broadly acute.

Common and widely distributed in the region, ranging from India, southern China and the southeast Asian mainland (Thailand, Cambodia, Laos, Vietnam, Malaya) to Singapore, Sumatra, Java, Borneo, the Philippines (Palawan, doubtfully Luzon), Celebes and the Lesser Sunda Islands (Flores), mostly recorded at low elevations from sea level to 1000 m, but also occurring at higher elevations up to 1850 m (fig. 4; 153 collections seen). Although there are many collections, habitat details and hosts are poorly known; host specificity is probably very low and the recorded hosts (*Coffea, Melastoma* [3 times], *Pithecellobium, Saurauia* [twice]) may be of little significance. The species can be identified by its combination of indumentum relatively dark in colour (ochre to reddish brown), with long dendritic hairs usually visible above the shorter ones; and the corolla of short to medium length (mostly 8–18 mm), usually robust, straight and obtuse at the apex. Corolla colour is obscured by the indumentum externally, but the internal colour has been variously noted as greenish, yellowish, orange, and red.

The present study has confirmed the consistent treatment of *S. ferruginea* as a distinct species by Danser (1931, 1935, 1938). He noted (Danser, 1931) that *S. junghuhnii* and *S. philippensis* showed a geographic replacement pattern with *S. ferruginea*, and suggested that they may be local forms of the latter species. Sub-

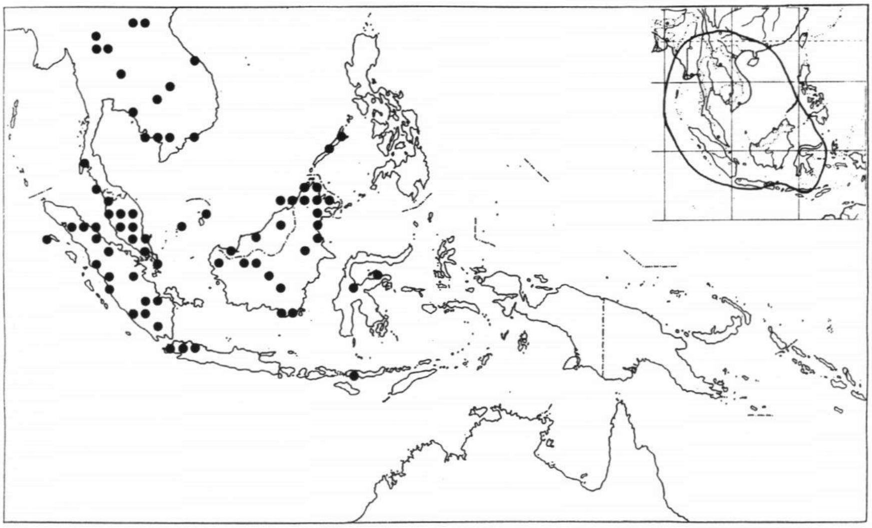

Fig. 4. Distribution of *Scurrula ferruginea* (Jack) Danser in Malesia. Symbols show recorded occurrence in 1° grid cells.

sequently, Danser (1935) maintained *S. philippensis* as a distinct species, but included *S. junghuhnii* within it. These two entities are distinct from *S. ferruginea* in their longer acute corollas and shorter indumentum. On the basis of these features, and on indumentum colour, *S. philippensis* has been treated in the present study as conspecific with *S. atropurpurea* (see there) and *S. junghuhnii* as conspecific with *S. lepidota* (see there). The circumscription of *S. ferruginea,* therefore, depends on significant weighting of its indumentum character (long dendritic hairs) and corolla characters (robust, obtuse).

Scurrula ferruginea is broadly sympatric with most of its Malesian congeners, and maintains its integrity to a high degree. However, it is likely that many of the variants which, during this study, have been referred to this species with some difficulty are the results of introgression, perhaps most often with *S. parasitica* and *S. lepidota.* The variants with unusually long, or slender, or acute corollas, or weakly expressed indumentum characters, are best explained in this way. Examination of specimens determined as *S. parasitica* or *S. ferruginea* by Danser between 1930 and 1940 indicates that he had increasing difficulty in discriminating between these two species, and that his concept of each of them was progressively changing. In particular, his concept of *S. ferruginea* probably developed more broadly and overlapped with that of *S. parasitica.* See account of specific limits in the introduction above. See under *S. parasitica* for note on apparent intergradation with that species, especially in Borneo.

The occurrence of *S. ferruginea* in Flores, but not elsewhere in the Lesser Sunda Islands, presents an interesting biogeographic pattern. This island is directly south of Celebes, where *S. ferruginea* is common, and the species may have reached it by recent southward migration. Other species disjunctions between Celebes and Flores are known (Van Balgooy, pers. comm.).

5. Scurrula lepidota (Blume) G. Don

Loranthus lepidotus Blume, Verh. Bat. Genootsch. 9 (1823) 191. — *Scurrula lepidota* (Blume) G. Don, Gen. Hist. 3 (1834) 422. — Type: Java: without locality or date, *Blume s.n.* (holo L 908.128-834; iso L 908,128-824, -833, -842, -844; 940,159-198; 952,162-51).

Loranthus obovatus Blume, Bijdr. 13 (1825) 663. — *Scurrula obovata* (Blume) G. Don, Gen. Hist. 3 (1834) 422. — Type: Lesser Sunda Islands, Timor, iv.1821, *Herb. Reinwardt 1308* (holo L; probable iso L 908,128-606, -607).

Loranthus kalahiensis Korthals, Verh. Bat. Genootsch. 17 (1839) 271. — *Scurrula kalahiensis* (Korthals) Danser, Bull. Jard. Bot. Buitenzorg III, 10 (1929) 351. — Type: Borneo, Dauna Kambat, Mt Kalahien, *Korthals s.n.* (holo L 908,127-1206; iso L 908,127-1202, -1207).

Loranthus ellipticus Korthals, Verh. Bat. Genootsch. 17 (1839) 272. — Type: Borneo, Doessen (Mons Kramat), *Korthals s.n.* (L).

Loranthus medinensis Molkenboer in Miq., Pl. Junghuhn. (1852) 112. — *Scurrula medinensis* (Molkenboer) Danser, Bull. Jard. Bot. Buitenzorg III, 10 (1929) 352. — Type: Java, 'Medinie. Mei. Jun. Ungarang. D. Helling', *Junghuhn s.n.* (holo L 908,127-960; iso L 908,127-940).

Loranthus junghuhnii Molkenboer in Miq., Pl. Junghuhn. (1852) 113. — *Dendrophthoe junghuhnii* (Molkenboer) Miq., Fl. Ind. Bat. 1, 1 (1856) 817. — *Scurrula junghuhnii* (Molkenboer) Danser, Bull. Jard. Bot. Buitenzorg III, 10 (1929) 351. — Type: Java, 'Medini. Mei. Jun. Ungarang. D. Helling', 3000–5000 ft (= G. Oengaran), *Junghuhn s.n.* (holo L 908,127-1283; probable iso L 908,127-1255).

For descriptions and additional synonymy see Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 437, 439, 440, 441, 442 under *S. junghuhnii, kalahiensis, lepidota, medinensis,* and *obovata* respectively. The description is amended as follows: Indumentum usually short, rarely with long dendritic hairs visible above the shorter ones but disappearing with age, often dense on the inflorescence and young vegetative parts but sparse on the corolla and older leaves, ochre to reddish brown. *Leaf lamina* (3.5–)6–12 cm long, (1.8–)3–5.5 cm wide. *Inflorescence* axis variable, (2–)12–20(–25) mm long but usually well developed and relatively slender; pedicels (1–)4–7 mm long. *Corolla* in the mature bud 19–45 mm long, usually slender, gradually clavate and sometimes angular towards the acute apex, often slightly inflated prior to anthesis.

Common in the southern part of the Malesian region, ranging from local occurrences in Sumatra to Java, where it is very common, southern Borneo, and several of the Lesser Sunda Islands (Sumbawa, Sumba, Flores, Alor, Timor), mostly recorded at high elevations from 1000 to 2400 m, but also occurring at lower elevations down to sea level, especially in Borneo (fig. 5; 82 collections seen). Doubtfully recorded from Thailand (see below). Although there are many collections, habitat details and hosts are poorly known; host specificity is probably very low and the recorded hosts (*Ficus* [twice], *Photinia, Viburnum*) may be of little significance. The species can be identified by its combination of indumentum relatively dark (ochre to reddish brown), mostly short and sparse on the corolla; and the long corolla (19–45 mm) usually slender, clavate, angular, and acute at the apex.

Danser (1931) treated *S. lepidota, S. junghuhnii, S. kalahiensis,* and *S. obovata* as distinct species, and *S. medinensis* as a doubtful species. All except *S. obovata* were regarded as having local occurrences in a single Malesian island. Danser considered *S. junghuhnii* as being doubtfully distinct from *S. philippensis*, and later

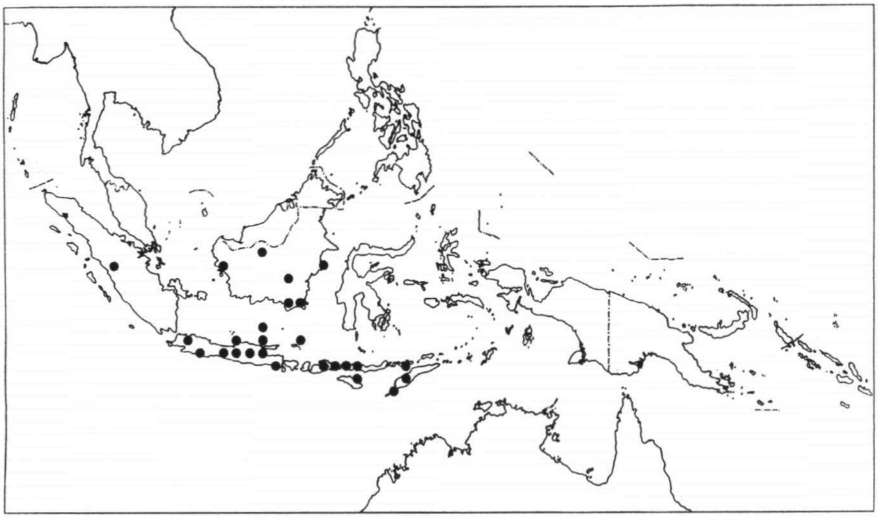

Fig. 5. Distribution of *Scurrula lepidota* (Blume) G. Don in Malesia. Symbols show recorded occurrence in 1° grid cells.

(Danser, 1935) treated them as conspecific. He also considered the latter two possibly to be forms of *S. ferruginea* (see there).

As a result of the present study it has been concluded that *S. lepidota, S. junghuhnii, S. kalahiensis, S. obovata,* and *S. medinensis* all belong in a single somewhat polymorphic species. The most representative form of the species is the one recognized by Danser as *S. lepidota,* common at high elevations in Java, with long inflorescence axes, long flowers, and relatively dense indumentum. *Scurrula junghuhnii, S. kalahiensis,* and *S. medinensis* are reduced forms occurring in Java, often at somewhat lower elevations, usually with shorter flowers, shorter inflorescence axes and sometimes smaller leaves and slightly darker indumentum, but grading continuously into *S. lepidota.* Whilst *S. junghuhnii* is closely related to *S. philippensis,* the two entities present different facies; the latter, with its much paler indumentum and slightly shorter flowers, is apparently conspecific with *S. atropurpurea* (see below).

Clinal variation in a different direction occurs eastwards from Java to the Lesser Sunda Islands, culminating in the form treated by Danser as *S. obovata.* In this form the leaves are more rapidly glabrescent, the corollas are very long, only very sparsely tomentose, and in bud very slender, clavate, and strongly angular or even winged in the clavate part.

The differences between *S. lepidota* and *S. atropurpurea* are rather slight, and are reflected in their turbulent taxonomic histories. Danser (1931, 1935) considered a form of the former (*S. junghuhnii*) and a form of the latter (*S. philippensis*) to be conspecific. The differences are largely of indumentum colour and corolla length. *Scurrula lepidota* is usually found at higher elevations than *S. atropurpurea,* especially in Java and Sumbawa where they are sympatric. The two species probably share common ancestry and have differentiated as relatively longer-flowered taxa at the frontier of the expansion of the genus across Sundaland.

Danser (1938) considered *S. gracilifolia* (Schultes) Danser of Indochina to be so similar to *S. obovata* that he applied the same description to each. *Scurrula gracilifolia* is also similar to *S. atropurpurea*, and in view of the limited material available, the absence of the species from the Flora Malesiana region, and the absence of nomenclatural implications, a decision on its taxonomic status has been deferred. Until further study has been made, the occurrence of *S. lepidota* in Indochina must be considered doubtful.

In its mountain habitats in Java, *S. lepidota* is sympatric with other upland species such as *S. oortiana* and *S. didyma*, and with widespread species such as *S. parasitica* and *S. ferruginea*. Recent climatic cycles have presumably had strong influences on habitats at high elevations, and there are strong indications that *S. lepidota* has been involved in hybridization with at least some of these species. See discussion under *S.* × *montana*.

The type specimen of *Loranthus (Scurrula) obovatus* bears three separate leaves which belong with *Amyema fasciculatum* (Blume) Danser. Danser (1931: 443) has given a detailed account of the confusion surrounding application of the names *Loranthus obovatus* Blume and *Loranthus fasciculatus* Blume, which now appears to have arisen through aggregation of material of the two quite distinct species on the one sheet. The three separate leaves agree entirely with the holotype material of *L. fasciculatus*, and are probably part of the same gathering.

6. Scurrula × montana Danser (pro spec.)

Scurrula montana Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 441. — Type: Java, Besoeki, Gendingwaloh, c. 1450 m, 9.vii.1916, *Koorders 43003b* (BO, not seen, lectotype here designated; iso L 933,191-20; 923,157-1411).

For description see Danser, *l.c.* The description is amended as follows: Indumentum usually dense, with long dendritic hairs visible above the shorter ones, reddish brown. *Stem internodes* sometimes flattened, angular and longitudinally ridged, relatively robust. *Leaf lamina* very variable, 2.5–12 cm long, 1.5–7 cm wide, often undulate at the margins, sessile or with a petiole to 15 mm long. *Inflorescence* axis very variable, 3–22 mm long, robust, usually bearing flowers along the entire length; bracts exceedingly variable but usually narrowly triangular or narrowly ovate, acute and shorter than the ovary, sometimes foliaceous, obovate, concave and much longer than the ovary. *Corolla* in the mature bud 12–24 mm long.

Occurs in Sumatra and Java, recorded at high elevations from 1275 to 2500 m (fig. 6; 11 collections seen). Also recorded from Bali (Danser, 1931). Habitat details and hosts are poorly known, although Danser (1931) referred to its abundance as a parasite on *Casuarina*. Identification is difficult owing to the variability in characters usually of high diagnostic value, probably because of hybridization (see below), but specimens show a combination of relatively dense and dark (reddish brown) indumentum, robust habit, and corolla 12–24 mm long. Internal flower colour and fruit colour have both been recorded as green.

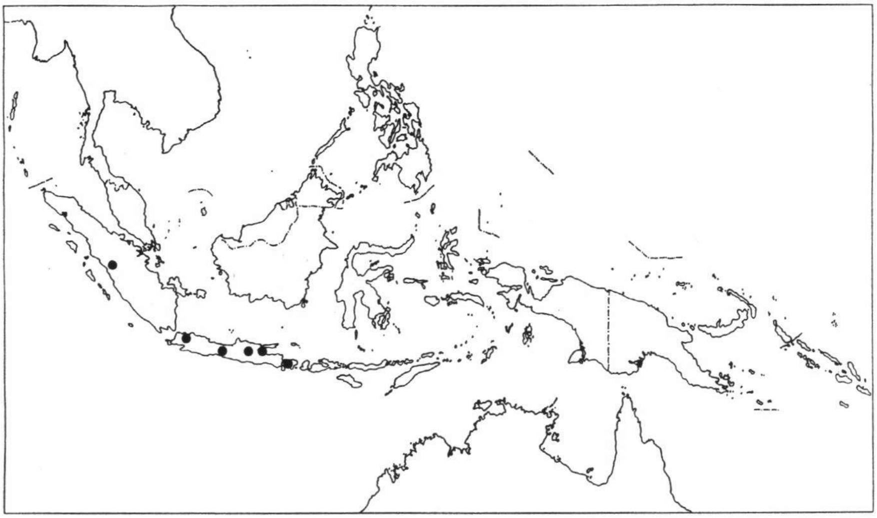

Fig. 6. Distribution of *Scurrula* × *montana* Danser. Symbols show recorded occurrence in 1° grid cells.

This species was regarded by Danser (1931) and other authors, including Van Steenis (1972), as characteristic of the high mountain flora of Java. However, perusal of Danser's description reveals exceptional variability, and this has been confirmed by examination of additional materials referred to the entity in the present study. There is even significant variation at an intraplant level.

Scurrula × *montana* is sympatric in its high mountain habitats with other species of the genus, including *S. lepidota, S. oortiana,* and *S. parasitica* (fig. 1). In its variable and apparently segregating characters, including density, length and colour of the indumentum, petiole length, leaf lamina dimensions and undulation, inflorescence axis length, bract dimensions and corolla length, it presents no unique attribute states and is clearly intermediate between these other species. In particular, most of the variation visible in *S.* × *montana* appears to be the result of intergradation between *S. lepidota* and *S. oortiana.* It is significant that *S. oortiana* has a similar area in the high mountains of Sumatra and Java to that of *S.* × *montana* (see notes under *S. oortiana*). Involvement of other species such as *S. parasitica* may be indicated by the presence of variants with relatively short flowers and glabrescent leaves or inflorescence parts.

Although apparently of hybrid derivation, *S.* × *montana* appears to have acquired some stability as a local biotype with an apparently high host specificity for *Casuarina.* This biotype is therefore a more or less identifiable entity in the Javanese mountain flora, perhaps with its own partially conserved gene pool. In view of the general difficulty in circumscription of the Malesian species of *Scurrula,* it is treated as having a biological status broadly comparable with that accorded to the Malesian species accepted in this study.

Danser (1931) cited 8 collections in his diagnosis of *S. montana*, and they are therefore syntypes. The collection chosen for lectotypification is consistent with Danser's description and is represented by isotypes. Of the other 7 syntypes, two were located in L filed under *S. lepidota*, and in preliminary segregation in the present study had been set aside as atypical of that species and showing apparent introgression from *S. oortiana*. This illustrates the extent of intergradation between *S. lepidota* and *S.* × *montana*, and is a probable explanation of some of the variability found in *S. lepidota*, especially the occasional occurrence of long dendritic hairs in the indumentum, and of short inflorescence axes. See note under *S. lepidota*.

In the present study many intergrades have been filed for convenience under *S. oortiana*. See there for further discussion.

7. Scurrula oortiana (Korthals) Danser

Loranthus oortianus Korthals, Verh. Bat. Genootsch. 17 (1839) 239, 269. — *Scurrula oortiana* (Korthals) Danser, Bull. Jard. Bot. Buitenzorg III, 10 (1929) 352. — Type: Sumatra, G. Singgalang, *Korthals s.n.* (L 909,112-279, lectotype here designated; iso L 909,112-280, -278).

Loranthus korthalsii Molkenboer in Miq., Pl. Jungh. (1852) 110. — *Scurrula korthalsii* (Molkenboer) Danser, Bull. Jard. Bot. Buitenzorg III, 10 (1929) 351. — Type: Java, without locality or date, *Junghuhn s.n.* (holo L 908,127-1256; iso L 908,127-1266).

For descriptions and additional synonymy see Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 439, 443, under *S. korthalsii* and *S. oortiana* respectively. The description is amended as follows: *Stem internodes* sometimes flattened and widened towards the apex. *Leaf* lamina mostly 9–14 cm long, 4.5–6 cm wide, often undulate. *Corolla* in the mature bud 15–35(–43) mm long.

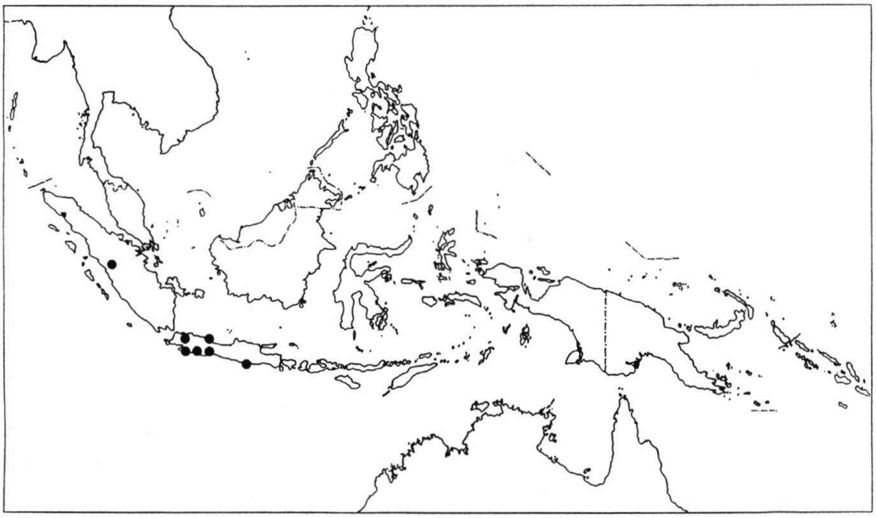

Fig. 7. Distribution of *Scurrula oortiana* (Korthals) Danser. Symbols show recorded occurrence in 1° grid cells.

Occurs in Sumatra and Java, recorded at high elevations from 1000 to 2050 m (fig. 7; 31 collections seen). Habitat details and hosts are poorly known; recorded hosts include *Citrus decumae, Eugenia, Ficus ribes,* and *Saurauia.* The species is distinctive, and can be identified by its combination of dense indumentum, with a layer of long dendritic hairs above the shorter ones and relatively dark, large leaves, very distinctive hood-like bracts enlarged to twice the length of and enclosing the ovary, and corolla usually 20–35 mm long.

The expanded bract, which forms an open hood around the ovary, gives *S. oortiana* a very distinctive character. The function of the bract is presumably one of protection of the floral parts from predation. Even though *S. oortiana* is one of the most easily identifiable species of *Scurrula,* however, there are strong indications of introgression from and into other species, and this provides one of the best illustrations of the weak differentiation of gene pools in the genus. The variation which occurs in indumentum colour, leaf size, and especially in inflorescence axis and corolla length, may be the result of introgression from sympatric species such as *S. parasitica* and *S. lepidota. Scurrula oortiana* is almost certainly parental to the hybrid entity *S.* × *montana* (see there). A number of specimens examined in the present study have been determined as putative intergrades between *S. oortiana* and other species.

In accepting *S. korthalsii* as a distinct species, Danser (1931) suggested that it may simply comprise forms of *S. oortiana* with shorter inflorescence axes and corollas. The present study has confirmed that this entity has the same qualitative bract character as *S. oortiana* and simply represents some of the introgressants discussed above.

In the diagnosis of *Loranthus oortianus* Korthals cited collections from Sumatra and Java, and they are consequently syntypes. The Sumatran specimen selected as lectotype is a good representative of normal expression of the species characters, with large bracts and a style c. 30 mm long.

8. Scurrula parasitica L.

Scurrula parasitica L., Sp. Pl. ed. 1, 1 (1753) 110. — Type: not seen.

Loranthus fuscus Blume, Verh. Bat. Genootsch. 9 (1823) 192. — *Scurrula fusca* (Blume) G. Don, Gen. Hist. 3 (1834) 421. — Type: BO (not seen), L.

Loranthus repandus DC., Prod. 4 (1830) 300. — *Dendrophthoe repanda* (DC.) G. Don, Gen. Hist. 3 (1834) 420. — *Cichlanthus repandus* (DC.) Tieghem, Bull. Soc. Bot. France 42 (1895) 253. — Type: Java, *Blume s.n.* (holo not seen; iso L).

For descriptions and extensive further synonymy see Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 434; Philipp. J. Sci. 58 (1935) 118; Bull. Jard. Bot. Buitenzorg III, 16 (1938) 34, under *S. parasitica* or *S. fusca.* The description is amended as follows: Indumentum usually short, very rarely with longer dendritic hairs visible above the main layer, sparse to dense, usually rapidly becoming sparse on the leaves, very variable in colour from cream to dark reddish brown but predominantly of darker hues. *Leaf lamina* 3–7(–9) cm long, 1.5–3.5(–4.5) cm wide, usually thin. *Corolla* in the mature bud 8–16(–20) mm long, slender, usually weakly clavate, rarely angular, acute.

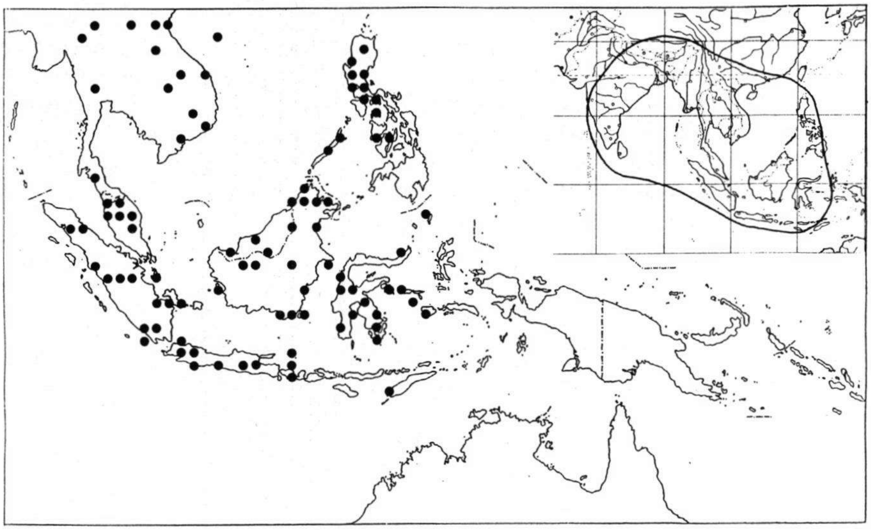

Fig. 8. Distribution of *Scurrula parasitica* L. in Malesia. Symbols show recorded occurrence in 1° grid cells.

Very common and widely distributed over almost the entire range of the genus, from the southeast Asian mainland (India, Ceylon, China, Hong Kong, Thailand, Cambodia, Laos, Vietnam, Malaya) to Sumatra, Java and the Kangean Archipelago, Borneo, the Philippines (widely from Palawan and Luzon to Mindanao), Celebes, the Lesser Sunda Islands (Bali, Timor), and the Moluccas, mostly at elevations from sea level to 1800 m, but recorded up to 2250 m (fig. 8; 190 collections seen). Although there are many collections, habitat details and hosts are poorly known. Host specificity is very low, and the recorded hosts (*Annona, Dalbergia, Dendrophthoe, Glochidion* [twice], *Manglietia, Melastoma, Moringa, Nerium, Schima, Xylocarpus*) may be of little significance. The species can be identified by its combination of indumentum short, leaves thin and small (mostly less than 7 cm long), and the corolla usually short (mostly 8–16 mm), slender, weakly clavate, and acute at the apex. Corolla colour is obscured externally by the indumentum, but the internal colour has been variously noted as greenish, pink, or coral.

In his revision of Malesian Loranthaceae, Danser (1931) did not record the presence of *S. parasitica*, but accepted *S. fusca* as a widespread species. Nevertheless, he noted the agreement of the type of *S. parasitica* with *S. fusca*, and in all subsequent publications treated the two as conspecific. Danser also noted the difficulty of delimiting paler forms of the species from *S. atropurpurea*.

Scurrula parasitica is sympatric with almost every other species of the genus, and has a complex geographic pattern of variability, probably generated in major part by introgression with other species. The greatest difficulty in delimiting the species centres on Borneo, where dark red brown indumentum, sometimes with a layer of longer dendritic hairs, indicates intergradation with *S. ferruginea*. Conversely, some Bornean specimens referred to *S. ferruginea* in the present study have slender acute flower buds probably derived through gene flow from *S. parasitica*. Specimens with longer corollas and paler indumentum probably reflect introgression from *S. atropurpurea*, especially in the Philippines. Some of the variability in the highlands of Java, involving *S.* × *montana*, *S. oortiana* and *S. lepidota*, is probably also attributable to gene flow from *S. parasitica*. See notes under the latter species.

2. TAXILLUS

Taxillus Tieghem, Bull. Soc. Bot. France 42 (1895) 243. — Syntypes: *Taxillus tomentosus* (Roth) Tieghem, *T. recurvus* (DC.) Tieghem, *T. bracteatus* (Wall. 1824, non Rich. 1792) Tieghem.

For descriptions and synonymy see Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 444; Philipp. J. Sci. 58 (1935) 125.

A genus of perhaps 30 species distributed in mainland Asia from Pakistan and India to Indochina and southern China, and reaching its eastern and southern limits in Japan, Taiwan, the Philippines and Borneo. The species usually have low host specificity. For notes on the difficulty in defining the morphological limits of *Scurrula* and *Taxillus*, see under *Scurrula* above. For notes on the general affinities of the genus, see under *Scurrula* above and Barlow (1983).

Although relatively diverse in southern mainland Asia, *Taxillus* is represented in Malesia by a single species only. The ancestor of *Taxillus* presumably reached Asia from Gondwana with the Indian block, and the genus has subsequently extended its range eastwards in southern Asia. However, it has occupied only a limited territory on continental islands from Borneo to Taiwan. The distribution pattern in Malesia is therefore very different from that of *Scurrula*, and together with the lack of local speciation, indicates that the arrival of *Taxillus* in Malesia is even more recent than that of *Scurrula*. It is suggested that the distribution and homogeneity of *Taxillus* is consistent with dispersal to the islands near the Asian mainland at times of minimum sea level in the last 100,000 years. Bird dispersal across the smaller sea gaps is not unrealistic, and establishment in new sites is facilitated by the very low host specificity.

1. Taxillus chinensis (DC.) Danser

Loranthus chinensis DC., Mém. Loranth. (1830) 28. — *Taxillus chinensis* (DC.) Danser, Bull. Jard. Bot. Buitenzorg III, 16 (1938) 40. — Type: G (not seen).

Loranthus sakoembangensis Korthals, Verh. Bat. Genootsch. 17 (1839) 285. — Type: Borneo, Mt Sakoembang, on *Leptospermum*, *Korthals s.n.* (holo L 908,127-1318; iso L 908,127-1305, -1308, -1315, -1328, -1338, P).

Loranthus estipitatus Stapf, Trans. Linn. Soc. Bot. 4 (1894) 221. — *Taxillus estipitatus* (Stapf) Danser, Bull. Jard. Bot. Buitenzorg III, 10 (1929) 355. — Type: Borneo, Mt Kinabalu, Tampassuk R., 750 m, *Haviland 1351* (K, not seen).

For descriptions and further synonymy see Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 445; Philipp. J. Sci. 58 (1935) 125; Bull. Jard. Bot. Buitenzorg III, 16 (1938) 40, under *T. estipitatus* or *T. chinensis*. The description is amended as

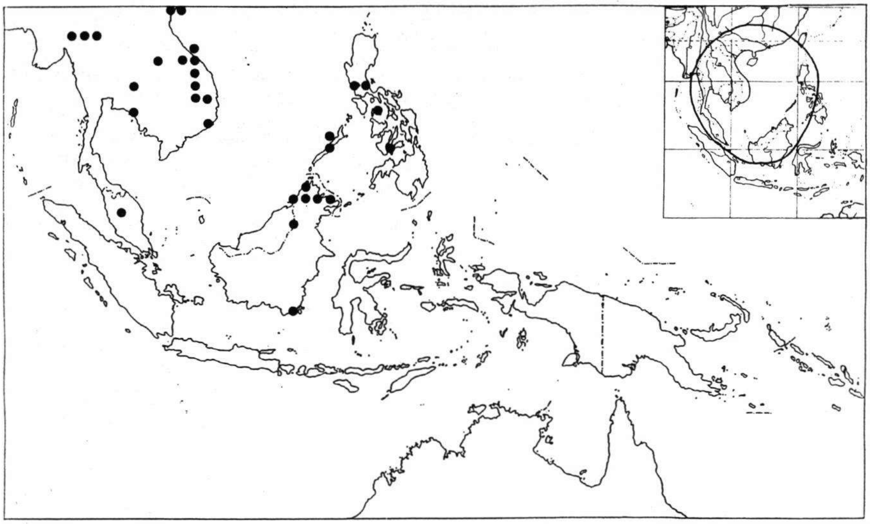

Fig. 9. Distribution of *Taxillus chinensis* (DC.) Danser in Malesia. Symbols show recorded occurrence in 1° grid cells.

follows: *Inflorescence* peduncle (0.5–)1–6 mm long. *Corolla* in the mature bud (14–) 22–32 mm long. *Fruit* narrowly ellipsoid to obovoid, crowned by a collar 1 mm long.

Common over a large area, from the southeast Asian mainland (China, Hong Kong, Thailand, Cambodia, Laos, Vietnam, Malaya) to Borneo, the Philippines (Palawan, Luzon, Negros, Sibuyan), and very doubtfully Java, mostly at elevations from 600 to 1650 m, less common at lower elevations down to 30 m and rarely at higher elevations to 2700 m (fig. 9; 60 collections seen). Habitat details and hosts are poorly known; host specificity is probably low, and the recorded hosts (*Acacia, Casuarina, Ficus, Litsea, Melastoma, Scleropyrum*) may be of little significance. The species can be generally distinguished from all other loranths of the region by its combination of inflorescence (2-flowered umbel), corolla (4-merous, gamopetalous, zygomorphic), and fruit (ellipsoid, not attenuate at the base) characters. Corolla colour is slightly obscured externally by the indumentum, but has been variously noted as generally greenish, often tinged yellow to red or brown. Fruit colour is generally green, rarely creamy green. In his revisions of Malesian and Philippine Loranthaceae, Danser (1931, 1935) treated this species as *T. estipitatus*. In his study of the Indochinese Loranthaceae, Danser (1938) showed that the earlier name *Loranthus chinensis* had been generally misapplied to a species of *Scurrula*, and that the type of this species was conspecific with *T. estipitatus*.

Danser (1931) treated *L. sakoembangensis* as insufficiently known and as a likely undescribed species of *Amyema*. The type gathering in L comprises numerous small specimens on 6 sheets, and is totally lacking flowers or fruits apart from what might possibly be a flower bud on the specimen annotated as holotype. Nevertheless, the material agrees entirely in its vegetative characters with *T. chinensis*, and *L. sakoembangensis* can be treated as conspecific with this species with confidence. The specimen annotated as holotype bears an apparently original collector's label with locality and host recorded consistently with the protologue.

The inflorescence, whilst apparently a simple umbel, is clearly a reduced simple raceme, and a close relationship of *Taxillus* with *Scurrula* is strongly indicated (see discussion under *Scurrula* above). The flower buds in very young inflorescences can often be seen to be unequal in size and insertion, and an age sequence can also be seen in those occasional inflorescences which have more than two flowers.

ACKNOWLEDGMENTS

Much of the work for this conspectus was undertaken whilst the author was Van Der Klaauw Visiting Professor at the Rijksherbarium, University of Leiden. The Director and Staff are thanked sincerely for their support and advice. The Directors of the following Herbaria are thanked for specimen loans: CANB; P.

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INDEX TO SPECIES NAMES

The list below includes only names mentioned in this conspectus. It should be used in conjunction with the comprehensive indexes in Danser (1929, 1931, 1935, 1938). The numbers mentioned here refer to page numbers. New species are printed in **bold**, synonyms are given in *italics*.