

***Daviesia spiralis* and *D. debilior* (Leguminosae: Papilionoideae),  
two new species occurring in the Wongan Hills, Western  
Australia**

M.D. Crisp

Herbarium, National Botanic Gardens, P.O. Box 158, Canberra City, A.C.T. 2601

**Abstract**

Crisp, M.D. *Daviesia spiralis* and *D. debilior* (Leguminosae: Papilionoideae), two new species occurring in the Wongan Hills, Western Australia. Nuytsia 4 (1): 9-16 (1982). Two new species occurring in the Wongan Hills, Western Australia, are described and illustrated. *Daviesia spiralis* is endemic to the Hills and has twisted leaves which are unique in the genus. *Daviesia debilior* includes two subspecies and extends northward to Eneabba.

***Daviesia spiralis* Crisp, sp. nov. (Figure 1)**

Ab omnibus speciebus *Daviesiae* foliis linearibus in spiram dextrorsum (externe visam) tortis facile dignoscenda. *Frutex* intricatus; *stipulae* adsunt; *racemi* floribus 1-2; *calyx* labio superno truncato emarginato; *carina* subulata inflexa, in dimidio superno supervolutiva.

*Typus*: 28 km from Piawaning along road to Wongan Hills town, 30°50'S, 116°39'E, 26 Jan. 1979, M.D. Crisp 5491, fl., fr., spirit material, photos (holo: CBG; iso: CBG, K, NSW, PERTH, US).

Intricate, rounded *shrub* to 1.5 m tall and broad; *branchlets* ribbed, muriculate. *Phyllodes* alternate, ascending, decurrent, linear, twisted into a right-handed spiral (as viewed externally), apically attenuate and uncinata, to 100 x 3 mm, much reduced towards branchlet apices, muriculate, with a central and two marginal ribs but no visible veins. *Stipules* minute,  $\leq$  0.5 mm long. *Racemes* 1-few per axil, 1-2-flowered; *rhachis* 2-8 mm long. *Pediceles* narrowly clavate, 5-18 mm long. *Calyx* campanulate, 4-4.5 mm long; upper two lobes united in a truncate emarginate lip; lower three lobes triangular, 1.5 mm long. *Standard* lamina transverse-broad-elliptic, emarginate, slightly cordate, 6.5-7.5 x 8-10 mm, with two parallel ridge-like callosities on either side of the centre line towards the base, yellow, the centre with a rich yellow, bilobed marking bordered with a red infusion; claw c. 1 mm long; *wings* irregularly obovate, pouched, shortly beaked, auriculate, reddish; claw c. 1.5 mm long; *keel* subulate, inflexed, supervolute in upper half, very acutely beaked, shallowly auriculate, reddish grading to maroon at apex; claw c. 1.5 mm long. *Stamens* almost uniform, inflexed; anthers ovoid, basifixed. *Ovary* subsessile, narrow-oblong; style inflexed; stigma capitate, minute. *Pod* compressed, obliquely half ovate, long acute, 10-13 x 4.5-5 mm; *seed* compressed, ovoid-elliptic, 3-4 x 2-2.5 mm, pale brown speckled with black; hilum lateral; aril conspicuous, c. 1.5 mm long.

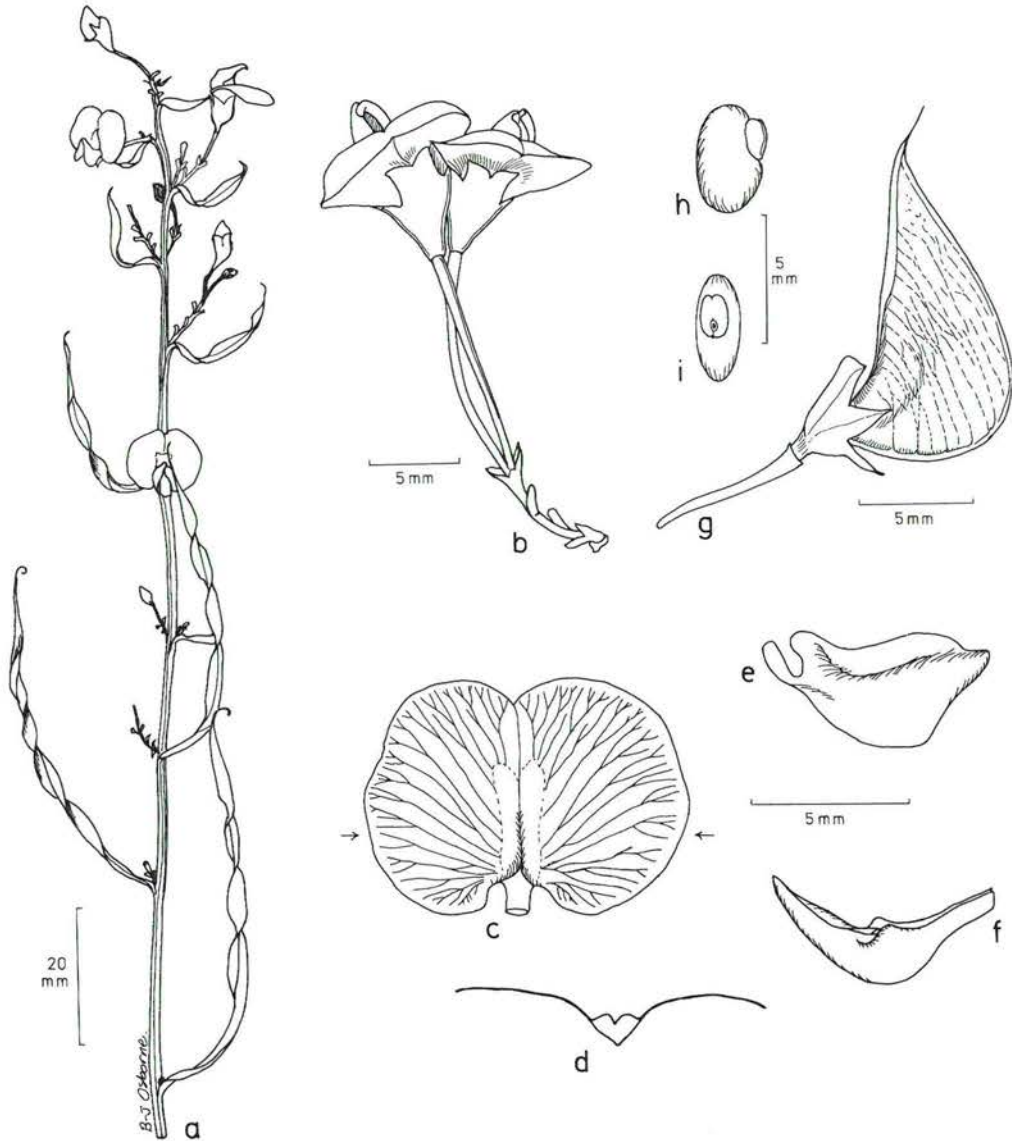


Figure 1. *Daviesia spiralis*. a—branchlet. b—inflorescence. c—standard. d—transection of standard in plane indicated by arrows on c. e—wing, claw at left. f—keel, claw at right. g—pod. h—seed, lateral view, radicular end downwards. i—seed, hilar view.

a from *K. F. Kenneally* 2303; b—i from the type, *M. D. Crisp* 5491. a, b and g drawn by B.-J. Osborne.

**Additional specimens examined.** WESTERN AUSTRALIA: Laterite gully adjacent to Fowlers Gully, S end of Wongan Hills, 194 km N of Perth, *K. F. Kenneally* 2303 (PERTH); "The Gap" between Elphin Railway Siding and T. V. Translator Tower, Wongan Hills, 30°50'S, 116°40'E, *K. F. Kenneally* 7155 (PERTH).

**Distribution.** Western Australia, Avon district, endemic in the Wongan Hills. Within the Hills there are 500 or more plants scattered in four or more populations over a range of at least 10 km (B. Rye, personal communication).

*Habitat.* *Daviesia spiralis* appears to grow exclusively in laterite-derived clay and gravel. It is associated with mallee shrubland dominated by *Eucalyptus eudesmioides*, *E. ebbanoensis*, *E. drummondii* and *Casuarina campestris*, with *Dryandra comosa* and *D. pulchella* common. However, like many species of *Daviesia* it tends to be most numerous in openings in the vegetation, especially at the type locality, where it has invaded the road cutting (B. Rye, personal communication, partly). At the type locality, it is associated with the type population of *D. debilior* subsp. *sinuans* (q.v.).

*Conservation status.* Vulnerable, coded 3V (criteria from Leigh, Briggs & Hartley, 1981).

*Flowering period.* September to January. *Fruiting period.* December to February.

*Affinity.* *Daviesia spiralis* is a most distinctive species, apparently without close relatives within the genus. Apart from the twisting of the leaves, it is vegetatively similar to *D. elongata* Benth. and *D. costata* Cheel, but is quite different in floral morphology and inflorescence. The flowers, fruits, seed and to some extent, the inflorescence of *D. lancifolia* Turcz. resemble those of *D. spiralis*, but there is no similarity in vegetative morphology. Taken together, the spiral leaves, the presence of stipules, the 1-2-flowered racemes, the truncate emarginate upper calyx lip and the subulate inflexed supervolute keel readily distinguish *D. spiralis* from all other *Daviesia* species.

*Etymology.* The specific epithet is from the Latin word *spira*, for anything coiled, wreathed or twisted, and refers to the spirally twisted leaves.

### ***Daviesia debilior* Crisp, sp. nov. (Figure 2)**

*Frutex* caulibus procumbentibus et ramulis ad 0.6 m debile adscendentibus; ramuli phyllodiaque prominenter costati; *phyllodia* in squamas ad nodos supernos vel in planta omni deminuta, angulata compressa vel versus basin caulium complanata, inermia; *bracteeae* magnae, conchatae, imbricatae, alabastra includentes; *calyx* lobis supernis binis fere ad apicem connatis; *legumen* oblique transversum-latum-obtriangulare, sutura inferna integra. Ad *D. hakeoidem* Meisn. et *D. junceam* Sm. arte cognata.

*Typus:* 13 km S of Eneabba-Lake Indoon road, from 7 km SW of Eneabba, 29°57'S, 115°12'E, 19 June 1977, C. Chapman (21B)77, fl. (holo: CBG; iso: K, PERTH).

*Shrub* with procumbent stems and many weakly ascending branchlets, to 0.6 m tall x 1.5 m broad; *branchlets* angular, 1-2 mm diam., prominently ribbed, even when fresh. *Juvenile phyllodes* flat but thick, narrowly spatulate, 20-50 x 4-8 mm, with midrib, thickened margins, and many ascending anastomosing raised veins; *intermediate phyllodes* longer and narrower than juveniles, usually present at base of mature plants. *Adult phyllodes* alternate, decurrent, reduced to minute scales at upper few nodes or over the entire plant, ascending, angular or compressed, linear, mucronate, unarmed, 0-120 x 0.4-2 mm, with several prominent ribs. *Stipules* minute or absent. *Racemes* 1 per axil, 2-4-flowered, very condensed; rhachis to 2 mm long; bracts numerous, shell-shaped, large, imbricate, enclosing buds, striate; bracts subtending pedicels spreading, obovate, tridentate, c. 3 x c. 2 m. *Pedicel* filiform, 1-3 mm long. *Calyx* obconical to campanulate, 1.5-2 mm long; upper two lobes more or less united

or with a very shallow sinus; lower three lobes triangular, acute, 0.2-0.4 mm long. *Standard* transverse-broad-elliptic, emarginate, cordate, deeply centrally grooved, 5-5.5 x 6-6.5 mm on a 1.5 mm claw, yellow infused with purple-black or red towards the centre and with a vertical yellow line towards the base in front, deep orange-pink to purple behind; *wings* obovate, auriculate, clawed, apically incurved, orange-pink; *keel* semicircular, falcate, with a long narrow pouch, acute, slightly auricled, clawed, dark purple-red. *Stamens* with filaments equal, incurved; anthers basifixed, alternately globular and narrow-ovoid. *Ovary* broadly stipitate; style subulate, inflexed. *Pod* strongly compressed, obliquely transverse-broad-obtriangular, shortly acuminate, 14-17 x 9-10 mm; *seed* compressed, ovoid, 3.5 x 2.5 mm, tan with obscure grey markings; hilum lateral; aril thickly lobed, 1.75 mm long.

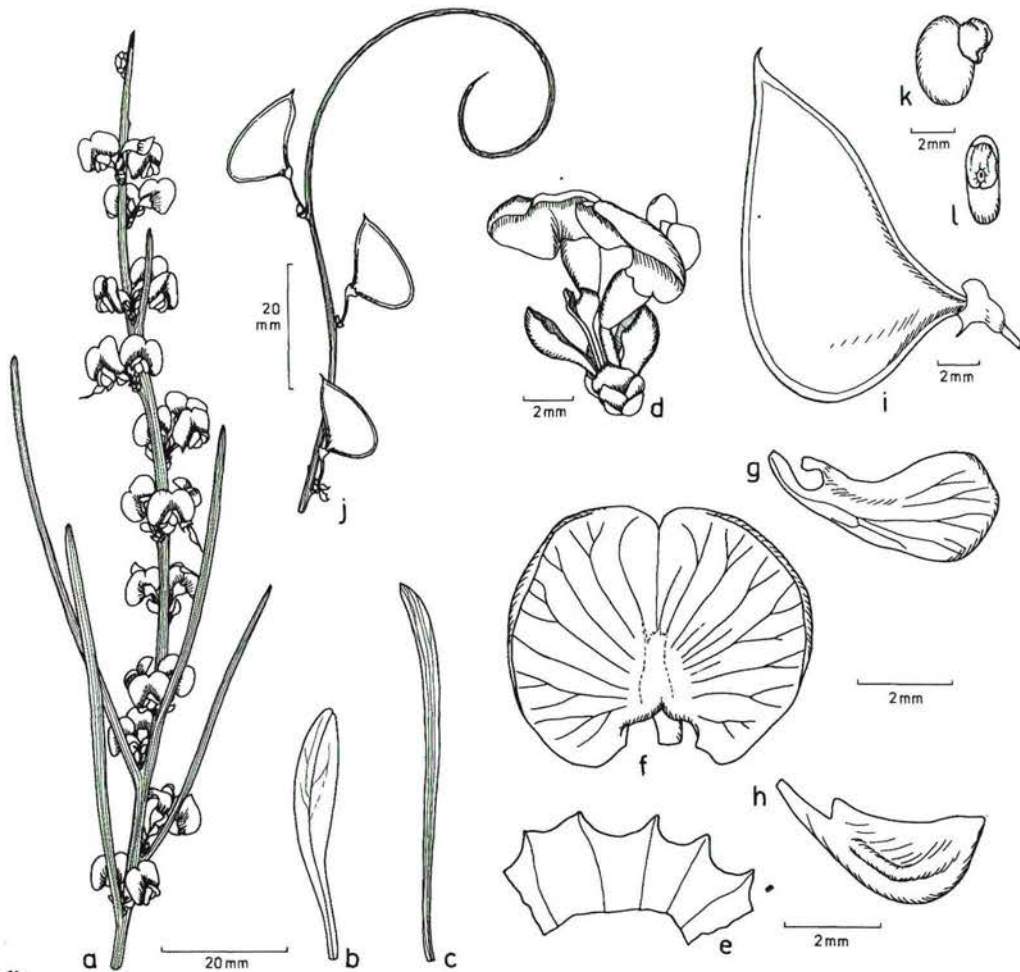


Figure 2. *Daviesia debilior* subsp. *debilior* (a-i). a—branchlet. b—juvenile phyllode. c—intermediate phyllode. d—inflorescence. e—calyx opened out, upper lobes at left. f—standard. g—wing. h—keel. i—pod. *D. debilior* subsp. *sinuans* (j-l). j—branchlet. k—seed, lateral view, radicular end downwards. l—seed, hilar view.

a from the type, C. Chapman (21B)77; b—h from C. Chapman s.n., 17 May 1979 (CBG 8004030); i from C. Chapman (66)77; j from E. H. Ising s.n., 10 Sep. 1926 (AD 97622028); k and l from H. Demarz 1854 (Kings Park). a-d, i and j drawn by A. Prowse.

*Etymology.* The epithet is the comparative degree of the Latin adjective *debilis*, meaning weak, and refers to the relatively feeble habit and unarmed phyllodes, which distinguish the new species from its near relative *D. hakeoides*.

*Affinity.* *Daviesia debilior* belongs to an endemic Western Australian group with numerous moderately enlarged imbricate bracts and frequently leafless branchlets. This group is not to be confused with *Daviesia* series *Involucratae* (Endl.) Benth. in which the bracts are few, enormous and leaf-like. There are several undescribed species in the *D. debilior* group but most of these are easily distinguished. All but one of the species in the group have a more erect, stronger habit than *D. debilior*. *D. hakeoides* Meisn. and *D. juncea* Sm. non (Schrad. et Wendl.) Pers. are the only close relatives of *D. debilior* which have been previously described.

*Daviesia hakeoides* is easily recognized by its pungent phyllodes. Specimens of *D. hakeoides* var. *subnuda* Benth. may appear leafless, but they always have some pungent phyllodes at least 2-3 mm long, which is immediately obvious when a finger is run down the branchlet. *Daviesia hakeoides* also differs from *D. debilior* in having pods which are prominently beaked because the lower suture is indented near the apex. In *D. debilior* subsp. *debilior* (q.v.) there is an abrupt transition from fully developed phyllodes to minute scale leaves part-way up the branchlet (Figure 2a). By contrast, the phyllodes of *D. hakeoides* var. *hakeoides* reduce gradually all the way up the branchlet, this being the typical condition in the genus.

*Daviesia juncea* and a closely related undescribed species are leafless like *D. debilior* subsp. *sinuans* (q.v.), but both differ from it in having larger flowers (standard lamina 6.5-8 mm long, calyx 2.5-3 mm long), differently shaped calyces, and branchlets which are more terete and striate than angular and ribbed.

*Daviesia debilior* includes two morphological variants which, because they have parapatric distributions, are best treated as subspecies.

#### Key to subspecies

1. Phyllodes present at least on lower parts of branchlets . . . . . subsp. *debilior*  
     Phyllodes all reduced to minute scales . . . . . subsp. *sinuans*  
 subsp. **debilior** (Figure 2 a-i)

*Branchlets* gently upcurved, not or slightly sinuous, not glaucous; *phyllodes* developed, except towards branchlet apices where they are abruptly reduced to minute scales, angular or compressed, linear, up to 120 x 2 mm, prominently many-ribbed.

*Specimens selected from 15 examined.* WESTERN AUSTRALIA: **Irwin district:** 60 km from Three Springs on road to Eneabba, c. 2 km E of Eneabba, 29°48'S, 115°18'E, *C. Chapman* (16)77 (CBG, PERTH); 2 km SW of Eneabba, 29°50'S, 115°15'E, *M. D. Crisp* 5451 (CBG, MEL); 13 km S of Eneabba-Lake Indoon road, from 7 km SW of Eneabba, 29°57'S, 115°12'E, *C. Chapman* (21)77 (AD, CBG); *ibid.*, *C. Chapman* (21C)77 (CBG, NSW); *ibid.*, *C. Chapman* (22)77 (CBG, US); *ibid.*, *C. Chapman* (66)77 (CBG, PERTH); 9.2 km N of Coorow-Green Head road along Eneabba south road, 30°00'S, 115°12'E, 17 May 1979, *C. Chapman* s.n. (CBG 8004030, MEL, PERTH). **Darling district:** Wannamal, 31°10'S, 116°03'E, *B. C. Crisp* 483 (CBG); Darlington, Darling Range, 19 July 1902, *A. Morrison* s.n. (E, PERTH).

*Distribution* (Figure 3). Western Australia, Irwin and Darling districts; mainly localised around Eneabba, also at Wannamal on the Geraldton Highway and at Darlington near Perth.

*Habitat*. Subspecies *debilior* usually grows in shallow sand overlying lateritic gravel and clay, although one collection was taken from gravelly clay with no sand. The vegetation is heath, and there are usually several other *Daviesia* species present.

*Flowering period*. May to July. *Fruiting period*. September.

*Conservation status*. Vulnerable, coded 3V (criteria from Leigh, Briggs & Hartley, 1981). Although the subspecies is locally common in its occurrences around Eneabba, all the sites are mere roadside relicts of the originally extensive heathland. Its extent at the two southern localities is unknown, but is unlikely to be great, because only one specimen has been obtained from each of these well-collected areas.

subsp. **sinuans** Crisp, subsp. nov. (Figure 2 j-l)

*Ramuli* sinuantes, ad apicem gracillimi (c. 0.5 mm diam.) interdum crispi, aliquando glaucescentes; *phyllodia* omnino in squamas redacta.

*Branchlets* very weakly ascending, becoming sinuous, occasionally glaucescent, the tips usually very slender (c. 0.5 mm diam.) and occasionally curled; *phyllodes* all reduced to scales.

*Typus*: 9 km from Wongan Hills town along road to Piawaning, 30°49'S, 116°39'E, 17 July 1980, M. D. Crisp 6518, fl., fr., spirit material, photos (holo: CBG; iso: AD, K, L, MEL, NSW, PERTH).

*Specimens selected from 15 seen*. WESTERN AUSTRALIA: **Avon district**: Coorow, 29°53'S, 116°01'E, B.C. Crisp 490 (CBG, PERTH); Walebing [ut Whalebing], A.M. Ashby 5148 (AD, CBG); Lake Hinds [ut Hines], Wongan Hills, 10 Sep. 1926, E.H. Ising s.n. (AD 97622028). **Darling district**: Mogumber, Moore River, 12 Nov. 1906, A. Morrison s.n. (AD, K, MEL); 65 mile peg, Great Northern Highway, H. Demarz 1854 (Kings Park Botanic Garden, Perth).

*Distribution*. (Figure 3) Western Australia, Avon and Darling districts; from Coorow south to the Moore River and east to Wongan Hills. This subspecies occurs farther inland than subsp. *debilior*.

*Habitat*. Subspecies *sinuans* appears always to grow on gravelly lateritic clay. Its type locality is also the type locality of *D. spiralis* (q.v.), and the site is described under that species.

*Flowering period*. May to July. *Fruiting period*. October to November.

*Conservation status*. Vulnerable, coded 3V (criteria from Leigh, Briggs & Hartley, 1981). Of the six known occurrences of *D. debilior* subsp. *sinuans*, I am familiar only with the type locality. There it is locally common, but perhaps less abundant than *D. spiralis*. This subspecies also appears to be restricted to relict roadside vegetation in otherwise cleared wheat-farming country.

*Morphological note.* The specimen *B. C. Crisp* 483 has been included under *D. debilior* subsp. *debilior*, but shows some tendency towards subsp. *sinuans*. The branchlets have longer leafless terminal portions than is usual for subsp. *debilior*. In fact, one branchlet has the phyllodes reduced to scales along its entire 30 cm length. In addition, this branchlet is strongly upcurved and almost sinuous. The specimen is from Wannamal, close to localities of subsp. *sinuans* and farther inland than the other localities of subsp. *debilior* (Figure 3).

*Etymology.* The subspecific epithet refers to the tendency of the branchlets to undulate, and is derived from the Latin verb *sinuo*, meaning bend, curve or wind.

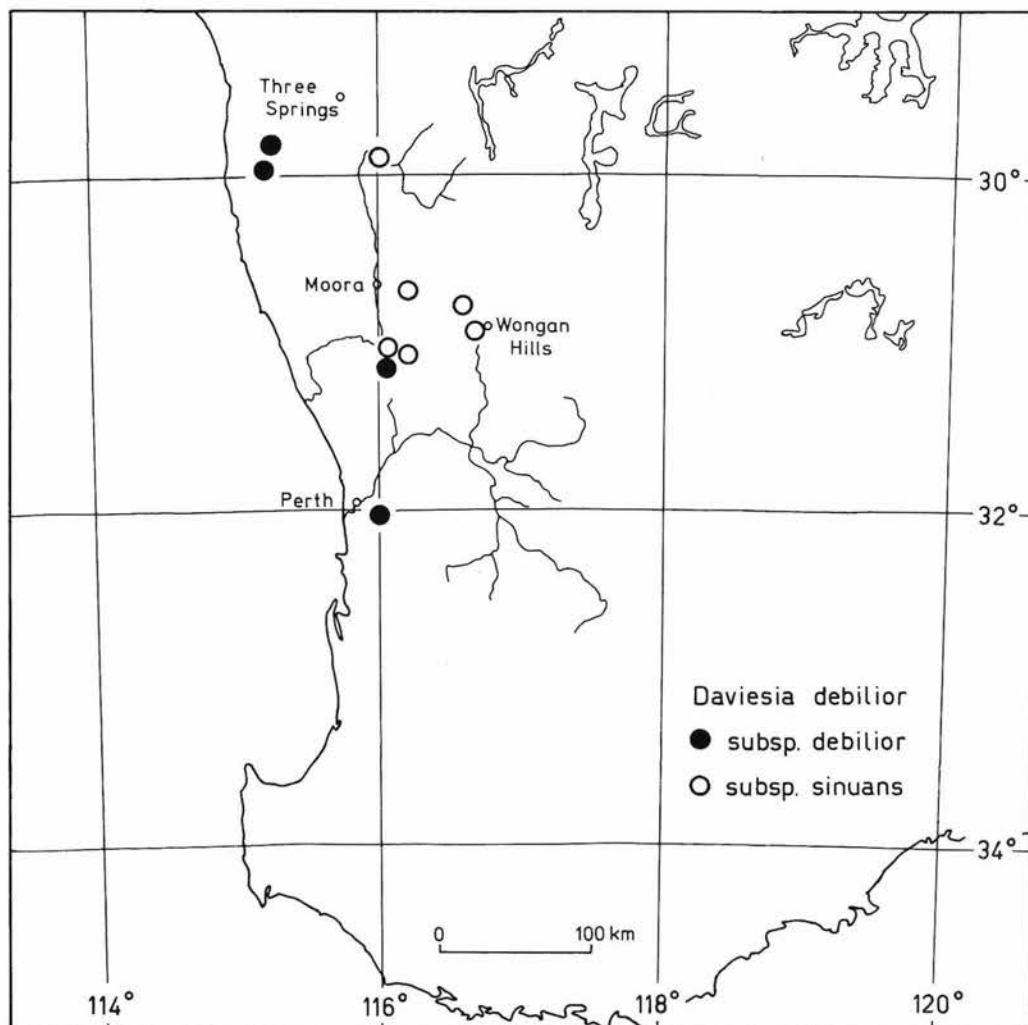


Figure 3. Distribution of *Daviesia debilior* subsp. *debilior* and subsp. *sinuans*.

#### Acknowledgements

This work forms part of a taxonomic revision of the genus *Daviesia* and was assisted by several staff members of the National Botanic Gardens, Canberra. The field work was supported, in part, by a grant from the World Wildlife Fund,

Australia. The illustrations were partly funded by the Bureau of Flora and Fauna, and I thank Betsy Osborne and Anne Prowse for doing the drawings. I am especially grateful to Mr Charles Chapman for his energetic field work, accurate observations, and for his hospitality.

#### **Reference**

- Leigh, J. H., Briggs, J. D. & Hartley, W. (1981). 'Rare or Threatened Australian Plants.' Australian National Parks and Wildlife Service Special Publication 7.