

Nomenclatural notes, new taxa and the systematic arrangement in the genus *Scaevola* (Goodeniaceae) including synonyms

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Abstract

Carolin, Roger (John Ray Herbarium, University of Sydney, Australia 2006) 1990. Nomenclatural notes, new taxa and the systematic arrangement in the genus *Scaevola* (Goodeniaceae) including synonyms. *Telopea* 3(4):477–515. A cladistic analysis of the species of *Scaevola* has resulted in a rearrangement of the subgeneric taxa defined by Bentham (1868) and Krause (1912). Some of the previously recognised subgeneric divisions are shown to be unnatural and some are discarded. Sect. *Crossotoma* is united with sect. *Scaevola* (sect. *Sarcocarpa*); sect. *Xerocarpa* is redefined to include sect. *Pogonanthera* which is reduced to a subsection and from which a new subsection is separated, subsect. *Parvifoliae*. *Nigromnia* is reduced to a synonym of *Scaevola*. Fourteen new taxa are described: *S. acacioides*, *S. browniana*, *S. browniana* subsp. *grandior*, *S. chrysopogon*, *S. densifolia*, *S. eneabba*, *S. glutinosa*, *S. parvifolia* subsp. *acuminata*, *S. parvifolia* subsp. *pilbarae*, *S. pulchella*, *S. revoluta* var. *viscida*, *S. spicigera*, *S. tenuifolia*, *S. virgata*; three new combinations are made: *S. revoluta* subsp. *stenostachya*, *S. globosa* and *S. linearis* subsp. *confertifolia*.

Introduction

A previous contribution in this series of precursors to the Goodeniaceae treatment in the Flora of Australia has dealt with the classification and nomenclatural problems in the genus *Dampiera* (Rajput & Carolin 1988). A similar treatment of the genus *Scaevola* is now provided.

Scaevola is the only genus of Goodeniaceae which has a significant number of species endemic outside the continent of Australia. Most species are endemic to Australia but two are widespread tropical strand species and occur in the Indopacific area (*S. frutescens*) and in the Atlantic and south-west Indian Oceans (*S. plumieri*). In addition a number of species occur throughout the Pacific Islands, often in montane situations, particularly in New Caledonia and the Hawaiian group, one species is restricted to Socotra Island in the Indian Ocean and another to Hainan Island in China.

This contribution is divided into two sections. The phylogeny and systematic results are considered first since the characters used to distinguish between species in the descriptions are discussed in detail in relation to the cladistic analysis. The second section contains the descriptions of new taxa, nomenclatural notes and typifications.

Bentham (1868) and Krause (1912) provided subgeneric classifications closely resembling each other. Reassessments of these are now needed.

As in the previous contribution, a phylogenetic classification is attempted using cladistic techniques.

Phylogeny and classification

It is necessary first to consider the circumscription of the genus *Scaevola*. Carolin (1959) suggested that *S. helmsii*, *S. stenophylla*, and *S. fasciculata* should be excluded from *Scaevola*. There are clear characters which indicate a close relationship between these species and *Goodenia* sect. *Monochila*. These are: (i) the fusion of the sepals only by their midline to the ovary and, moreover, not to the top; (ii) the compressed seeds; (iii) the white corolla with purplish spots at the base of the lobes; (iv) the long stiff hairs in the throat of the corolla (similar, in fact, to those of *Cooperhooikia*) which are not inserted on barbulae or lacinations of the wing; and (v) the stiff patent hairs on the style. For these reasons these three species are excluded from this analysis. Previously they have been included in *Scaevola* because of their indehiscent fruits. This single character definition is clearly not satisfactory. When I described the genus *Nigromnia* (Carolin 1974), I suggested that it was closely related to some *Scaevola* species. I have included it in this analysis to test its distinctness.

The terminal taxa used in this analysis are listed in Appendix 1, together with their constituents. When these terminal taxa contain more than one species the constituent species do not differ in any of the characters used in the analysis.

The characters used in the analysis are listed and discussed below. Multistate coding is used where the transformation series is considered to be linear. When it is considered to be branched, additive coding is used.

The polarity of the character states is determined largely by outgroup comparison. Carolin (1977) has provided a higher order cladogram which indicates the outgroups to be *Nigromnia*, *Diaspasis* and *Cooperhooikia*. *Nigromnia* is probably a derivative of one of the groups within *Scaevola* (see below) and is therefore not an outgroup for the whole genus. *Diaspasis* has many specialized features which make it necessary to refer to *Cooperhooikia* to obtain the most parsimonious interpretations of polarities. In some cases it is necessary to refer to the outgroups of the clade containing *Cooperhooikia* to determine the most parsimonious polarisation. Where the outgroups are unequivocal in determining polarities no further comment is provided. The asterisk (*) indicates the primitive condition. The numbering of the characters is that given in the figures and a summary of the characters is given in Appendix 2.

1. Shrubs (and climbers): 0; undershrubs: 1*; multicaulate from a stock: 2.

2. Young parts not viscid: 0*; young parts viscid: 1.

When the young parts are viscid the older parts are often covered with a varnish which eventually cracks and fragments. The varnish is secreted by glandular hairs which are either peltate or pseudostellate (see below), although some species which have glandular hairs with globular heads are viscid without producing a varnish (e.g. *S. glutinosa*). The outgroups appear to be equivocal with regard to this character. *Diaspasis* is not viscid whereas one species of *Cooperhooikia*, *C. polygalacea*, is. However, this is only one species and, since the outgroup of the clade containing *Cooperhooikia* and *Scaevola* has no viscid species, the most parsimonious interpretation is that the lack of this character is primitive.

3. Stems not ribbed: 0*; stems ribbed: 1.

4. Cauline leaves normally developed: 0*; cauline leaves mostly reduced to triangular 'scales' less than 5 mm long: 1.

5. Leaves not stem-clasping at the base: 0*; leaves stem-clasping at the base: 1.

Some species have clearly petiolate leaves, e.g. *S. crassifolia*, and others are just as clearly sessile, e.g. *S. linearis*. However, the gradations between these extremes are so gradual over the genus that it is impossible to draw a rational boundary between the two states. I have therefore not used this feature in this analysis. There is, however, a clear difference between stem-clasping and not stem-clasping.

6. Simple hairs present: 0*; simple hairs absent: 1.

These hairs generally differ from those found elsewhere in the family since they are papillate (Carolin 1970).

7 and 8. Glandular hairs absent: 00; glandular hairs with globular heads: 01*; glandular hairs peltate: 02; glandular hairs pseudostellate: 11. (See Fig. 1).

Carolin (1977) has suggested a transformation series for these hair types. It is suggested that the globular head type has given rise to the peltate type by shortening of the stalk and broadening of the head into a shield shape. The pseudostellate type, now seen to be much more widespread in the genus than previously reported (Carolin 1970), also developed from the globular head type by an extension of each of the cells in the head. Sometimes the stalk of the pseudostellate type is also reduced. All these hair types are known to secrete substances in some species although in others they may be inactive in this respect (Carolin, pers. obs.). The viscid nature of the plant is probably a

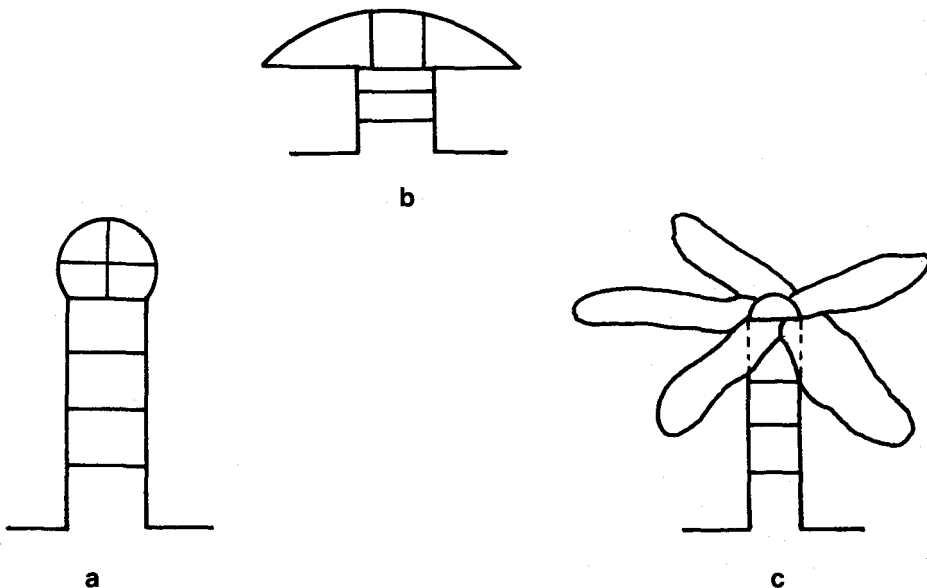


Fig. 1. Types of glandular hair (coding for characters 7 and 8 given in parentheses). [glandular hairs absent (00)]; a glandular hairs with globular heads (01); b glandular hairs peltate (02); c glandular hairs pseudostellate (11).

function of the amount secreted and possibly of the type of secretion. The pseudostellate glandular hairs of some species, e.g. *S. spinescens* and *S. coriacea*, do not appear to secrete at all and remain simply as a scurfy indumentum.

9. Compound thyrse: 0; thyrse reducing to a raceme or spike above: 1*; raceme or spike: 2.

10. Inflorescence mostly terminal: 0*; inflorescence mostly axillary: 1.

In those species with mostly lateral inflorescences the main stem produces a large number of more or less condensed inflorescences in the leaf axils. The terminal bud may or may not eventually produce one itself.

11. Bracts all more or less the same size as leaves: 0; bracts reducing in size towards the apex: 1*; bracts mostly reduced: 2.

This is a difficult character to score but it appears to be so useful in defining groups that it is included despite the need to make some relatively arbitrary decisions.

12. Bracts without marginal bristles: 0*; bracts with marginal bristles: 1.

13. Bracteoles similar to leaves but smaller: 0*; bracteoles much smaller than leaves, \pm lanceolate: 1; bracteoles minute: 2.

14. Flowers pedunculate: 0*; peduncles obsolete: 1.

The pedicel is the flower stalk above the bracteoles, the peduncle is the stalk below the bracteoles. See character 29 below.

15. Sepals >1.5 mm long: 0*; sepals \leq to 1.5 mm long: 1.

16. Sepals free: 0*; sepals connate with distinct lobes: 1; sepals connate into an undulate rim: 2.

17. Corolla not bearded inside: 0*; corolla bearded inside: 1.

The beard of the corolla refers to dense long hairs in the throat as opposed to a thin scattering of hairs or their absence. Generally there is a clear discontinuity between the two states. (Striations on the wings of the corolla lobes are an autapomorphy for the terminal taxon STR1.)

18. Barbulae broad (mostly 0.2 mm wide or more), flat: 0*; barbulae narrow (less than 0.2 mm wide), \pm terete: 1. (See Fig. 2.)

The barbulae occur on the margins of the corolla wings towards the base of the lobes and/or as outgrowths in the throat. They would appear to be analogues, but possibly not homologues, of the 'calli' in *Dampiera* (Rajput & Carolin 1988) and the 'enations' of *Goodenia* (Carolin, unpub). In *Cooperhookia* and *Goodenia* sect. *Monochila*, there are long stiff hairs in these positions. In some species of *Scaevola*, e.g. *S. sericea*, these long stiff hairs occur at the ends of the lacinations of the corolla wings and on the ends of broad outgrowths from the throat which have the same texture as the wings. Thus it is the terminal hairs of the barbulae of *Scaevola* which are homologous with the stiff hairs inside the corolla of *Cooperhookia* and *Goodenia* sect. *Monochila*. The body of the barbula, in *Scaevola*, is an extension of the margin of the wing. In many species the stiff terminal hairs of the barbulae are reduced to papillae, e.g. *S. linearis*,

whilst in others they may be obsolete, e.g. *S. sericophylla*.

19. Stiff hairs in place of barbulae: 0*; barbulae aculeate with stiff hairs: 1; barbulae papillate at top: 2; barbulae simple: 3; barbulae absent: 4. (See Fig. 2.)

The laciniations on the margins of most species of sect. *Scaevola* are considered to be homologous with the narrower barbulae of most other species and are here referred to as 'barbulae'.

20. Apex of anther glabrous: 0*; apex of anther hairy: 1.

21. Hairs present on lips of indusium: 0*; hairs absent from lips of indusium: 1.

22, 23 and 24. Indusium with hairs scattered over the upper surface: 000*; indusium with a few basal hairs on the upper surface: 010; indusium glabrous on the upper surface: 020; indusium with a stiff erect beard at the base on the upper surface, equalling or exceeding the lips: 100; indusium with a short flat beard at the base on the upper surface: 200; indusium with short flat dense beard on the upper surface: 101. (See Fig. 3.)

25. Mesocarp dry: 0*; mesocarp fleshy: 1.

26. Fruit with four fertile locules: 0*; fruit with two fertile and two sterile locules: 1; fruit with two fertile locules only: 2; fruit with only one fertile locule: 3.

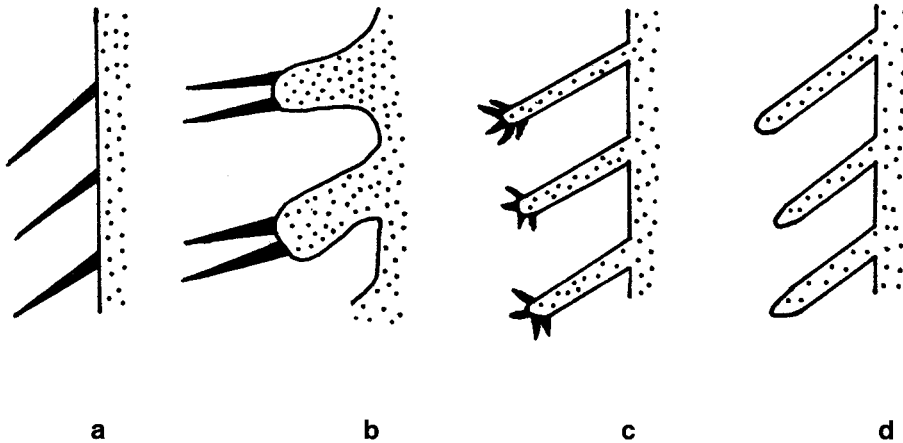


Fig. 2. Barbulae type and position on the margins of the wings or their extensions which are decurrent in the throat of the corolla (coding for characters 18 and 19 given in parentheses). **a** No barbulae, hairs on \pm straight margin (00); **b** Barbulae broad (laciniations), aculeate with long stiff hairs (01); **c** Barbulae narrow, papillate (the hairs reduced to papillae) (12); **d** Barbulae narrow, simple (13). The stippled area represents the multicellular petal tissue; the unicellular hairs are shown in black.

Carolin (1966) has described the characteristics of the fruit of the genus. Despite the outgroups only having two (or one) locules in the fruit, the floral anatomy (see also Carolin 1959) indicates that the primitive condition is four-carpellary and, therefore, in all probability four-locular. This is accepted as a basis for the analysis.

27. Endocarp smooth: 0*; endocarp rugose: 1.

28. Fruit glabrous: 0*; fruit hairy: 1.

The indumentum condition of the fruit is not necessarily the same as the rest of the plant and is treated as a separate character.

29. Flower pedicillate: 0*; Flower sessile in bracteoles: 1.

See character 14 above. This character was only used in the analysis of group B and therefore was not recorded for species included in the cladograms of group A.

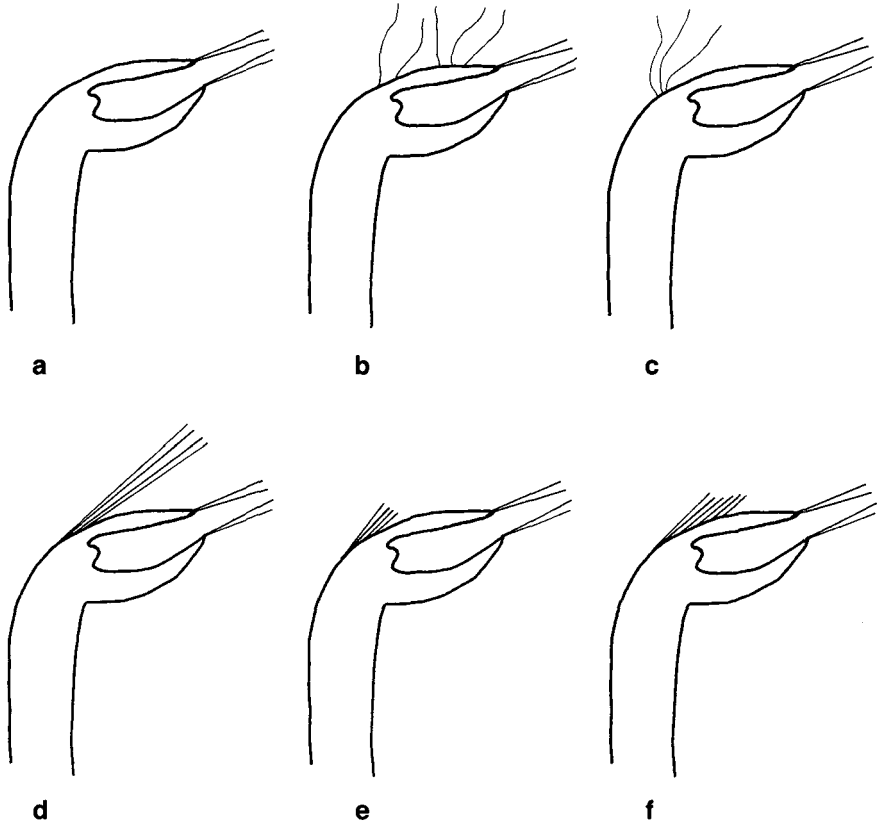


Fig. 3. Arrangement of the hairs on the upper surface of the indusium (coding of characters 22, 23, 24 given in parentheses). **a** Indusium glabrous (020); **b** Indusium with hairs scattered over the surface (000); **c** Indusium with a few basal hairs (010); **d** Indusium with a beard of long stiff hairs at the base mostly equalling or exceeding the lips (100); **e** Indusium with a short flat beard at the base (200); **f** Indusium with a short flat dense beard at the base (101).

The cladograms

The preliminary cladograms were generated by Swofford's PAUP package using global branch swapping and the MULPARS option (Swofford 1986) and an outgroup as defined by the primitive states of the characters (see above). One hundred trees with overall parsimony, and a strict consensus tree, were generated by the algorithm although many of these were in principal the same (see Swofford 1986). The strict consensus tree was then used as input to MACLADE (Maddison and Maddison 1987) and manipulated to test the effect of moving specific clades.

When there is a great deal of homoplasy in a cladogram, there are almost always a number of alternative most parsimonious trees. The consensus tree is, then, usually much longer than those from which it is derived. Nevertheless, each of these latter is a possible phylogeny; that there are several most parsimonious trees indicates that the raw information will not resolve the phylogeny. There seems little point in showing any of these trees as we did for *Dampiera* (Rajput and Carolin 1988), since none of them are more preferred than the others. There may be ways of resolving such situations by weighting the less homoplasious characters but this is time-consuming without the necessary computer programs and it still may not produce a resolution. Moreover, giving an arbitrary weighting to a character at the start of an analysis, applies this weighting throughout the group under consideration. When one is dealing with a large group this may not be appropriate, since a character may be more variable on one clade than on another. Gauld and Underwood (1986) have addressed this problem to some extent but their technique is not incorporated into the more generally available packages. By scanning the series of most parsimonious trees, it is possible to select clades which are 'robust', i.e., occur in a large number of such trees. However, since most parsimonious solutions are N-complete, it may not be possible to assign probabilities to any particular clade and therefore one has no satisfactory measure of confidence except intuition. Even considering only the trees generated in this run, there are no resolutions of the polychotomies of the consensus tree which one could accept as being significantly more frequent. The most appropriate way of dealing with this problem available at present seems to be by using MACLADE which enables clades to be manipulated individually to achieve a resolution based upon what one believes to be 'robust' characters.

The preliminary analysis was completed using all terminal taxa. Since there was a clear division into two main groups, however, the results are reported in two separate parts.

Three cladograms are figured. The first (Fig. 4) is the consensus cladogram generated by PAUP for all sections other than sect. *Scaevola*.

The second (Fig. 5) is the consensus cladogram for sect. *Scaevola* in which an extra character, number 29, has been included.

The third (Fig. 6) is the preferred cladogram established by manipulation with MACLADE. In this I have given weight to the type of beard on the back of the indusium. Those species on the sub-sect. *Xerocarpa* clade which have a long beard I have grouped together on the same clade and those with the beard reduced to short appressed bristles I have grouped on another clade, reducing the tree length by 4 character state changes. No such manipulation was considered necessary in sect. *Scaevola*.

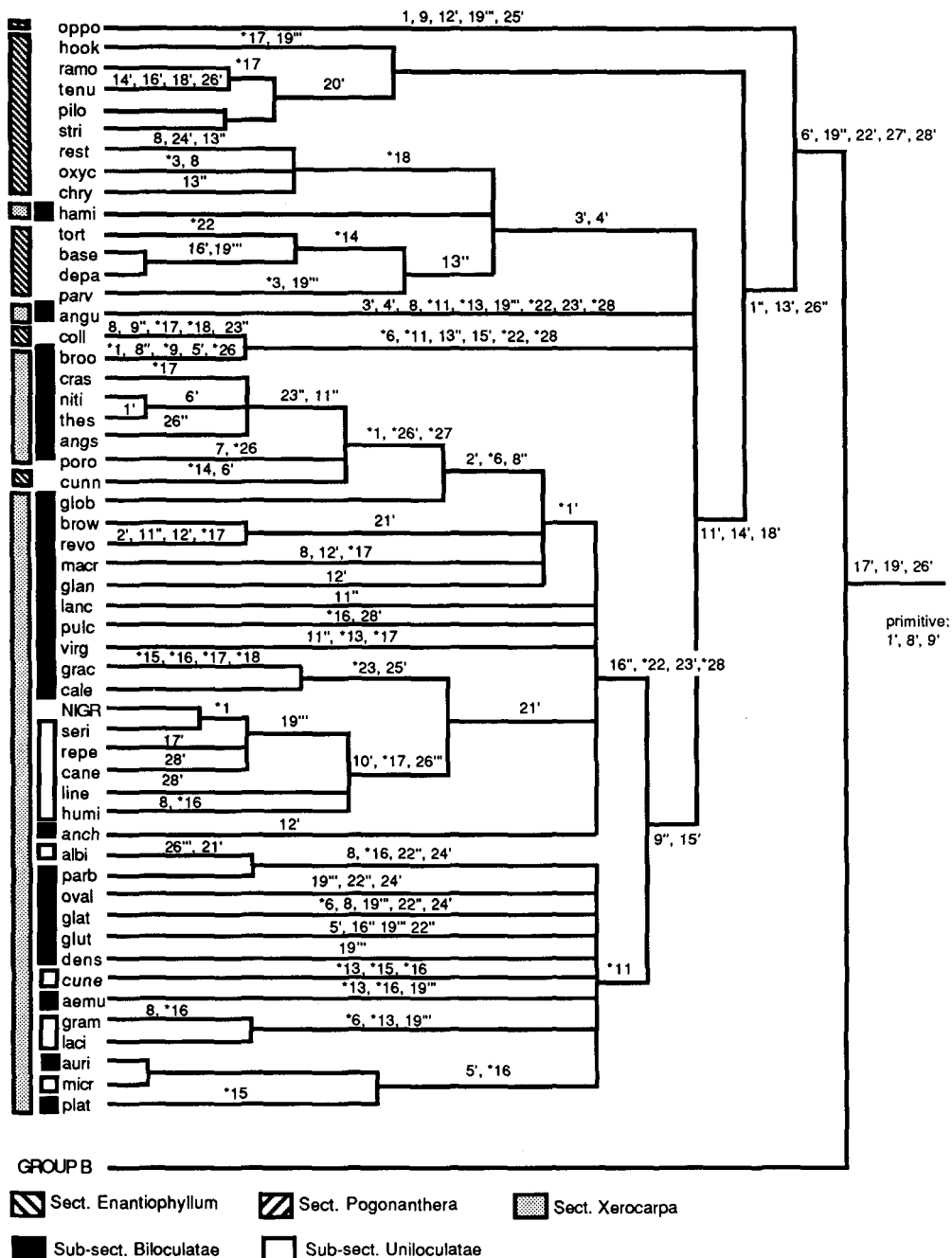


Fig. 4. The consensus cladogram for Group A. The key to the abbreviations of the names of the terminal taxa is provided in Appendix 1. The key to the character codes is provided in Appendix 2. The attachment of Group B (sect. *Sarcocarpa*, Fig. 5) is shown. A number without a prime represents a change of a binary character from state '0' to state '1'; a primed number indicates a change of a multistate character to the state indicated by the number of primes; an asterisked number represents a reversal of a character to the state indicated by the prime.

I have also indicated a possibly paraphyletic group of species which it may be useful to examine in the future. The frequently purple beard on the back of the indusium is possibly an advanced feature which unites them, although it is not consistent in some of the species. In addition *S. oxyclona* has the same purple beard.

Discussion

The first point to draw attention to is that three changes occur at the root of the cladogram, which may well indicate that the arguments used to polarize these character states are giving incorrect solutions.

The primitive character state of the barbulae (character 19) is, as mentioned above, not present in *Scaevola* and that has to change. The bearded throat of the corolla also appears to be primitive. The cladogram also suggests that a fruit with two sterile locules is primitive.

S. porocarya is the only member of the family which has four fertile locules. I have suggested (Carolin 1966) that this corroborates my interpretation of the 4-carpellary nature of the ovary of Goodeniaceae and is thus the primitive condition. The cladogram indicates that *S. porocarya* is not a primitive species and, indeed, that the state of four fertile locules is derived from the state of two fertile locules. Elsewhere (Carolin 1987) I have argued that large scale morphological reversions like this are unlikely to occur. It is difficult to do that here in view of the number of other advanced characters of the species in question. Moreover, if this reversion is disallowed the cladogram would show seven

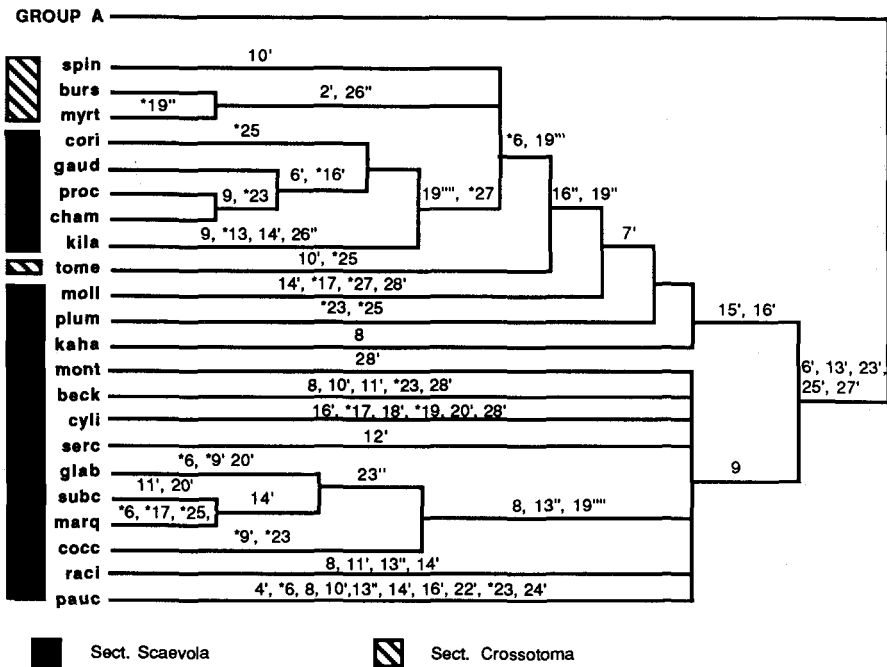
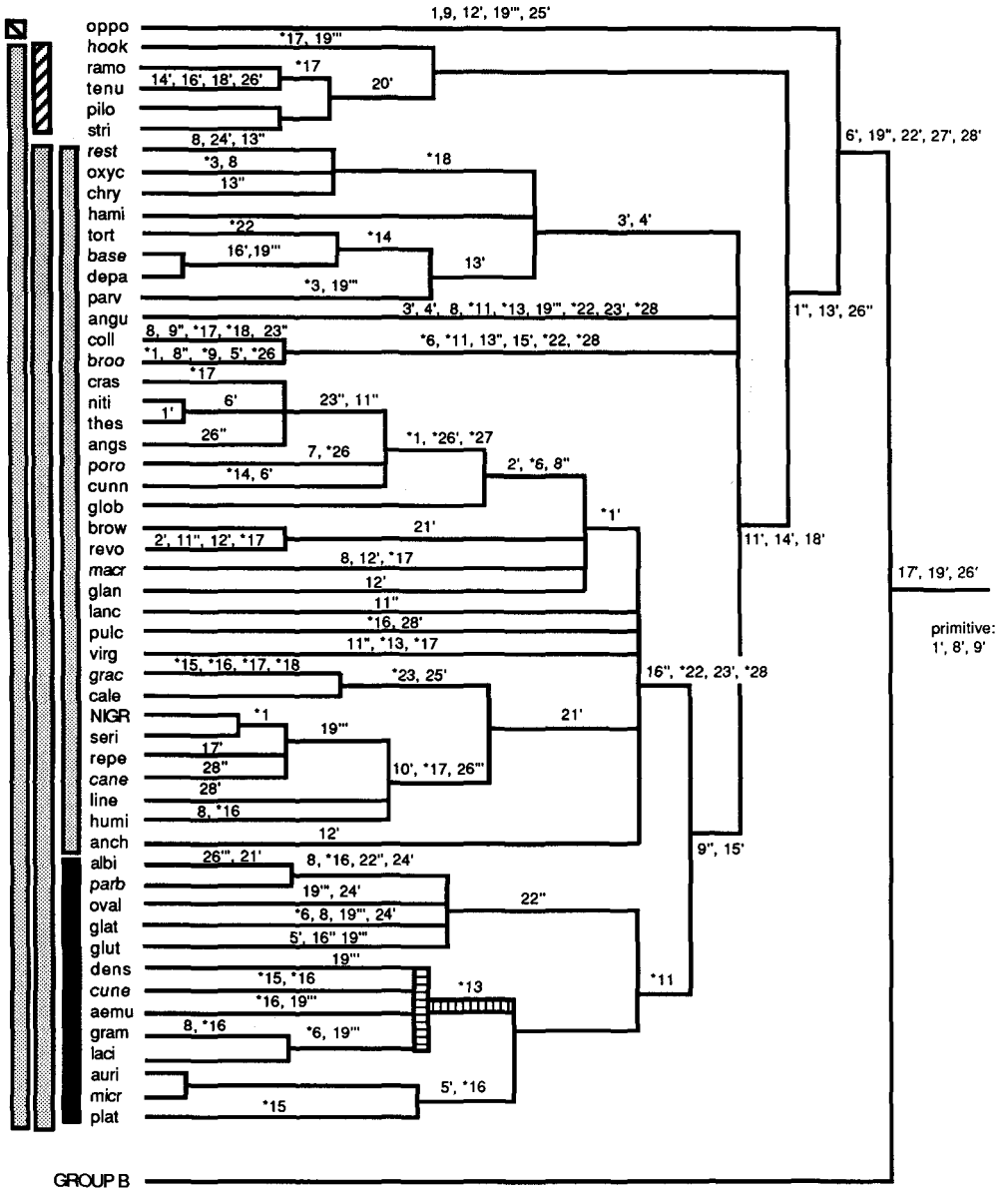


Fig. 5. Consensus cladogram of Group B. See Fig. 4 for explanation. Group A attachment is indicated. The whole of this group is referred to sect. *Scaevola* (*Sarcocarpa*) in this contribution.



Sect. Enantiophyllum
 Sub-sect. Pogonanthera
 Sect., Sub-sect. Series Xerocarpa
 Sub-sect. Pogogyneae

Fig. 6. Preferred cladogram of Group A. See Fig. 4 for explanation. The clade including DENS, CUNE, AEM and GRAM-LACI represents a possibly paraphyletic group discussed in the text.

independent origins of the 2-locular condition. The problem of such apparently complex reversions needs addressing carefully but, despite this result, I am not convinced that overall parsimony is necessarily the answer.

The primitive state of characters number 1, 8 and 9 is set to '1'.

Also of interest is the change of state in the hairs on the back of the indusium at the base of Group A (sects. *Xerocarpa* and *Enantiophyllum*) to a long stiff beard (character 22). This suggests that the state 'Indusium with a few basal hairs' (character 23), which characterizes a number of clades above the first branching, is a reduction transformation of the long stiff beard and not of scattered hairs as the additive coding of character 22 and 23 implies. Changing the coding to allow for this new interpretation does not result in significant changes to the cladogram which is generated.

Some comment about *Nigromnia* is necessary at this stage. All the characters which I discussed when erecting *Nigromnia* are clearly autapomorphies for it; one of them, the dense axillary clustering of the flowers, is simply an extreme case of axillary spikes with numerous flowers. Although the general appearance of *N. globosa* is considerably different from other members of this group, there is little doubt about its position amongst those species with axillary spikes. However, I do not consider that the differences are great enough to warrant maintaining it as a separate genus and thus making *Scaevola* paraphyletic.

An examination of the clades in the preferred cladogram shows that mostly they are reasonably well founded. The position of the clade constituting *S. collaris* and *S. brookeana* is probably open to question since it is quite widely dispersed in the preliminary most parsimonious cladograms. *S. angulata* is also quite widely dispersed by the preliminary cladograms; it occurs in several positions in subsect. *Xerocarpa* and in several positions in subsect. *Parvifoliae*. Its position therefore remains doubtful. On the other hand there are some fairly well established clades within sect. *Xerocarpa*, e.g., the one rooted below *S. globulifera* with peltate hairs secreting varnish and few simple hairs (or none). *S. gracilis* and *S. calendulacea* (together with *S. porrecta*) also represent a well defined clade. All these species have fleshy fruits, like those of sect. *Scaevola*, and are strand plants or plants of coastal sand-dunes, probably dispersed to the outlying parts of the distribution of the clade by sea birds which presumably eat the mesocarp. The clade rooted below *S. humifusa*, characterized by the synapomorphy of lateral inflorescences, is also well defined.

Taxonomy

The sections as defined by Bentham (1868) and Krause (1912) do not appear to be natural groupings. They are discussed below in relation to the cladograms. The systematic arrangement suggested by the present study is presented at the end of this discussion.

Sect. *Sarcocarpa*

Bentham (1868) included only one species in this section for Australia. Bentham and Hooker (1876) and Krause (1912), dealing with the genus on a world-wide basis, each describe the section in much the same way. It is, in fact, better represented outside Australia than in it. The cladogram indicates that at least part of the section is related to sect. *Crossotoma* as circumscribed by Bentham (1868) and Krause (1912) with subsequent additions. This is primarily due to the peculiar psuedostellate hairs (see above) and the fleshy fruit. The

cladogram clearly indicates that some of the Hawaiian species are more closely allied to sect. *Crossotoma* than any of these are to some other Hawaiian species or to any of the New Caledonian species — a rather unexpected result. It also indicates that *S. coccinea*, from New Caledonia, is more closely related to *S. glabra*, from Hawaii, and to the Marquesan species, *S. capitata* and *S. marquesensis*, than it is to the other New Caledonian species. The first, two in particular, show a close relationship in the unique combination of a long pedicel with an obsolete peduncle (see characters 14 and 29), resulting in the bracteoles being inserted in the axils. This may possibly be due to convergence as a result of the specialized bird pollination of all these species. Although there remain a number of unresolved polychotomies in the Oceanic species, the cladogram suggests at least three colonizations of the Hawaiian Islands: *S. sericea*, the *S. gaudichaudiana* group and *S. glabra* as suggested by Patterson (1987). The cladogram indicates that sect. *Crossotoma* should be included with sect. *Sarcocarpa* (sect. *Scaevola*).

Sect. *Phacelophyllum*

Unfortunately, I could not obtain satisfactory material of the single species, *S. hainanensis*, of this section early enough to include in the analysis. Towards the end of the investigation, however, I was lent some material with a few flowers and it seems that it is closest to *S. plumieri*. It has aculeate barbulae and sepals connate into a sinuate tube. The flowers, although mostly solitary, have buds in the axils of the bracteoles indicating that they may on occasion develop into cymes. Even the peculiar swollen leaf base, which is characteristic of this species, appears almost as a development of the slightly swollen base in *S. plumieri*. It shows a superficial resemblance to *S. calendulacea* but it has large leaf-like bracts, unlike the reduced ones of *S. calendulacea*, and aculeate barbulae unlike the papillate ones of *S. calendulacea*. It has not been possible to determine the fruit type. I am here reducing this section to a synonym of sect. *Scaevola*.

Sect. *Pogonanthera*

Bentham (1868) and Krause (1912) circumscribe this section in exactly the same way. There is no one feature which satisfactorily differentiates this section from sect. *Xerocarpa* as circumscribed by them. Their emphasis appears to be on the presence of a peduncle in the former, although this does not occur in all the species included. The cladogram indicates that *S. cunninghamii* and *S. collaris* do not belong to the same clade as the rest of this section as defined by Bentham and Krause. Although I do not consider the systematic position of *S. collaris* established clearly, it does seem to belong with sect. *Xerocarpa*. *S. cunninghamii* clearly belongs to sect. *Xerocarpa*. The composition of the rest of the section is equivocal according to the preferred cladogram. There is no clear advanced character uniting the *S. ramosissima* group with the *S. parvifolia* group, whereas there are clear synapomorphies separating them. Moreover *S. hamiltonii*, which Krause includes in sect. *Xerocarpa*, falls here into the *S. parvifolia* group. It is probably better to recognize three sub-sections here since these clades have little in common. *S. angulata* remains an unresolved clade which prevents a completely confident separation of sub-sect. *Parvifoliae* and *Xerocarpa*.

Sect. *Xerocarpa*

This represents a fairly well founded clade, although it is necessary to exclude some of the species previously included in it and to enlarge its circumscription.

In particular, series *Parviflorae* of Bentham (1868), with subsequent additions, is referred to *Goodenia* sect. *Monochila* (see above). The other series which Bentham (1868) recognizes within sect. *Xerocarpa* do not appear to be natural groupings. The members of series *Monospermae*, which Krause (1912) raises to subsection *Uniloculatae*, and in which he includes Bentham's series *Parviflorae*, are scattered over several different clades and the series seems to be of little taxonomic significance (Fig. 4). Series *Pogogynae* is not represented by a clade on the preferred cladogram. However, I am suggesting that sub-sect. *Xerocarpa* be divided into two series, neither of them represented by well defined clades, but which may be useful in assessing the variation within the genus. Series *Pogogynae* consists of those species which have a well defined basal beard on the upper surface of the indusium. This beard may be long or short and corresponds more or less with Bentham's (1868) series *Pogogynae*. Series *Xerocarpa* consists of those species with a few basal hairs or with scattered hairs on the upper surface of the indusium. Whether either of these series is actually a clade depends entirely on the interpretation of the transformation of the indusial beard. The evidence presented here does not allow us to resolve this problem. Series *Macrostachyae* and *Globuliferae* appear to be quite polyphyletic and are therefore here reduced to synonyms.

As indicated above, the position of *S. oxyclona* is possibly not secure in sect. *Parvifoliae* since it shows resemblances to the paraphyletic series *Pogogynae*.

Sect. *Enantiophyllum*

van Leenhouts (1957) reduced this to a single species which here stands as a separate clade.

Synopsis of sections, subsections and series of *Scaevola*

Sect. *Scaevola*

Sect. *Sarcocarpa* Don, Gen. Hist. 3: 727 (1834).

ORTHOGRAPHIC VARIANT: *Sarcocarpeae* DC., Prodr. 7: 508 (1839).

LECTOTYPE: *S. plumieri* (L.) Vahl, here chosen.

Sect. *Crossotoma* Don, Gen. Hist. 3: 730 (1834).

LECTOTYPE: *S. spinescens* R. Br., here chosen.

Sect. *Phacelophyllum* K. Krause, Pflanzenr. 54: 118 (1912).

HOLOTYPE: *S. hainensis* Hance.

Mostly tall shrubs, often with large leaves. Vegetative growth usually continuing on the main inflorescence axis after flowering has ceased. Bracts leaf-like. Bracteoles usually small to minute. Barbulae often aculeate. Mesocarp fleshy.

Sect. *Enantiophyllum* Miq., Ann. Mus. Bot. Lugd. Bat. 1: 210 (1864).

HOLOTYPE: *S. amboinensis* Miq.

Scramblers with large opposite leaves. Vegetative growth continuing on main inflorescence axis after flowering has ceased. Bracts leaf-like. Bracteoles minute. Barbulae simple. Mesocarp fleshy.

Sect. *Xerocarpa* Don, Gen. Hist. 3: 728 (1834).

ORTHOGRAPHIC VARIANT: *Xerocarpeae* DC., Prodr. 7: 508 (1839).

LECTOTYPE: *S. crassifolia* Labill., here chosen.

Sect. *Gymnostegia* Benth. in Endl., Enum. Pl.: 68 (1837). (Bentham gives the name thus in the main text but in the footnote describing the section he gives '*Gymnostigma*'. It is, however, the nakedness of the indusium that is emphasised and I am here accepting the first spelling.)

TYPE: *S. thesioides* Benth.

Shrubs or herbs with a stock. Leaves various. Growth of the inflorescence axis terminating after flowering. Bracteoles various. Barbulae papillate, simple or absent. Mesocarp dry, thin.

Subsect. **Xerocarpa**

Subsect. *Biloculatae* K. Krause, Pflanzenr. 54: 145 (1912).

LECTOTYPE: *S. crassifolia* Labill., here chosen.

Subsect. *Uniloculatae* K. Krause, Pflanzenr. 54: 160 (1912).

LECTOTYPE: *S. canescens* Benth., here chosen.

Series Monospermae Benth., Fl. Austral. 4: 86 (1968).

LECTOTYPE: *S. canescens* Benth., here chosen.

Flowers mostly sessile. Leaves well developed. Anthers glabrous at tip.

Series **Xerocarpa**

Series *Globuliferae* Benth., Fl. Austral. 4: 85 (1868).

LECTOTYPE: *S. globulifera* Benth., here chosen.

Series *Macrostachyae* Benth., Fl. Austral. 4: 85 (1868).

LECTOTYPE: *S. macrostachya* Benth., here chosen.

Indusium without a definite basal beard.

Series **Pogogynae** Benth., Fl. Austral. 4: 98 (1868).

LECTOTYPE: *S. aemula* R. Br., here chosen.

Indusium with a basal beard of stiff bristles which may be reduced to short appressed hairs.

Subsect. **Pogonanthera** (*Don*) *Carolin*, **comb. nov.**

BASIONYM: sect. *Pogonanthera* Don, Gen. Hist. 3: 729 (1834).

ORTHOGRAPHIC VARIANT: *Pogonandra* DC., Prodr. 7: 511 (1839).

LECTOTYPE: *S. striata* R. Br., here chosen.

Flowers pedunculate. Anthers with hairs at tip (except *S. hookeri*).

Subsect. **Parvifoliae** *Carolin*, **subsect. nov.**

HOLOTYPE: *S. parvifolia* Benth.

Flores plerumque pedunculati; folia caulina parva.

Flowers usually pedunculate. Cauline leaves usually reduced. Anthers glabrous at tip.

Scaevola sect. **Xerocarpa** series **Parviflorae** Benth., Fl. Austral. 4: 86 (1868).

LECTOTYPE: *S. fasciculata* Benth., here chosen, is referred to the genus *Goodenia*.

Typifications, nomenclatural notes and new taxa

This section is dealt with in the same way as in the contribution on *Dampiera* (Rajput & Carolin 1988). Argument is provided there for the selection of various types in the cases of collections by R. Brown, L. Preiss, and E. Pritzel. The same symbols are used to designate the selection of lectotypes, i.e. when only one collection relates to the protologue this is shown by '*' after the type statement; when lectotypes have to be selected from more than one collection relating to the protologue this is shown by '#'.

When a name is considered to be a synonym of another name, the name which is currently accepted is given after '='.

In all cases, other things being equal, the specimen cited in the protologue which agrees most closely with the protologue description is selected. Where all agree well, the most complete specimen is selected.

When selected specimens are cited, the total number which was examined is indicated in parentheses.

The taxa are arranged in a supposedly phylogenetic sequence.

Taxa here included in *Scaevola*

Temminckia tahitensis Nadeaud, J. Bot. (Desvaux) 1897: 107 (1897) = *S. tahitensis* Carlquist.

LECTOTYPE: TAHITI: A 1200 mètres à la base du Mont Mauru, district de Hitiao à la seconde étape pour aller au Vaipurau, Mr Temarii, 4 Nov. 1896 (P).#

Scaevola spinescens R. Br., Prodr.: 586 (1810).

LECTOTYPE: SOUTH AUSTRALIA: Near the shores of Bay no 3., Anch(orage) 5, and Bay 5, South Coast, R. Brown (BM). ISOLECTOTYPE: K.#

There is only one sheet of Brown's collections of this species at BM and it bears two labels as indicated above. 'Anch(orage) 5' is the same as 'Bay 5', 'Bay 3' is not. It is quite impossible to separate the collections and the whole sheet is accepted as the lectotype. The sheet at K is labelled 'South Coast Bay IV, V, VII, XII, XIV'. In this case also it is impossible to separate the collections.

Scaevola acacioides Carolin, sp. nov.

Frutex ad 1 m altus pilis furfuraceis. Folia anguste oblongo-elliptica 25–50 mm longa crassa glabrescentes. Flores plerumque in dichasiis vel monochasiis dispositi, sessiles inter bracteolas. Corolla alba vel cremea ad 13 mm longa.

HOLOTYPE: WESTERN AUSTRALIA: Bee Gorge, lat: 22° 16' S: 118° 15' E, Wittenoom area, Blockley 21–9, 30 May 1966 (PERTH).

Shrub to 1 m high with scurfy hairs on the younger parts. *Leaves* thick, greyish green, narrow-oblong-elliptic, 25–50 mm long, 2–5 mm wide, tapering gradually towards base, glabrescent, with a few villous axillary hairs, acute, entire. *Flowers* in dichasia or monochasia or solitary in leaf axils, sessile between the bracteoles; peduncle 8–15 mm long; bracteoles deltoid, 1–1.5 mm long. *Sepals* connate into a sinuate rim c. 0.5 mm high. *Corolla* white to cream, 10–13 mm long, with some scurfy stellate-glandular hairs outside, with a dense beard of white hairs on connate part of lobes; barbulae prominent, papillate terminally; connate part of lobes 7–8 mm long; lobes equal, 5–6 mm long, 1.5 mm wide;

wing obsolete or very narrow. *Stamen* filaments filiform, c. 8 mm long; anthers oblong, 2 mm long, obtuse. *Ovary* 2-locular almost to summit, with a few scurfy hairs; style slightly curved, 7 mm long with a few simple hairs towards base; indusium transverse-obovate, 0.5 mm long, 1.5 mm wide, with a few white hairs above and white bristles c. 0.3 mm long on lips. *Fruit* not seen.

RANGE: Pilbara region of Western Australia.

HABITAT: Ironstone soils.

DISCUSSION: The longer leaves and the branched inflorescence distinguish this from other Australian species in sect. *Scaevola*.

SPECIMEN EXAMINED: WESTERN AUSTRALIA: 38 km W of Wittenoom, *K. Newbey 10051* (PERTH).

Named for the superficial similarity of the leaves to the phyllodes of some *Acacia* sp.

Scaevola bursariifolia *J. Black*, Trans. & Proc. Roy. Soc. S. Australia. 51: 385 (1927).

LECTOTYPE: SOUTH AUSTRALIA: Bunda Plateau (north of Fowler's Bay towards Eucla), *R. Tate*, Feb. 1879 (AD).#

Scaevola groeneri *F. Muell.*, *Fragm.* 6: 15 (1866) = ***S. myrtifolia*** (*Vriese*) *K. Krause*.

LECTOTYPE: WESTERN AUSTRALIA: *Drummond 363* (MEL). ISOLECTOTYPES: BM, K, W.#
Merkusia myrtifolia *Vriese*, *Natuurk. Verh. Maatsch. Wetensch. Haarlem ser. 2* 10:72 (1854) = ***S. myrtifolia*** (*Vriese*) *K. Krause*.

HOLOTYPE: WESTERN AUSTRALIA: S.W. Australia, *Drummond 363* (K).

ISOTYPES: BM, P. *Vriese* gives 'Drummond 263', but this is apparently a misprint for 363.

Scaevola tenuifolia *Carolin*, *sp. nov.*

Herba prostrata pilis brevibus patentibus obtecta. Folia linearia plerumque integra. Cymae axillares pedunculis arcuatis. Alae petalorum non striatae. Antherae comosae manifeste. Barbulae corollae brevissimae vel obsoletae.

HOLOTYPE: WESTERN AUSTRALIA: Foot of East Mount Barren, *Blackall 1417*, 26 Sept. 1931 (PERTH).

Decumbent to prostrate perennial herb to 1 m. *Stems* ± striate, mostly branching from the base, hispid with short patent simple and small red glandular hairs. Leaves sessile, linear, mostly entire, revolute; basal leaves 2–4.5 cm long, 0.2–0.4 cm wide, occasionally to 4-toothed towards apex; cauline leaves 0.7–3.5 cm long, 0.1–0.2 cm wide. *Flowers* in racemes or simple thyrses; peduncles curved, slender, 1–5 cm long; bracteoles linear-triangular, 2–8 mm long, entire. Sepals free, linear, c. 2 mm long. *Corolla* 12–20 mm long, blue to mauve; lobes apiculate, 7–10 mm long, 1.5 mm wide, with long patent simple white hairs outside, densely bearded inside; barbulae simple or almost obsolete; wings 4–6 mm long, 2 mm wide, not striate. *Stamen* filaments 2–4 mm long; anthers oblong, 1 mm long, apiculate and comose. *Ovary* oblong, c. 2 mm long, hairy as on sepals with denser glandular hairs; style 5–8 mm long; indusium c. 1 mm long, 2 mm wide, densely covered with white simple hairs and with dense marginal bristles c. 0.2 mm long. *Fruit* ribbed, 2-locular.

RANGE: South western Australia; only known from East Mount Barren and Thumbs Peak.

DISCUSSION: This species is related to *S. striata* from which it can be distinguished by the stiff patent hairs on the stems, the curved peduncles and the wings of the petals which are not striate.

SELECTED SPECIMENS EXAMINED (7): WESTERN AUSTRALIA: Top of Mt Barren, *Gardner & Blackall*, s. dat. (PERTH); SW to E slopes of East Mt Barren, *Willis*, 14 Oct. 1961 (PERTH); East Mt Barren, *George 3672*, 21 April 1962 (PERTH); Thumbs Peak Range, *George 7117*, 31 Oct. 1965 (PERTH).

Named for the narrow leaves. Latin, *tenuis*- = narrow; *-folium* = leaved.

Scaevola apterantha F. Muell., *Fragm.* 1: 121 (1859) = *S. ramosissima* (Sm.) K. Krause.

LECTOTYPE: VICTORIA OR NEW SOUTH WALES: Ranges beyond the Snowy River, *F. Mueller*, Jan. 1855 (MEL). There are two sheets at MEL apparently labelled by Mueller with this name. One of these has no locality label. Since Mueller writes "In montibus ad flumen Snowy River" in his protologue, the specimen so labelled is chosen as lectotype.

Scaevola benthamea Vriese in J.G.C. Lehmann, *Pl. Preiss.* 1: 411 (1845) = *S. calliptera* Benth.

LECTOTYPE: WESTERN AUSTRALIA: In limoso-arenosis, umbrosis prope praedium rusticum cel. Mairu ad fl. Canning, Perth, *Preiss 1520*, d. 2 m. Nov. 1839 (W). ISOLECTOTYPE: P.*

No specimens of this collection have been located at LD or at L.

Scaevola striata R. Br., *Prodr.*: 586 (1810).

LECTOTYPE: WESTERN AUSTRALIA: King George Third Sound, *R. Brown*, 2 Dec. 1801 (BM). ISOLECTOTYPES: K, MEL.#

Mounted on the same sheet as the lectotype is a specimen labelled 'S. striata ?, Bay I, S. Coast, Jan. 1802'. This specimen, however, has no open flowers and therefore does not correspond to the protologue.

Scaevola striata R. Br. var. *arenaria* E. Pritzel, *Bot. Jahrb. Syst.* 35: 569 (1905).

HOLOTYPE: WESTERN AUSTRALIA: Crescit in distr. Stirling interior. pr. Warrungup, *Diels 4945* (B-destroyed).

NEOTYPE: 1 mile (1.6 km) SE of Kukerin, *Newbey 1509*, 16 Oct. 1964 (PERTH).

Scaevola prostrata Vriese in J.G.C. Lehmann, *Pl. Preiss.* 1: 406 (1845) = *S. striata* R. Br.

LECTOTYPE: WESTERN AUSTRALIA: In solo subarenoso sylvae prope Middleton Bay, *Preiss 1490*, 23 Sept. 1840 (LD 0481). ISOLECTOTYPE: L 909,62...294. K. Krause (1912) reduces this to a synonym of *Dampiera diversifolia*. The type specimens, although very scrappy, appear to be *Scaevola striata*.#

Scaevola phlebopetala F. Muell., *Fragm.* 2: 18 (1860).

LECTOTYPE: WESTERN AUSTRALIA: Murchison River, *Oldfield* (MEL). ISOLECTOTYPE: K. Two collections of this species, with this labelling, are present in both MEL and K. The collection with the longer sepals and larger flowers is selected as the lectotype since it agrees more with the type description.

Scaevola hamiltonii K. Krause, *Pflanzenr.* 54: 153 (1912).

LECTOTYPE: ?NEW SOUTH WALES: Ohne genauen Standort, *A.A. Hamilton* (NSW). ISOLECTOTYPE: B (destroyed).*

Scaevola chrysopogon *Carolin*, sp. nov.

Herba erecta glabra foliis caulinis anguste ellipticis pilis appressis obtectis. Flores sessiles plerumque solitarii. Sepala libera. Ovarium costatum pilis patentibus simplicibus brevis tenuibus obtectum. Indusium barbam chrysodromam densam in pagina posteriore aperens.

HOLOTYPE: WESTERN AUSTRALIA: 16 miles (25.6 km) S of Wannoo Roadhouse, NW Coastal Highway, *George 10367*, 9 Sept. 1970 (PERTH).

Perennial herb or undershrub to 60 cm high. *Stems* terete, slender, markedly striate, glabrous or occasionally with scattered short appressed simple hairs especially around the nodes. *Basal leaves* ovate, tapering or petiolate, 1–4 cm long, 3–10 mm wide, coarsely dentate, densely pubescent; cauline leaves sessile, narrow-elliptic, 2.5–10 cm long, 0.5–2 mm wide, with short appressed simple hairs, entire. *Flowers* axillary, mostly solitary or in cymes with up to 3 flowers, sessile between the bracteoles; bracteoles 2, linear-triangular, 1.2–2.5 mm long. *Sepals* free, triangular to narrow-triangular, 1.4–1.8 mm long, covered with short mostly appressed simple hairs and minute glandular hairs, with short coarse arcuate hairs on the margin. *Corolla* 13–23 mm long, cream to white; lobes apiculate, 7–11 mm long, covered outside with minute glandular hairs and long fine appressed simple hairs becoming shorter and tortuous or arcuate towards the base, with a very dense beard of long fine hairs in throat; barbulae simple; wings 0.7–1 mm wide, sparsely ciliate, mostly rounded at apex. *Stamen* filaments flattened, c. 7 mm long, glabrous; anthers 1.5–1.8 mm long, with a short truncate appendage. *Ovary* 2-locular, ovoid to narrow-ovoid, 3–6 mm long, ribbed, covered with short patent simple and minute glandular hairs; style to 9.5 mm long, glabrous; indusium 2 mm wide, with a dense golden brown beard about 1.5 mm long on posterior surface, with dense marginal bristles c. 0.7 mm long.

RANGE: Peron Peninsula and the region just south of Shark Bay in Western Australia.

DISCUSSION: This species can be distinguished from *S. restiacea* by the finer hairs on the ovary.

SPECIMENS EXAMINED: WESTERN AUSTRALIA: Peron Peninsula, *Carolin 3318*, 28 Aug. 1961 (SYD); 54 km S of Denham, *George 9550*, 26 Aug. 1969 (PERTH); c. 14.5 miles (23.2 km) S of Wannoo, *Phillips*, 17 Sept. 1968 (CBG 025840); E of Nerren-Nerren, *Beard 7111*, 20 Oct. 1974 (PERTH).

Named for the golden brown hairs at the base of the upper surface of the indusium. Greek, *chryso-* = golden, *pogon* = beard.

Scaevola parvifolia *F. Muell. ex Benth.* subsp. **pilbarae** *Carolin*, subsp. nov.

Differt ab subspecie *parvifolia* sepalis sine pilis simplicibus lobis corollae pilis simplicibus tantum basin et apicem versus.

HOLOTYPE: WESTERN AUSTRALIA: 50 km S of Rudall River, *P. Wilson 10545*, 15 Aug. 1971 (PERTH)

Stems covered with minute glandular and simple hairs and \pm dense long patent simple hairs. *Basal leaves* lanceolate, to 2 cm long, to 5 mm wide, hairy as stems; cauline leaves ovate to lanceolate, 3–20 mm long, 2–5 mm wide, hairy as stems. *Bracteoles* triangular, 1.5–3 mm long, densely glandular hairy, with scattered long simple hairs. *Sepals* densely glandular hairy, rarely with long simple hairs around the margin. *Corolla* lobes densely glandular-puberulent on the outside occasionally with long simple hairs towards base and on apex.

RANGE: Pilbara region of Western Australia.

HABITAT: Sandy soils.

SELECTED SPECIMENS EXAMINED (26): WESTERN AUSTRALIA: Washing Machine Corner, *Harris 82*, 12 May 1982 (AD 98223490); 56 miles (89.6 km) from Port Hedland on Broome road, *Carolin 7610*, 4 Aug. 1970 (SYD); 72 miles (115 km) from Roy Hill on Wittenoom road, *Carolin 7699*, 7 Aug. 1970 (SYD); South Mt Hodgson, *Davis 174*, 20 Oct. 1979 (PERTH); near Upper Rudall River, *George 10830*, 23 May 1971 (PERTH, SYD); Little Sandy Desert, *Mitchell 517*, 22 July 1979 (NT); 4 miles (6.4 km) N of Jigalong on Rabbit Proof Fence, *Royce 1581*, 13 May 1947 (PERTH); 70 miles (112 km) N of Sandstone towards Wiluna, *Royce 10365*, 14 Oct. 1972 (PERTH).

The subspecific epithet refers to the Pilbara region which is the centre of the distribution (latinized and in the genitive case).

***Scaevola parvifolia* F. Muell. ex Benth. subsp. *acuminata* Carolin, subsp. nov.**

Differt ab subspecie *parvifolia* gemma *acuminata*.

HOLOTYPE: WESTERN AUSTRALIA: On Depot Springs near bore 25.5 km east of Depot Springs, *Saffrey 1058*, 27 Aug. 1970 (PERTH).

Stems scabrid with minute glandular hairs and patent ± stiff long simple hairs. *Basal leaves* linear, 20–35 mm long, 5 mm wide, densely minutely glandular hairy, with minute simple hairs and long simple hairs; cauline leaves linear to lanceolate, 8–27 mm long, 3–7 mm wide, hairy as basal leaves. *Bracteoles* lanceolate to ovate, 1.5–4 mm long. *Sepals* 2–3 mm long, densely glandular hairy, with long simple hairs. *Corolla* 20–32 mm long; lobes 10–20 mm long, minutely glandular hairy and with patent to retrorse long simple hairs outside; bud acuminate.

RANGE: Austin, Coolgardie and Eucla Regions of Western Australia; Depot Springs to Great Victoria Desert.

DISCUSSION: Can be distinguished from subsp. *parvifolia* by the larger leaves, the larger flowers and the acuminate bud.

SELECTED SPECIMENS EXAMINED (17): WESTERN AUSTRALIA: 5 miles (8 km) from Melma on Leonora road, *Carolin 5894*, 26 Aug. 1967 (PERTH); 12 miles (19.2 km) S of Mt Magnet, *Demarz 5237*, 26 Oct. 1974 (PERTH); 76 km S of Neale Junction, Great Victoria Desert, *George 11948*, 15 Aug. 1974 (PERTH); c. 38 miles (60.8 km) SSW of Queen Victoria Springs, *Helms*, 23 Sept. 1891 (NSW).

The subspecific epithet refers to the shape of the flower bud. Latin, *acuminatus* = with the edges curving inwards and tapering gradually towards the top.

***Scaevola patens* F. Muell., Fragm. 3: 33 (1862) = *S. depauperata* R. Br.**

HOLOTYPE: VICTORIA OR QUEENSLAND: Cooper's Creek (MEL). The protologue states 'In deserto juxta Cooper's Creek, *Wheeler*'. The only specimen that I have found corresponding to Mueller's description and even partly corresponding to his label citation is the one here assumed to be the holotype.

***Scaevola angulata* R. Br., Prodr.: 586 (1810).**

LECTOTYPE: NORTHERN TERRITORY: Carpentaria main(and), opposite Groote Island, *R. Brown*, 4 Jan. 1801 and Carpentaria Islands (BM).

ISOLECTOTYPES: MEL, P.* There is one sheet of this species collected by Brown at BM, attached are two labels as given. It is not possible to determine the application of the labels and there is very little difference between the specimens on the sheet. The whole sheet is selected as the lectotype.

***Scaevola pulchella* Carolin, sp. nov.**

Suffrutex ad 90 cm altus pilis simplicibus confertis caulis porcatis. Sepala libera. Barbulae corollae papillatae conspicuis alisque ciliatis. Ovarium biloculare pubescens.

HOLOTYPE: WESTERN AUSTRALIA: 80–85 miles (128–136 km) southwards from Onslow, Beard 2980, 24 Aug. 1963 (PERTH).

Ascending to prostrate pubescent shrub to 90 cm high. *Stems* ± ridged, slender, covered with long slender soft patent hairs. *Leaves* sessile, linear to elliptic-ob lanceolate, 15–40 mm long, 4–10 mm wide, mostly entire to denticulate, pubescent with ± dense simple hairs, larger leaves obtuse and mucronate. *Flowers* in axillary or terminal spikes; bracts linear to oblong, lower bracts occasionally narrow-obovate and leaf-like, to 24 mm long, 1–6 mm wide, hairy as leaves; bracteoles narrow-elliptic to linear, 4–8 mm long, 0.7–1.7 mm wide, pubescent with a conspicuous tuft of silky hairs at the base. *Sepals* ovate-triangular, 1.5 mm long, free or slightly connate at the base, obscured by long hairs on ovary. *Corolla* bluish-mauve, 13–20 mm long, densely covered outside with long simple antrorse to ± patent hairs outside, sparsely bearded inside; lobes 7–11 mm long, 1–1.5 mm wide; wings c. 1 mm wide, sparsely ciliate with simple hairs; barbulae short, densely papillate terminally. *Stamen* filaments 4.5–5.5 mm long; anthers 1.5–2.5 mm long, truncate. *Ovary* 2-locular, ellipsoid, c. 2 mm long, densely covered with long ± patent simple hairs to 2 mm long; style 13–16 mm long, shortly pilose towards base; indusium 1.2 mm wide, glabrous, with short sparse bristles on lips. *Fruit* ellipsoid, 2–3 mm long, hairy as ovary.

RANGE: Carnarvon area and east of Exmouth Gulf in Western Australia.

HABITAT: *Triodia* communities.

DISCUSSION: The presence of free sepals, the ridged stems and the indumentum on the ovary are features which indicate an affinity with *S. hamiltonii* and its relatives.

SELECTED SPECIMENS EXAMINED (12): WESTERN AUSTRALIA: c. 125 km on NW Coastal Highway, Ashby 4030, 1 Aug. 1971 (AD 97417316); North West Cape, Butler 117, 1963 (PERTH); 3 miles (4.8 km) W of Giralia, Tomkinson, Aug. 1963 (PERTH); c. 175 km from Carnarvon to Gascoyne rds. junction on Onslow road, Ashby 2920, 16 Aug. 1969 (AD 971020038, PERTH); Mia Mia, NW Coastal Highway, Ashby 5168, 26 June 1975 (AD 97631025); c. 3 km S of Lyndon River on NW Coastal Highway, Ashby 3209, 14 June 1970 (AD 971040192).

The collector of the holotype notes 'flowers bluish-mauve, pretty' and from this I have selected the specific epithet. Latin, *pulcher* = beautiful, pretty.

Scaevola multiflora Lindley var. *microstachya* Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 407 (1845) = *S. nitida* R. Br.

LECTOTYPE: WESTERN AUSTRALIA: In littore arenoso prope Oyster Harbour, Preiss 1488, 23 Sept. 1840. The only sheet of this collection which has so far been located is: LD 0477.

Scaevola fastigiata Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 406 (1845) = *S. nitida* R. Br.

LECTOTYPE: WESTERN AUSTRALIA: In littore arenoso ad Baldhead, Preiss 1491, 16 Oct. 1840 (LD 0468).

ISOLECTOTYPE: L 909,62 . . .561.*

Scaevola flaccida Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 407 (1845) = **S. thesioides Benth.**

LECTOTYPE: WESTERN AUSTRALIA: In arenosis prope urbem Fremantle, *Preiss 1521*, 13 Dec. 1838 (LD 0469).

ISOLECTOTYPES: L 903,311-. . .423, L 903,311-. . .425, P, W.* Vriese in J.G.C. Lehmann, Pl. Preiss. 2: 243 (1848) himself reduces this to a synonym of *S. thesioides*.

Scaevola paniculata Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 407 (1845) = **S. thesioides Benth.**

LECTOTYPE: WESTERN AUSTRALIA: In clivulis calcareis prope Limekiln, Perth, *Preiss 1516*, 5 Jan. 1839 (LD 0502).

ISOLECTOTYPES: K, L 903,311-. . .426, P, W.*

***Scaevola thesioides Benth.* var. *filifolia E. Pritzel*, Bot. Jahrb. Syst. 35: 571 (1905).**

HOLOTYPE: WESTERN AUSTRALIA: Distr. Eyre propria Esperance in arenosis, fl. in Nov. *D(iels) 5937* (B-destroyed).

NEOTYPE: 4 miles (6.4 km) S of Trulove, *Blackall 1041*, 15 Oct. 1931 (PERTH).

Scaevola scabrida W. Fitzg., J. R. Soc. W. Australia 3: 215 (1918) = **S. macrostachya (Vriese) Benth.**

LECTOTYPE: WESTERN AUSTRALIA: King Leopold Range, *Fitzgerald 788*, May 1905 (NSW).#

Merkusia macrostachya Vriese, Nederl. Kruidk. Arch. 2: 154 (1851) = ***Scaevola macrostachya (Vriese) Benth.***

LECTOTYPE: WESTERN AUSTRALIA: Various parts of N(orth) W(est) C(oast) (of Australia), *Cunningham (K)*.

ISOLECTOYPE: BM.# It is difficult to be sure to which collection at K Vriese was referring. I have treated this as a lectotypification although the two specimens on the sheet selected may have been the only ones he used.

Scaevola caespitosa R. Br., Prodr.: 585 (1810) = **S. globulifera Labill.**

LECTOTYPE: WESTERN AUSTRALIA: In collibus sterilibus prope Portum Regis Georgii III m ora australi N. Hollandia, *R. Brown (BM)*.

ISOLECTOTYPE: K.*

Scaevola globulifera Labill. var. *humilis* Benth., Fl. Austral. 4: 94 (1868) = **S. globulifera Labill.**

LECTOTYPE: WESTERN AUSTRALIA: *Drummond (K)*.

ISOLECTOTYPES: MEL.*

Scaevola revoluta R. Br. var. *strigosa* Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 409 (1845) = **S. globulifera Labill.**

LECTOTYPE: WESTERN AUSTRALIA: In littore arenoso inter frutices ad Point Possession, *Preiss 1506*, 16 Oct. 1840 (LD 0484).

ISOLECTOTYPE: MEL.*

Scaevola cunninghamii var. *hispida* Benth., Fl. Austral. 4: 92 (1868) = **S. cunninghamii DC.**

LECTOTYPE: WESTERN AUSTRALIA: Depuech (Depuch) Islands, *Bynoe (K)*.

ISOLECTOTYPE: ?BM.#

Scaevola browniana *Carolin, sp. nov.*

Suffrutex ad 1 m. Folia late obovata ad lineari plerumque revoluta pilis longis sericeis strictis axillaribus. Flores in spicis productis ubi fructificantibus bracteis multo magnis minoribus quam folius. Corolla coerulea vel alba glabra versus basim. Ovarium septum ovarii imperfectum. Fructus cylindricus glaber rugosus vel tuberculatus. Bracteae inferiores foliaceae bracteolae plerumque lanceolatae.

HOLOTYPE: WESTERN AUSTRALIA: 6 miles (9.6 km) W of Louisa Downs Hstd., *Maconochie 1150*, 21 May 71 (NT 31143).

ISOTYPES: PERTH, CANB, K.

MISAPPLIED NAME: *Scaevola revoluta* auct. non R. Br. pro parte: Benth., Fl. Austral. 4: 96 (1869); Bailey, Queensl. Fl. 3: 909 (1900); K. Krause, Pflanzenr. 54: 155 (1912); Ewart & Davies, Flora Northern Territory: 268 (1917).

Perennial subshrub to 1 m, occasionally low and spreading, mostly densely tomentose-villous. *Stems* terete, occasionally ridged below the leaves, mostly tomentose-villous, occasionally pilose with long dense patent hairs. *Leaves* broad-obovate to linear, 6–55 mm long, 2–17 mm wide, sometimes shortly mucronate, sometimes denticulate; axillary hairs very long and dense, mostly sericeous, not woolly. *Inflorescence* a terminal or axillary spike, often elongating in fruiting stage and sometimes very long; bracts narrow-lanceolate to broad-ovate or obovate, 3.5–25 mm long, 1–10 mm wide, lower bracts occasionally leaf-like; bracteoles linear to ovate, mostly lanceolate, 2–9 mm long, 0.5 mm wide. *Sepals* reduced to an obscure rim c. 0.3 mm long, glabrous or fringed with short hairs. *Corolla* blue to white, 5–18 mm long, moderately to very densely hairy outside with long straight slender appressed to patent hairs, sometimes glabrous towards base, with a moderately dense to sparse beard; barbulae papillate, distinct; lobes shortly apiculate above wings, 2–6.5 mm long, 0.5–1.2 mm wide; wings 0.2–1 mm wide, rounded at apex. *Stamen* filaments 2.5–5 mm long; anthers 0.8–2 mm long, truncate to emarginate. *Ovary* obovoid to cylindrical, 1–1.5 mm long, glabrous, 2-ovular, with an incomplete septum; style 5–16 mm long, slender, flattened and very recurved towards the corolla lobes, mostly pilose with long slender hairs especially towards base; indusium 1–2 mm wide with sparse short hairs on both surfaces near base or with long slender hairs on posterior side near base, with minute to long bristles on lips. *Fruit* cylindrical, 3–5 mm long, rugose to striate-tuberculate, one-seeded, glabrous.

DISCUSSION: In the past the name *S. revoluta* has been applied to this species. It differs from that species particularly in the narrower bracteoles and the lack of the long ciliate bristles on the bracts and bracteoles. Moreover the bracts frequently intergrade with the leaves.

Named in honour of Robert Brown, the author of 'Prodromus Florae Novae Hollandiae'.

subsp. **browniana**

Leaves 6–36 mm long, 0.2–12 mm wide. Bracts narrow-lanceolate to ovate, occasionally broad-ovate, 3.5–25 mm long, 1–7 mm wide. Bracteoles 2–7 mm long, 0.5–1 mm wide. Corolla white to blue 5–11 mm long; lobes 2–4.5 mm long, 0.5–0.7 mm wide; wings 0.2–0.4 mm wide. Style pilose towards the base; indusium c. 1 mm wide, with sparse short hairs on both surfaces near base, with short to minute bristles on lips. Fruit 3–4 mm long.

RANGE: Hamersley Range, Kimberley region and Upper Fitzroy River in

northern Western Australia; Victoria River, Katherine Gorge, western Arnhem Land in Northern Territory; eastern Barkly Tablelands in Queensland.

HABITAT: In open woodland savannah, on sandstone ranges.

DISCUSSION: This subspecies circumscribes a considerable variation but there appears to be no distinct discontinuities in it.

SELECTED SPECIMENS EXAMINED (48): WESTERN AUSTRALIA: 16 km NW of Newman, *Toelken 6324*, 20 Sept. 1979 (AD 98007110); summit of Mt Bruce, Hamersley Range, *Beard 2919*, 19 Aug. 1963 (PERTH); Sir Graham Moore Island, *Wilson 11204*, 30 June 1973 (PERTH); Mt Anderson, *Broadbent 614*, 25 Jan. 1953 (PERTH). NORTHERN TERRITORY: Victoria River, Kununurra road, *Byrnes 707*, 7 May 1968 (NT 14374, PERTH, SYD); 21 km N of Jim Jim Falls, *Craven 6134*, 29 May 1980 (AD 98232271, CANB); c. 11 miles (17.6 km) SSW of Mt Gilruth, *Lazarides 7931*, 28 Feb. 1973 (CANB); 51 miles S of Hookers Creek Settlement, *Chippendale*, 14 July 1956 (MEL 1521630, NSW 82013, NT 2317). QUEENSLAND: Nicholson River area near Fish River gorge, *Kanis 1761*, 8 June 1974 (CANB, NT 53962).

subsp. **grandior** *Carolyn*, subsp. nov.

Haec subspecies differt a typo bracteis foliosioribus et corolla 15–18 mm longa.

HOLOTYPE: WESTERN AUSTRALIA: Hidden Valley 3.2 km E of Kununurra, East Kimberley, *Kenneally 1909*, 3 Aug. 1974 (PERTH).

Leaves obovate to oblong, 12–55 mm long, 3–17 mm wide, obtuse, broadly sessile, tomentose. *Bracts* obovate, 11–22 mm long, 6–10 mm wide, leaf-like. *Bracteoles* lanceolate, 5–9 mm long, 0.5–1 mm wide. *Sepals* connate into an undulate tube c. 0.3 mm long, fringed by sparse simple small hairs. *Corolla* blue, 15–18 mm long, moderately densely hairy outside with long slender antrorse hairs; barbulae papillate, long and distinct; lobes 5–6.5 mm long, 1–1.2 mm wide; wings 0.6–1 mm wide. *Stamen* filaments 5 mm long; anthers 1.5 mm long. *Ovary* c. 1.6 mm long; style c. 14 mm long, pilose with very long patent hairs; indusium c. 2 mm wide, with long slender hairs on posterior side near base, with long bristles on lips. *Fruit* 5 mm long.

RANGE: Kununurra to the junction of the Hann and Fitzroy Rivers in Gardner and Fitzgerald Regions of Western Australia.

DISCUSSION: This subspecies differs from the type in having more leaf-like bracts, a larger corolla with longer and more distinct barbulae, generally larger floral parts and the longer more distinct hairs on the indusium.

SELECTED SPECIMENS EXAMINED (11): WESTERN AUSTRALIA: Hidden Valley, Kununurra, *Ollerenshaw 1674*, 31 May 1975 (CBG 7703666, SYD); Emu Creek E of Kununurra, *Symon 12122*, 19 May 1980 (ADW 54895, SYD); near junction of Hann and Fitzroy Rivers, *Fitzgerald 1173*, June 1905 (PERTH).

The flowers, in particular, are larger than those of the type variety and from this I have taken the varietal epithet. Latin, *grandior* = larger.

***Scaevola revoluta* R. Br.**, Prodr.: 586 (1810).

LECTOTYPE: NORTHERN TERRITORY: Carpentaria Islands, *R. Brown*, 20 & 21 Oct. 1802 (BM). **ISOLECTOTYPES:** K, NSW.#

There are two collections on the lectotype sheet which are virtually indistinguishable from each other.

***Scaevola revoluta* R. Br.** subsp. **revoluta** var. **viscida** *Carolyn*, var. nov.

Differt typo indumento glanduloso.

HOLOTYPE: NORTHERN TERRITORY: Barkly Tableland, Nicholson River area near Dry Creek Gorge in China Wall, *Kanis 1815*, 11 June 1974 (NT 53933).

Differs from the type variety in the very few long simple hairs, which may be quite absent, and the very dense viscid glandular indumentum.

SPECIMEN EXAMINED: QUEENSLAND: 8 miles (12.8 km) SW of Calvert Hills on Creswell Downs Road, *Carolin 9260*, 14 May 1974 (SYD).

***Scaevola revoluta* subsp. *stenostachya* (W. Fitzg.) *Carolin*, stat. nov.**

BASIONYM: *Scaevola stenostachya* W. Fitzg., J. Roy. Soc. W. Australia 3: 215 (1918).

HOLOTYPE: WESTERN AUSTRALIA: Near Isdell River, between Isdell Range and Graces Knob, *W. Fitzgerald 880* (NSW).

Merkusia glandulifera DC. var. *eglandulosa* Vriese, Nederl. Kruidk. Arch. 2: 166 (1851) = ***Scaevola glandulifera* DC.**

LECTOTYPE: the type of *Scaevola rufa* Vriese (see below).

Scaevola rufa Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 405 (1845) = ***S. glandulifera* DC.**

LECTOTYPE: WESTERN AUSTRALIA: In calculus inter frutices sylvae ad radices jugi montium Darlings Ranges, Perth, *Preiss 1513*, 23 Sept. 1839 (LD 0471). ISOLECTOTYPES: L 903,311-. . .346, P, W.*

Vriese cites *Preiss 1513* under both *Merkusia anchusifolia* and *Merkusia glandulifera* in Natuurk. Verh. Holl. Maatsh. Wetensch. Haarlem ser. 2 10: 67 (1854).

Scaevola glandulifera DC. var. *tenuis* E. Pritzl, Bot. Jahrb. Syst. 35: 570 (1905) = ***S. glandulifera* DC.**

LECTOTYPE: WESTERN AUSTRALIA: In district Avon in collibus apertis a Moore River, *Pritzl 739*, flor. m. oct. (AD). ISOLECTOTYPES: B (destroyed), K, W.*

***Scaevola holosericea* Vriese** in J.G.C. Lehmann, Pl. Preiss. 1: 408 (1845).

LECTOTYPE: WESTERN AUSTRALIA: In arenosis sylvae ad montem Eliza mountain Perth, *Preiss 1478*, 23 Sept. 1839 (LD 0472). ISOLECTOTYPES: L 909,62. . .321, L 903,311-. . .353, L 903,311-. . .354, MEL, W.*

Scaevola sphaerocarpa Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 409 (1845) = ***S. anchusifolia* Benth.**

LECTOTYPE: WESTERN AUSTRALIA: In arenosis prope urbiculam Fremantle, *Preiss 1512*, 14 Dec. 1838 (LD 0486). ISOLECTOTYPES: L 909,62. . .318, MEL, P, W.*

***Scaevola eneabba* *Carolin*, sp. nov.**

Frutex pilis antrorsis rigidis. Folia lineari-oblongeolata ad 30 mm longa crassa. Bractee lanceolatae ciliatae ad 8 mm longae; bracteolatae angustiores ac plus minusve breviores. Corolla c. 9 mm longa extus pilis longis patulis stramineis. Ovarium pilis longis simplicibus albis patulis conferte obtectum.

HOLOTYPE: WESTERN AUSTRALIA: 40 mls (64 km) from Eneabba, *Humphreys*, 15 Oct. 1964 (PERTH).

Erect undershrub to 50 cm, with short antrorse simple hairs. *Leaves* thick, linear-oblongeolate, to 30 mm long, to 1.5 mm wide, entire, obtuse. *Flowers* in terminal spikes to 25 mm long; bracts lanceolate, to 8 mm long, c. 1 mm wide, ciliate; bracteoles similar to bracts but narrower and slightly shorter. *Sepals* deltoid, c. 1 mm long. *Corolla* (colour unknown) c. 9 mm long, pubescent outside with long stiff brownish simple hairs towards top and minute scattered

simple hairs all over, pubescent inside on lobes and in throat; barbulae few, papillate; lobes narrow-elliptic, c. 6 mm long, c. 1 mm wide; wings c. 1.5 mm wide. *Stamen* filaments c. 4 mm long; anthers c. 1 mm long, truncate-emarginate. *Ovary* covered with dense long spreading white simple hairs, 2-locular; style 7–8 mm long, pubescent with long hairs; indusium c. 1 mm long, with a few scattered hairs; bristles on lips widely spaced, weak. *Fruit* 2-locular; mature fruit not seen.

RANGE: Known only from the type collection.

DISCUSSION: Probably related to *S. anchusifolia* but the hairs on the ovary distinguish it.

Named for the locality of the type, which is an Aboriginal word and therefore indeclinable.

Scaevola longifolia Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 410 (1845) = *S. lanceolata* Benth.

LECTOTYPE: WESTERN AUSTRALIA: In solo limoso planitie ad fluvium Vasse River, Sussex, *Preiss 1472*, 7 Dec. 1839 (LD 0474). ISOLECTOTYPES: L 903,311-...398, L 903,-.311...394, MEL, P, W. (see *S. virgata*).

Scaevola virgata Carolin, sp. nov.

Suffrutex virgatus perennis ad 45 cm. Folia linearia ad oblanceolata ad basim caulis amplectentia et pilis longis strictis vel tortuosis obtectis. Sepala in tubo connata margine sinuato vel truncato. Corolla alba vel coerulescens pallide 5–8 mm longi pilis sparsis extus obtectis plus minusve glabris ad basim. Fructus globuloso-cylindricus duobus loculis sterilibus et duobus loculis foecundis grandioribus.

HOLOTYPE: WESTERN AUSTRALIA: Between Northampton and Geraldton, *Ashby 1026*, 23 Aug. 1964 (AD 96523133). ISOTYPE: SYD.

Tufted usually much branched perennial subshrub to 45 cm. *Stems* terete, villous. *Leaves* linear to oblanceolate, 2–6 cm long, 3–8 mm wide, acute, mostly broadened and ± stem-clasping at base, entire to dentate, covered with ± dense long fine straight to tortuous hairs. *Inflorescence* a terminal or rarely axillary spike; bracts ovate to narrow-ovate, 4–27 mm long, 2–5 mm wide, acute to very acuminate, ± stem-clasping, covered with long fine straight hairs especially on margins and inner surface; bracteoles narrow-lanceolate, 3–6 mm long, 0.5–1 mm wide. *Sepals* connate into a sinuate or truncate rim, 0.25 mm long, glabrous. *Corolla* white to pale blue, 5–8 mm long, covered outside with ± sparse fine hairs, with sparse simple hairs inside; barbulae papillate and simple; lobes 2.5–4 mm long, 0.5–1 mm wide, apiculate above wings; wings 0.5–1 mm wide, obtuse to truncate. *Stamen* filaments 1.5 mm long; anthers 0.5 mm long, truncate. *Ovary* broad-ellipsoid, to 1 mm long, glabrous, 2-locular; style 3–4 mm long, covered with long fine hairs; indusium c. 1 mm wide with sparse short hairs at base and ± dense marginal bristles to 0.2 mm long. *Fruit* globular-cylindrical, c. 3 mm long, 2 mm wide, rugose, glabrous, with 2 locules containing seeds and 2 smaller sterile locules; endocarp bony, thick; mesocarp spongy, thin.

RANGE: Ogilvie Plains to Watheroo in southern Irwin and northern Drummond districts of Western Australia.

HABITAT: Scrubs or heath on rocky soils.

DISCUSSION: This species seems close to *S. lanceolata* and this name has indeed been applied to it. However the type of *S. lanceolata* is clearly not conspecific with it. The indumentum of *S. virgata* is finer, the hairs on the corolla are much less dense and even tending to be absent altogether from the base. *S. longifolia* is the name which has been most generally applied to it in the past but the type of that species is a specimen of *S. lanceolata*.

SELECTED SPECIMENS EXAMINED (34): WESTERN AUSTRALIA: Ogilvie Plains, *Blackall 4502*, 30 Aug. 1940 (PERTH); Northampton, *Carolin 3240*, 28 Aug. 1961 (SYD); Mt Sewell near Oakabella, *Green 445*, 11 Aug. 1956 (PERTH); 20 miles (32 km) N of Geraldton, *Newbey 2188*, 28 Aug. 1965 (PERTH); 10 miles (16 km) E of Geraldton, *Shaw 591*, 1 Oct. 1966 (AD 96832196); 27 miles (43.2 km) SE of Walkaway on Burma Road, *George 7853*, 4 Sept. 1966 (PERTH); Coorow-Carnamah, *Beard 1954*, 25 Sept. 1962 (PERTH); 14 miles (22.4 km) N of Badgingarra, *George 6729*, 13 Aug. 1965 (PERTH); Dinner Hill, c. 30 miles (48 km) W of Watheroo, *Carolin 3400*, 1 Sept. 1961 (SYD).

Named for the habit. Latin, *virgatus* = twiggy.

Scaevola suaveolens R. Br., Prodr.: 585 (1810) = *S. calendulacea* (Kennedy) Druce.

LECTOTYPE: NEW SOUTH WALES: Botany Bay, *R. Brown* (BM).# All the collections made by Brown fit his description quite well but only this one has a ripe fruit from which he could have determined it was a "berry".

***Scaevola spicigera* Carolin, sp. nov.**

Frutex expansus ad 50 cm pilis mollibus sericeis et glandulosis parvis obtectus. Folia oblongo-elliptica anguste 35–60 mm longa pilis sericeis in axillis. Flores in thyrsi spiciformes numerosi dispositi. Corolla alba 5–6 mm longa. Ovarium loculo uno. Indusium setis brevissimis in labiis dispositis. Fructus oblongus rugosus costatus plerumque semene solitario.

HOLOTYPE: WESTERN AUSTRALIA: 79 miles (126.4 km) S of Learmonth, *George 2399*, 2 June 1961 (PERTH).

Low spreading ± silky hairy shrub to 50 cm. *Leaves* narrow-oblong-elliptic to oblanceolate, 35–60 mm long, 3–8 mm wide, often more densely hairy below, entire, acute, tapering gradually towards base with a conspicuous tuft of silky axillary hairs. *Flowers* arranged in numerous spike-like axillary thyrses to 20 cm long; bracts leaf-like but smaller; bracteoles lanceolate, 4–6 mm long, to 2 mm wide, c. ½ as long as flowers or longer. *Sepals* reduced to a minute sinuate rim. *Corolla* white, 5–6 mm long, pubescent outside with ± appressed simple hairs, pubescent in throat; barbulae simple, scarcely distinguishable from hairs; lobes oblong-elliptic, c. 2.5 mm long, c. 0.5 mm wide; wing <0.5 mm wide, lacinate; connate part of lobes 2.5–3.5 mm long. *Stamen* filaments linear, c. 1 mm long; anthers oblong, c. 0.5 mm long. *Ovary* obovoid, pubescent, 1-locular except at base, with 2 ovules; style 2–2.5 mm long, glabrous except at base; indusium semi-orbicular, 0.5–1 mm long, glabrous except for a few short hairs close to base and very short bristles on lips. *Fruit* cylindrical, 3 mm long, pubescent, ribbed, rugose, usually with a single seed; epicarp very thin, dry, brown; endocarp thin.

RANGE: Vlaming Peninsula of Western Australia.

HABITAT: In *Triodia* grassland on red sandy soils.

DISCUSSION: Similar to *S. canescens* but the simple hairs are much less dense and accompanied by glandular ones. The inflorescences are more spike-like with longer internodes and the axillary hairs are silky and separate rather than woolly and felted.

SPECIMENS EXAMINED: WESTERN AUSTRALIA: 10 miles (16 km) E of Ningaloo HS., *George 10235*, 4 Oct. 1970 (PERTH); Learmonth Road, 44 miles (70.4 km) S of Bullara turnoff, *George 3287*, 22 Nov. 1962 (PERTH); Cardabia Station turnoff on Learmonth Road, *Beard 3536*, 20 Aug. 1964 (PERTH); ± 55 miles (88 km) N of Minilya River on road to Learmonth, *George 1434*, 31 Aug. 1960 (PERTH).

Named for the spike-like inflorescences. Latin, *spica* = spike, *-ger* = bearing.

Scaevola glaucescens Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 410 (1845) = *S. canescens* Benth.

LECTOTYPE: WESTERN AUSTRALIA: In arenosis prope urbiculam Perth, *Preiss 1477*, 15 April 1839 (LD 0463). ISOLECTOTYPES: K, L 903,311-...326, L 903,311-...327, MEL 1521288, P, W.*

Scaevola trinervis Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 407 (1845) = *S. canescens* Benth.

LECTOTYPE: WESTERN AUSTRALIA: In arenosis umbrosis sylvae prope lacum Keremulu, *Preiss 1479*, 16 Aug. 1839 (LD 0464). ISOLECTOTYPES: K, MEL.*

Scaevola sericophylla F. Muell. ex Benth., Fl. Austral. 4: 102 (1868).

LECTOTYPE: WESTERN AUSTRALIA: Murchison River, *Oldfield* (K).# There are two sheets at K, both labelled apparently by Mueller, one as *S. sericophylla* and the other as *S. oldfieldii* var. *sericophylla*. Both are also annotated by Bentham. One only, however, is clearly labelled "Murchison River". It is this specimen which is selected as the lectotype.

Scaevola repens Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 406 (1845).

LECTOTYPE: WESTERN AUSTRALIA: In arenosis sylvae prope urbiculam Perth, *Preiss 1519*, 20 Oct. 1839 (LD 0480). ISOLECTOTYPES: L 903,311-...415, L 903,311-...414, MEL, P, W.

Scaevola repens Vriese var. *angustifolia* Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 406 (1845).

LECTOTYPE: WESTERN AUSTRALIA: In arenosis umbrosis ad fl. Cygnorum, *Preiss 1493*, June 1839. The only sheet of this collection which has so far been located is LD 0480.

Scaevola oldfieldii F. Muell., Fragm. 2: 19 (1860).

LECTOTYPE: WESTERN AUSTRALIA: In campis arenosis et clivis rupestris ad flumen Murchison, *A. Oldfield* (MEL). Isolectotypes: MEL, K. There are two specimens at MEL which are candidates for the type, but only one is labelled as collected by Oldfield. This is selected as the lectotype.#

Scaevola humifusa Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 410 (1845).

LECTOTYPE: WESTERN AUSTRALIA: In solo sublimoso-arenoso planitie ad flumen Avon River, *Priess 1480*, 10 Sept. 1839 (LD 0473). ISOLECTOTYPES: L 903,311-...356, L 903,311-...358, MEL, P, W.*

Scaevola depressa Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 410 (1845).

LECTOTYPE: WESTERN AUSTRALIA: In regionibus interioribus Australiae meridionali-occidentalis, *Preiss 1502*, Nov. 1840 (LD 0467). ISOLECTOTYPE: L 909,62...719 (pro parte). The specimen at LD is so poor that an identification is practically impossible. The sheet in L has three pieces mounted on it and two labels, i.e., *Preiss 1505* and *Preiss 1502*, the latter contained in an otherwise empty cellophane packet. It is not possible to determine which specimen belongs to which label. One specimen is *S. humifusa* and the other is *S. longifolia*.

Scaevola humifusa var. *pulvinaris* E. Pritzel, Bot. Jahrb. Syst. 35: 572 (1905) = *S. pulvinaris* (E. Pritzel) K. Krause.

HOLOTYPE: WESTERN AUSTRALIA: Bei Cranbrook an feuchten Platzen auf Kahlen Flachen, *Diels 4403*, flor sept. (B-destroyed). NEOTYPE: 28.5 miles (45.6 km) N of Ravensthorpe, *George 314*, 13 Sept. 1959 (PERTH).

Scaevola arenaria E. Pritzl, Bot. Jahrb. Syst. 35: 572 (1905) = *S. humifusa* Vriese

LECTOTYPE: WESTERN AUSTRALIA: Hab. in distr. Avon pr. Tammin in arenosis apertis aridis, *Pritzl 754*, Oct. 1839 (K). ISOLECTOTYPES: BM, W.#

Scaevola globosa (*Carolin*) *Carolin*, comb. nov.

BASIONYM: *Nigromnia globosa* *Carolin*, Nuytsia 1: 292 (1974).

See above.

Scaevola linearis R. Br., Prodr.: 586 (1810).

LECTOTYPE: SOUTH AUSTRALIA: Bay X, South Coast, R. Brown (BM). ISOLECTOTYPE: K.*

Scaevola linearis R. Br. subsp. *confertifolia* (*J. Black*) *Carolin*, comb. nov.

BASIONYM: *Scaevola linearis* R. Br. var. *confertifolia* J. Black, Fl. S. Australia. ed. 1: 565 (1929).

LECTOTYPE: SOUTH AUSTRALIA: Kangaroo Island, *J.B. Cleland*, 16 Nov. 1924 (AD). ISOLECTOTYPE: ?K.

Scaevola paludosa R. Br., Prodr.: 586 (1810).

LECTOTYPE: WESTERN AUSTRALIA: Bay I, South Coast, R. Brown, 12 Jan. 1802 (BM)#. A specimen at K is dated 11 Jan. and is thus probably not strictly an isoelectotype.

Scaevola ovalifolia R. Br., Prodr.: 584 (1810).

LECTOTYPE: NORTHERN TERRITORY: Carpentaria, R. Brown (BM). ISOLECTOTYPE: MEL.*

Brown recognized two variations in this species. Specimens of both α and β are mounted on the same sheet at BM but there is no difficulty in distinguishing the glabrous form from the hairy one. *S. ovalifolia* α *cinerascens* is taken as the type to conform with current use. β *glabra* is now included under *S. glabrata* *Carolin*.

Scaevola glutinosa *Carolin*, sp. nov.

Frutex erectus plerumque viscidus ad 70 cm pilis glandulosis simplicibusque patentibus longis. Folia obovata dentata sessilia. Bractee minores. Bracteolae circa 1/4-plo longiore quam corolla. Corolla 14–24 mm longa. Indusium basi breviter barbatur. Ovarium duabus loculis.

HOLOTYPE: QUEENSLAND: Granada, about 50 miles (80 km) N of Cloncurry, *Everist 5225*, 11 April 1954 (BRI 231469).

Erect, \pm spreading usually viscid shrub to 70 cm high, pubescent with soft patent simple hairs and patent glandular hairs usually as long as the simple ones. Leaves obovate, 20–68 mm long, 6–26 mm wide, dentate, with an acute tooth at apex, sessile and at least upper ones broad and almost stem-clasping at base, pubescent as stems. Flowers in terminal spikes which elongate in fruiting stage to 12 cm long; bracts smaller than leaves, ovate-elliptic, to 15 mm long, slightly smaller towards top, dentate or entire, acute-acuminate; bracteoles linear-lanceolate, 7–11 mm long, c. 1/4 as long as corolla. Sepals connate into a sinuate rim 0.5–1 mm long. Corolla blue 14–24 mm long, pubescent outside with patent hairs, tomentose in throat; barbulae simple; lobes narrow-ovate, 6–11 mm long, to 1.7 mm wide; wings to 10 mm wide; connate part of corolla

8–13 mm long. *Stamen* filament 2–3 mm long; anthers narrow-oblong, 1–2 mm long, obtuse or truncate. *Ovary* pubescent with fine mostly simple hairs, 2-locular to top, 1.5–30 mm long; style 5–8.5 mm long, usually with a few scattered hairs; indusium depressed-obovate to 2 mm long, to 2.5 mm wide, glabrous below or with a few scattered long hairs, with a sparse beard of a few white bristles less than or scarcely equalling bristles on lips above. *Fruit* cylindrical, 4–6 mm long, \pm pubescent, rugose with 2 fertile locules and 2 small sterile cavities; mesocarp green, dry, thin; endocarp hard, woody.

RANGE: Northern Queensland in Cloncurry region.

HABITAT: Frequently on limestone.

DISCUSSION: The long viscid glandular hairs together with the patent simple hairs, the sparse short beard on the back of the indusium and the \pm stem-clasping upper leaves distinguish this species from other members of series *Pogogyneae*. The flowering spikes are more compact than most other species of this Section and the transition from leaves to bracts is more abrupt.

SELECTED SPECIMENS EXAMINED (11): QUEENSLAND: Digby Peaks Range, *Purdie 1047*, 10 Sept. 1977 (BRI 232747); 2 miles (3.2 km) S of Duchess, *Ollerenshaw & Kratzing 1249*, 6 Aug. 1974 (CBG 058322, BRI 201263); 32 miles (51.2 km) E of Cloncurry, *Lazarides 4071*, 9 Sept. 1953 (BRI 017290, CANB, NT 18784); "Sutherland" 60 miles (96 km) NW of Maxwelton, *Nelson & Entwistle 14*, 24 April 1963 (BRI 039198).

The specific epithet refers to the stickiness of the plant. Latin, *glutinosus* = glutinous, sticky.

***Scaevola densifolia* Carolin, sp. nov.**

Suffrutex prostratus pubescens. Folia oblanceolata 8–30 mm longa semper fasciculata. Flores in spicis foliosis. Bracteolae ad $\frac{1}{2}$ -plo longiores quam corolla instructus. Fructus late ovoideus gibbosus ac seriebus duabus tuberculorum.

HOLOTYPE: WESTERN AUSTRALIA: Hamersley River, *Allan 180*, 8 Nov. 1969 (PERTH). ISOTYPE: SYD.

Prostrate undershrub to 40 cm, pubescent with very short simple patent hairs and some longer ones. *Leaves* oblanceolate, 8–30 mm long, 2–9 mm wide, entire or sometimes with a prominent tooth on either side, mostly obtuse, tapering towards the base, often fasciculate in axils. *Flowers* in leafy spikes, sessile between the bracteoles; peduncles to 2 mm long; bracteoles linear, 5–7 mm long, c. 5 mm wide, to $\frac{1}{2}$ as long as corolla. *Sepals* triangular, to 2.5 mm long, connate into a tube to 0.5 mm long, sericeous. *Corolla* white or cream, 7–17 mm long, densely pubescent outside with coarse simple appressed hairs towards top becoming smaller and less appressed below, tomentose in throat; barbulae few, thin, simple, scarcely distinguishable from the hairs; lobes narrow-oblong-elliptic, 3–6 mm long, to 1.5 mm wide; wing to 1 mm wide; connate part of corolla 6–11 mm long. *Stamen* filament 2–4 mm long; anthers narrow-oblong, 1–2 mm long, truncate. *Ovary* pubescent, 2-locular, 1.5–3 mm long; style glabrous, 3–6 mm long; indusium semi-orbicular to semi-elliptic, 1–2 mm long, 1.5–2.5 mm wide, with a few short hairs at base on the upper surface not exceeding bristles on lips. *Fruit* broad-ovoid, 3–4 mm long, with two large lateral protuberances and a band of tubercles on posterior and anterior surface, pubescent with 2 fertile locules and 2 sterile cavities which almost join across the septum.

RANGE: Eyre Region of Western Australia.

DISCUSSION: Previously misplaced in *S. paludosa*. The fruit with two lateral protuberances and two bands of tubercles is unique in the genus.

SELECTED SPECIMENS EXAMINED (9): WESTERN AUSTRALIA: c. 58 km N of Oldfield River, *Eichler 20391*, 21 Oct. 1968 (AD 97018210, CANB, PERTH); West River, *Newbey 1726*, 13 Dec. 1964 (PERTH); Ravensthorpe, *Gardner*, Nov. 1944 (PERTH); Hamersley River, *George 1971*, 2 Dec. 1960 (PERTH); Fitzgerald River, *George 10561*, 19 Nov. 1970 (PERTH).

Named for the leaves which are crowded on the lateral branches. Latin, *densus* = dense, *-folium* = leaved.

***Scaevola aemula* R. Br.**, Prodr.: 584 (1810).

LECTOTYPE: SOUTH AUSTRALIA: Bay X, South Coast, *R. Brown*, 1802 (BM).
ISOLECTOTYPES: K, MEL.*

Scaevola sinuata R. Br., Prodr.: 584 (1810) = ? *S. aemula* R. Br.

LECTOTYPE: WESTERN AUSTRALIA: Goose Island Bay, *R. Brown*, May 1803 (BM).
ISOLECTOTYPES: K, MEL.*

***Scaevola humilis* R. Br.**, Prodr.: 585 (1810).

LECTOTYPE: SOUTH AUSTRALIA: Inlet XII, South Coast, *R. Brown* (BM). ISOLECTOTYPE: K.*

***Scaevola pallida* R. Br.**, Prodr.: 585 (1810).

LECTOTYPE: VICTORIA: In campis graminosis Port Phillip, *R. Brown*, 25–28 Jan. 1804 (BM).#

Brown's protologue in the Prodrusus only indicates that the species was collected along the southern coast of Australia. There are at least two collections corresponding to Brown's manuscript description, the lectotype and one at K labelled Port Phillip, *R. Brown*, May 1802.

***Scaevola auriculata* Benth.**, Fl. Austral. 4: 99 (1868).

LECTOTYPE: WESTERN AUSTRALIA: *Drummond 3rd coll. no. 153* (K). ISOLECTOTYPES: BM, MEL.#

There are two sheets at K bearing collections with this number, one bears a specimen of no. 153, the other bears a specimen of no. 157 as well. The lectotype is the sheet bearing the single collection.

Molkenboeria microphylla Vriese, Natuurk. Verh. Holl. Maatsch. Wetensch. Haarlem ser. 2 10: 44 (1854) = ***Scaevola microphylla* (Vriese) Benth.**

LECTOTYPE: WESTERN AUSTRALIA: ad flum. Cygn., *Drummond* (K). ISOLECTOTYPES: L 909,62. ...566, LD 0487.

Since Vriese cites "Herb. Hook." in the protologue, the specimen at K is selected as lectotype.

Molkenboeria macrophylla Vriese, Natuurk. Verh. Holl. Maatsch. Wetensch. Haarlem ser. 2 10: 44 (1854) = ***Scaevola macrophylla* (Vriese) Benth.**

HOLOTYPE: WESTERN AUSTRALIA: Nov. Holl. ad fl. Cygn. Spec. Drummondii (K).

***Scaevola platyphylla* Lindley**, Sketch Veg. Swan R.: 26 (1839).

This name was published on 1 December 1839. *Scaevola semiamplexicaulis* DC., Prodr. 7: 509 (1839) was published in 'late December'. The former name thus has priority by a few weeks.

Scaevola candollei Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 405 (1845) = *S. platyphylla* Lindley.

LECTOTYPE: WESTERN AUSTRALIA: In confragosis jugi montium Darling's Range Perth, *Preiss 1497*, Sept. 1841. (L 909,62...569). ISOLECTOTYPE: MEL 1521496.

Taxa here excluded from *Scaevola*

Typification of those species to be transferred to *Goodenia* will appear in the corresponding paper on *Goodenia*.

Scaevola umbellata Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 411 (1845) = ***Goodenia pulchella*** Benth.

LECTOTYPE: WESTERN AUSTRALIA: In humidis umbrosisque prope urbiculam Perth, *Preiss 1435a*, 25 March 1839 (LD 0451). ISOLECTOTYPE: W. The species is clearly treated differently from its variations by Vriese and must thus be recognised as a separate taxon from any of them.# The variations given below are not designated as varieties by Vriese and therefore have no taxonomic status.

α ***procumbens*** Vriese, op. cit.: 412

SPECIMEN CITED: WESTERN AUSTRALIA: In arenosis aridis prope villam ccl. Andrews ad flum. Cygnorum, *Preiss 1451*, 2 Feb. 1839 (LD 0451 mounted on the same sheet as the type of the species).

β ***denticulata*** Vriese, op. cit.: 412

SPECIMEN CITED: WESTERN AUSTRALIA: In arenosis prope urbiculam Freemantle, *Preiss 1428*, 26 Dec. 1839 (LD 0452). DUPLICATES: G, L 903,311-...251, L 903,311-...252, W.*

γ ***spathulata*** Vriese, op. cit.: 412

SPECIMEN CITED: WESTERN AUSTRALIA: In solo sublimoso-arenoso Peninsulae Perth, *Preiss 1430*, 15 May 1839 (LD 0452 mounted on the same sheet as a specimen of β *denticulata*). DUPLICATES: G, L 903,311-...252, L 903,311-...253, W.*

Scaevola tenera Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 409 (1845) = ***Goodenia coerulea*** R. Br.

LECTOTYPE: WESTERN AUSTRALIA: In regionibus interioribus Australiae meridionali-occidentalis, *Preiss 1442*, Feb. 1841 (LD 0448). ISOLECTOTYPES: G, L 909,62...340.* Although Vriese describes var. β (see below), he does not describe a var. α as such.

var. β ***pauciflora*** Vriese, op. cit.: 409

LECTOTYPE: WESTERN AUSTRALIA: In arenosis districtus Sussex, *Preiss 1482*, 20 May 1839 (LD 0448). ISOLECTOTYPES: G, L 903,311-...240, P, W.#

Scaevola stricta Vriese in J.G.C. Lehmann, Pl. Preiss. 1:408 (1845) = ***Goodenia scapigera*** R. Br.

LECTOTYPE: WESTERN AUSTRALIA: In rupestris ad latera collium Konkoberuphills, Kent, *Preiss 1511*, 19 Nov. 1840 (LD 0466). ISOLECTOTYPES: G, L 903,311-...295, P.* The specimen at W labelled with this number does not seem to belong to Goodeniaceae.

Scaevola pusilla Vriese in J.G.C. Lehmann, Pl. Preiss. 1:412 (1845) = ***Goodenia tenella*** R. Br.

LECTOTYPE: WESTERN AUSTRALIA: In solo humoso humido umbroso ad Eight-mile Bridge, Plantagenet, *Preiss 1470*, Feb. 1841 (LD 0483). ISOLECTOTYPES: G, L 909,62-...385).*

Scaevola pterosperma Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 408 (1845) = **Goodenia incana** R. Br.

LECTOTYPE: WESTERN AUSTRALIA: Ad promontorium Cape Riche, *Preiss 1499*, 24 Nov. 1840 (LD 0482). ISOLECTOTYPES: G, L 903,311-. . .275, MEL 24038, P, W.#

Scaevola reinwardtii Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 409 (1845) = **Verrauxia reinwardtii** (Vriese) Benth.

LECTOTYPE: WESTERN AUSTRALIA: In planitie arenosa Quangen, Victoria, *Preiss 1454*, 20 March 1844 (W).*

Scaevola geniculata Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 404 (1845) = **Goodenia affinis** (Vriese) Vriese.

LECTOTYPE: WESTERN AUSTRALIA: In rupestribus promontorii Cape Riche, *Priess 1503*, 20 Nov. 1840 (LD 0470). ISOLECTOTYPE: MEL 24312.*

Scaevola verreauxii F. Muell., Bot. Teachings: 65 (1877) ex Index Kewensis 2: 821 (1895) is an error for '*Scaevola* and *Verreauxia*'.

Temminckia macrophylla Vriese, Nederl. Kruidk. Arch. 2: 146 (1851). This is not a member of the Goodeniaceae.

Temminckia microcarpa Nadeaud as cited in Index Kewensis, suppl. 2: 181 (1904) is a mistake and should read *Terminalia microcarpa* Nadeaud.

Taxon of uncertain position

Scaevola lyratifolia Vriese in J.G.C. Lehmann, Pl. Preiss. 1: 405 (1845)

There are no flowers on the specimens and it is not possible, as yet, to determine its correct placement.

LECTOTYPE: WESTERN AUSTRALIA: In saxosis prope catarractam capitis fluvii Cygnorum, *Preiss 1485*, 25 July 1839 (LD 0475). ISOLECTOTYPE: MEL 1521315.

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This work could not have been completed without the able assistance of Sue Cooke (née Dyer) and David Salt, and I am indebted to them for so much of the mundane work associated with this project and many of the draft descriptions. Belinda Pellow also helped substantially. The Australian Biological Resources Survey supplied a grant to assist in this research and the University of Sydney has consistently supported the program over a number of years.

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Appendix 1

Terminal taxa arranged in alphabetical order showing constituent taxa

- ACAC *S. acacioides* is not included since some important data are lacking.
- AEMU *S. aemula*, *S. amblyanthera*, *S. humilis*
- ALBI *S. albida*
- ANCH *S. anchusifolia*, *S. enneaba*
- ANGS *S. angustata*
- ANGU *S. angulata*
- AURI *S. auriculata*, *S. microphylla*
- BASE *S. basedowii*
- BECK *S. beckii*
- BROO *S. brookeana*
- BROW *S. browniana*
- BURS *S. bursariifolia*
- CALE *S. calendulacea*
- CANE *S. canescens*, *S. spicigera*
- CHAM *S. chamissoniana*, *S. gaudichaudiana*, *S. procera*
- CHRY *S. chrysopogon*
- COCC *S. coccinea*
- COLL *S. collaris*
- CORI *S. coriacea*
- CRAS *S. crassifolia*
- CUNE *S. cuneiformis*
- CUNN *S. cunninghamii*
- DENS *S. densifolia*
- DEPA *S. depauperata*
- FRUT *S. sericea*
- GAUD *S. gaudichaudii*
- GLAB *S. glabra*
- GLAT *S. glabrata*
- GLAN *S. glandulifera*
- GLOB *S. globulifera*
- GLUT *S. glutinosa*
- GRAC *S. gracilis*, *S. porrecta*
- GRAM *S. graminea*
- HAMI *S. hamiltonii*
- HOOK *S. hookeri*

HUMI	<i>S. humifusa</i>
KILA	<i>S. kilaueae</i>
LACI	<i>S. laciniata</i>
LANC	<i>S. lanceolata</i>
LINE	<i>S. linearis</i> , <i>S. paludosa</i>
MACR	<i>S. macrostachya</i>
MARQ	<i>S. marquesensis</i>
MOLL	<i>S. mollis</i>
MONT	<i>S. montana</i> , <i>S. indigofera</i> , <i>S. tahitensis</i> , <i>S. floribunda</i>
MYRT	<i>S. myrtifolia</i>
NITI	<i>S. nitida</i>
NIGR	<i>Nigromnia globosa</i>
OPPO	<i>S. oppositifolia</i>
OVAL	<i>S. ovalifolia</i>
OXYC	<i>S. oxyclona</i>
PARB	<i>S. parvibarbata</i>
PARV	<i>S. parvifolia</i>
PAUC	<i>S. pauciflora</i> , <i>S. verticillata</i>
PILO	<i>S. pilosa</i>
PLAT	<i>S. platyphylla</i> , <i>S. macrophylla</i>
PLUM	<i>S. plumieri</i> , <i>S. socrataensis</i> , <i>S. hainanensis</i>
PORO	<i>S. porocarya</i>
PROC	<i>S. procera</i>
PULC	<i>S. pulchella</i>
RACI	<i>S. racimigera</i>
RAMO	<i>S. ramosissima</i>
REPE	<i>S. repens</i> , <i>S. oldfieldii</i>
REST	<i>S. restiacea</i>
REVO	<i>S. revoluta</i>
SERI	<i>S. sericophylla</i>
SPIN	<i>S. spinescens</i>
STRI	<i>S. striata</i> , <i>S. calliptera</i> , <i>S. phlebopetala</i>
SUBC	<i>S. subcapitata</i>
TENU	<i>S. tenuifolia</i>
THES	<i>S. thesioides</i>
TOME	<i>S. tomentosa</i>
TORT	<i>S. tortuosa</i>
VIRG	<i>S. virgata</i>

Appendix 2

List of characters used in the cladistic analysis

1. Shrubs and climbers: 0; undershrubs: 1; multicaulate from a stock: 2.
2. Viscid on young parts: 0; not viscid on young parts: 1.
3. Stems not ribbed: 0; stems ribbed: 1.
4. Cauline leaves normally developed: 0; cauline leaves reduced to triangular 'scales' less than 5 mm long: 1.
5. Leaf base not stem-clasping: 0; leaf base stem-clasping: 1.
6. Simple hairs present: 0; simple hairs absent: 1.
- 7 and 8. Glandular hairs absent: 00; glandular hairs with \pm globular heads: 01; glandular hairs peltate: 02; glandular hairs pseudostellate: 11.
9. Compound thyrse: 0; thyrse reducing to a raceme or spike above: 1; raceme or spike: 2.

10. Inflorescences mostly terminal: 0; inflorescences mostly axillary: 1.
11. Bracts all \pm same size as leaves: 0; bracts reducing in size towards apex: 1; bracts mostly reduced: 2.
12. Bracts without marginal bristles: 0; bracts with marginal bristles: 1.
13. Bracteoles similar to leaves but smaller: 0; bracteoles much smaller than leaves, \pm lanceolate: 1; bracteoles minute: 2.
14. Flowers pedunculate: 0; peduncle almost obsolete: 1.
15. Sepals mostly $>$ 1.5 mm long: 0; sepals $<$ or = 1.5 mm long: 1.
16. Sepals free: 0; sepals connate with distinct lobes sepals: 1; connate into an undulate rim: 2.
17. Corolla not bearded inside: 0; corolla bearded inside: 1.
18. Barbulae broad (mostly 0.2 mm wide or more), flat: 0; barbulae narrow ($<$ 0.2 mm wide) \pm terete: 1.
19. Stiff hairs in place of barbulae: 0 (does not occur in *Scaevola*); barbulae aculeate with stiff hairs: 1; barbulae papillate at top: 2; barbulae simple: 3; barbulae absent: 4.
20. Apex of anther glabrous: 0; apex of anther hairy: 1;
21. Hairs present on lips of indusium: 0; hairs absent from lips of indusium: 1.
- 22, 23 and 24. Indusium with hairs scattered over the upper surface: 000; indusium with a few basal hairs on the upper surface: 010; indusium glabrous on the upper surface: 020; indusium with a stiff erect beard at the base on the upper surface equalling or exceeding the bristles on the lips: 100; indusium with a short flat beard on the upper surface: 200; indusium with a short flat dense beard on upper surface: 101.
25. Mesocarp dry : 0; mesocarp fleshy: 1.
26. Fruit with four fertile locules: 0; fruit with two fertile locules and two sterile locules: 1; fruit with two fertile locules only: 2; fruit with only one fertile locule: 3.
27. Endocarp smooth: 0; endocarp rugose: 1.
28. Fruit glabrous: 0; fruit hairy: 1.
29. Flower pedicillate: 0*; flower sessile in bracteoles: 1.

Appendix 3

Character states of terminal taxa

Outgroup	10000	00110	00000	00000	00000	0000
<i>S. sericea</i>	00000	00100	00100	01010	00001	1100
<i>S. plumieri</i>	00000	00100	00101	11010	00001	1101
<i>S. coriacea</i>	00000	11120	00201	21?00	00001	1001
<i>S. kilaueae</i>	00000	11100	00101	20010	00001	1101
<i>S. gaudichaudii</i>	00000	11120	00101	20?40	00001	1001
<i>S. chamissoniana</i>	00000	01100	00101	20?40	00201	1001
<i>S. mollis</i>	00000	11110	00101	10?40	00201	1001
<i>S. spinescens</i>	00000	01121	00101	21120	00001	2001
<i>S. bursariifolia</i>	01000	01120	00111	21120	00001	2001
<i>S. myrtifolia</i>	01000	01120	00101	21120	00201	2001
<i>S. tomentosa</i>	00000	01121	00001	21130	00201	2001
<i>S. montana</i>	00000	00100	00100	01010	00001	1111

<i>S. beckii</i>	00000	00011	20101	00110	00201	1001
<i>S. glabra</i>	00000	10020	00210	01?40	00201	1000
<i>S. coccinea</i>	00000	10020	00210	01?40	00201	1000
<i>S. subcapitata</i>	00000	00000	20210	01?41	00201	1101
<i>S. marquesensis</i>	00000	10000	00100	11?40	00201	1100
<i>S. racimigera</i>	00000	00020	20211	01120	00001	1001
<i>S. pauciflora</i>	00010	00?20	20211	01120	00011	1001
<i>S. oppositifolia</i>	00000	10100	01000	01030	01001	111
<i>S. hookeri</i>	20000	10110	00100	00030	01010	211
<i>S. ramosissima</i>	20000	10110	00100	00021	01010	211
<i>S. pilosa</i>	20000	10110	00100	01021	01010	211
<i>S. tenuifolia</i>	20000	10110	00110	10121	01010	111
<i>S. striata</i>	20000	10110	00100	01021	01010	211
<i>S. restiacea</i>	20110	10010	10210	01020	01010	211
<i>S. chrysopogon</i>	20110	10110	10210	01020	01000	211
<i>S. oxyclona</i>	20010	10010	10110	01020	01000	211
<i>S. hamiltonii</i>	20110	10110	10110	01120	01000	211
<i>S. tortuosa</i>	20110	10110	10200	01120	00000	211
<i>S. basedowii</i>	20110	10110	10200	11130	01000	211
<i>S. parvifolia</i>	20010	10110	10210	01130	01000	211
<i>S. depauperata</i>	20110	10110	10200	11130	01000	211
<i>S. angulata</i>	20110	10010	00010	01130	00100	210
<i>S. pulchella</i>	20000	10120	10111	01120	00100	211
<i>S. collaris</i>	20000	00020	00211	00020	00200	210
<i>S. crassifolia</i>	01000	00220	20111	20120	00200	100
<i>S. angustata</i>	01000	00220	20111	21120	00200	200
<i>S. nitida</i>	01000	10220	20111	21120	00200	100
<i>S. thesioides</i>	11000	10220	20111	21120	00200	100
<i>S. globulifera</i>	11000	00220	10111	21120	00100	210
<i>S. porocarya</i>	01000	00220	10111	21120	00100	000
<i>S. cunninghamii</i>	01000	10220	10101	21120	00100	100
<i>S. browniana</i>	10000	10120	10111	21120	10100	210
<i>S. revoluta</i>	11000	10120	21111	20120	10100	210
<i>S. macrostachya</i>	10000	10020	11111	20120	00100	210
<i>S. glandulifera</i>	10000	10120	11111	21120	00100	210
<i>S. anchusifolia</i>	20000	10120	11111	11120	00100	210
<i>S. lanceolata</i>	20000	10120	20111	21120	00100	210
<i>S. virgata</i>	20000	10120	20011	20120	00100	210
<i>S. gracilis</i>	20000	10120	10110	00020	10001	210
<i>S. calendulacea</i>	20000	10120	10111	21120	10001	210
<i>S. canescens</i>	20000	10121	10111	20130	10100	311
<i>S. sericophylla</i>	00000	10121	10111	20130	10100	310
<i>S. repens</i>	20000	10121	10111	21130	10100	310
<i>S. brookeana</i>	00001	00200	00211	01120	00000	110
<i>S. linearis</i>	20000	10121	10111	20120	10100	311
<i>S. humifusa</i>	20000	10021	10111	01120	10100	310
<i>S. albida</i>	20000	10020	00111	01120	12010	311
<i>S. parvibarbata</i>	20000	10020	00111	01120	02010	211
<i>S. ovalifolia</i>	20000	10120	00111	11130	02010	211
<i>S. glabrata</i>	20000	00020	00111	11130	02010	211
<i>S. glutinosa</i>	20001	10120	00111	21130	02000	211
<i>S. densifolia</i>	20000	10120	00111	11130	01000	211

<i>S. cuneifolia</i>	20000	10120	00010	01120	01000	211
<i>S. aemula</i>	20000	10120	00011	01130	01000	211
<i>S. graminea</i>	20000	00020	00011	01130	01000	211
<i>S. laciniata</i>	20000	00120	00011	11130	01000	211
<i>S. microphylla</i>	20001	10120	00111	01120	01000	211
<i>S. auriculata</i>	20001	10120	00111	01120	01000	211
<i>S. platyphylla</i>	20001	10120	00110	01130	01000	211
<i>Nigromnia globosa</i>	00000	10121	10111	20130	10100	310

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<i>G. scapigera</i> R. Br.	507
<i>G. tenella</i> R. Br.	507
<i>Merkusia glandulifera</i> DC. var. <i>eglandulosa</i> Vriese	500
<i>M. macrostachya</i> Vriese	497
<i>M. myrtifolia</i> Vriese	492
<i>Molkenboeria macrophylla</i> Vriese	506
<i>M. microphylla</i> Vriese	506
<i>Nigromnia globosa</i> Carolin	504
<i>Scaveola acaciodes</i> Carolin, sp. nov.	491
<i>S. aemula</i> R. Br.	506
<i>S. anchusifolia</i> Benth.	500
<i>S. angulata</i> R. Br.	495
<i>S. apterantha</i> F. Muell.	493
<i>S. arenaria</i> E. Pritzel	504
<i>S. auriculata</i> Benth.	506
<i>S. benthamea</i> Vriese	493
<i>S. browniana</i> Carolin, sp. nov.	498
<i>S. browniana</i> Carolin subsp. <i>grandior</i> Carolin, subsp. nov.	499
<i>S. bursariifolia</i> J. Black.	492
<i>S. caespitosa</i> R. Br.	497
<i>S. calendulacea</i> (Kennedy) Druce	502
<i>S. callifera</i> Benth.	493
<i>S. candollei</i> Vriese	507
<i>S. canescens</i> Benth.	503
<i>S. chrysopogon</i> Carolin, sp. nov.	494
<i>S. cunninghamii</i> D.C.	497
<i>S. cunninghamii</i> var. <i>hispida</i> Benth.	497
<i>S. densifolia</i> Carolin, sp. nov.	505
<i>S. depauperata</i> R. Br.	495
<i>S. depressa</i> Vriese	503
<i>S. encabba</i> Carolin, sp. nov.	500

<i>S. fastigiata</i> Vriese	496
<i>S. flaccida</i> Vriese	497
<i>S. geniculata</i> Vriese	508
S. glandulifera D.C.	500
<i>S. glandulifera</i> DC. var. <i>tenuis</i> E. Pritzel	500
<i>S. glaucescens</i> Vriese	503
S. globosa (Carolin) Carolin, comb. nov.	504
<i>S. globulifera</i> Labill.	497
<i>S. globulifera</i> Labill. var. <i>humilis</i> Benth.	497
S. glutinosa Carolin, sp. nov.	504
<i>S. groeneri</i> F. Muell.	492
S. hamiltonii K. Krause	493
S. holosericea Vriese	500
S. humifusa Vriese	503
<i>S. humifusa</i> var. <i>pulvinaris</i> E. Pritzel	503
S. humilis R. Br.	506
S. lanceolata Benth.	501
<i>S. linearis</i> R. Br.	504
<i>S. linearis</i> R. Br. var. <i>confertifolia</i> J. Black	504
<i>S. longifolia</i> Vriese	501
S. lyratifolia Vriese	508
S. macrophylla (Vriese) Benth.	506
S. macrostachya (Vriese) Benth.	497
S. microphylla (Vriese) Benth.	506
<i>S. multiflora</i> Lindley var. <i>microstachya</i> Vriese	496
S. myrtifolia (Vriese) K. Krause	492
S. nitida R. Br.	496
S. oldfieldii F. Muell.	503
S. ovalifolia R. Br.	504
S. pallida R. Br.	506
S. paludosa R. Br.	504
<i>S. paniculata</i> Vriese	497
S. parvifolia F. Muell. ex Benth. subsp. pilbarae Carolin, subsp. nov.	494
S. parvifolia F. Muell. ex Benth. subsp. acuminata Carolin, subsp. nov.	495
<i>S. patens</i> F. Muell.	495
S. phlebopetala F. Muell.	493
S. platyphylla Lindley	506
<i>S. prostrata</i> Vriese	493
<i>S. pterosperma</i> Vriese	508
S. pulchella Carolin, sp. nov.	496
S. pulvinaris (E. Pritzel) K. Krause	503
<i>S. pusilla</i> Vriese	507
S. ramosissima (Sm.) K. Krause	493
<i>S. reinwardtii</i> Vriese	508
S. repens Vriese	503
S. repens Vriese var. angustifolia Vriese	503
S. revoluta R. Br.	499
S. revoluta R. Br. subsp. revoluta var. viscida Carolin, var. nov.	499

S. revoluta subsp. stenostachya (<i>W. Fitzg.</i>) <i>Carolin, stat. nov.</i>	500
<i>S. revoluta</i> R. Br. var. <i>strigosa</i> Vriese	497
<i>S. rufa</i> Vriese	500
<i>S. scabrida</i> W. Fitzg.	497
S. sericophylla <i>F. Muell. ex Benth.</i>	503
<i>S. sinuata</i> R. Br.	506
<i>S. sphaerocarpa</i> Vriese	500
S. spicigera <i>Carolin, sp. nov.</i>	502
S. spinescens <i>R. Br.</i>	491
<i>S. stenostachya</i> W. Fitzg.	500
S. striata <i>R. Br.</i>	493
S. striata <i>R. Br.</i> var. <i>arenaria</i> <i>E. Pritzel.</i>	493
<i>S. stricta</i> Vriese.	507
<i>S. suaveolens</i> <i>R. Br.</i>	502
S. tahitensis <i>Carlquist.</i>	491
<i>S. tenera</i> Vriese.	507
<i>S. tenera</i> var. β <i>pauciflora</i> Vriese	507
S. tenuifolia <i>Carolin, sp. nov.</i>	492
S. thesioides <i>Benth.</i>	497
S. thesioides <i>Benth.</i> var. <i>filifolia</i> <i>E. Pritzel</i>	497
<i>S. trinervis</i> Vriese	503
<i>S. umbellata</i> Vriese.	507
S. α. procumbens <i>Vriese</i>	507
S. β. denticulata <i>Vriese</i>	507
S. γ. spathulata <i>Vriese.</i>	507
<i>S. verreauxii</i> <i>F. Muell.</i>	508
S. virgata <i>Carolin, sp. nov.</i>	501
<i>Temminckia macrophylla</i> Vriese	508
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