The genus *Porana* (Convolvulaceae) in Australia

G.W. Staples

Harvard University Herbaria, 22 Divinity Avenue
Cambridge, Massachusetts 02138 U.S.A.

Abstract

Staples, G.W. The genus *Porana* Burm. f. (Convolvulaceae) in Australia. Nuytsia 6(1):51-59 (1987). The monotypic, endemic, Australian *Duperreya* Gaud. is discussed as a synonym of *Porana* Burm. f. A new species, *Porana commixta,* long confused with *Porana sericea* (Gaud.) F. Muell., is described and figured. The ranges and ecological preferences of the two species are described. The occurrence of *Porana paniculata* Roxb., which is cultivated as an ornamental, in Australia is documented.

Introduction

Generic delimitation in the Convolvulaceae has been a recurrent and at times intractable problem. Recent revisionary treatments have clarified some generic limits and provided a foundation for reassessing the classification within the family as a whole. Other genera, and even tribes, have not yet been critically examined; *Porana* Burm. f., and the tribe Poraneae are two such taxa. A revision of this genus and an examination of the tribal composition and relationships were begun in 1983. This paper discusses the occurrence of *Porana* in Australia as a preliminary to a generic revision. The single species initially described from this continent was assigned to the monotypic genus *Duperreya* Gaud. Later it was included in *Porana* sensu lato. Subsequent treatments have variously included the Australian plant in *Porana* or maintained the monotypic *Duperreya.* In this paper I present evidence for including the taxon in *Porana* and describe a second, heretofore unrecognized, species. I then discuss the relationships of the two species with others in the genus.

Taxonomic history

In its broadest circumscription the genus *Porana,* with some 49 available specific epithets, included plants from Africa, Madagascar, continental Asia, Malesia, Australia and Middle America. Prior to my work several of these taxa were recognized as extraneous and removed to other genera as follows: the African plants were reassigned to *Neuropeltis* Wall., *Turbina* Raf., and *Metaporana* N. E. Br.; the Madagascan plants to *Metaporana;* the American plants to *Calycobolus* Willd. My own research confirms these assignments and leads to a narrower concept of *Porana* as a genus of about 20 taxa, largely confined to continental Asia, with a few species in Malesia, and two in Australia. Taxonomic treatment of the Australian plants has varied since they were discovered.

The monotypic Australian genus *Duperreya* was described by Charles Gaudichaud in 1826, based on *D. sericea.* Mueller named *Ipomoea modesta* in 1860. Later (1867), after examining fruiting material collected by Drummond, Mueller realized that both these names referred to the same plant, accepted Gaudichaud's epithet, and transferred it to *Porana.*

Duperreya was accepted as a valid genus by George Don (1837), Choisy (in Decandolle 1845), Schneider (in Sargent 1916) and Roberty (1952, 1964). Among those who regarded *Duperreya* as a synonym of *Porana* are Mueller (1867, 1889), Kurz (1873), Peter (in Engler & Prantl 1891), and most Australian floristic treatments, e.g. Bentham (1869), Blackall & Grieve (1974), and Johnson (in Jessop 1981). Both Schneider and Roberty maintained *Duperreya* for the Australian plants although each was aware that Mueller had transferred them to *Porana;* their reasons for doing so are discussed below.

Schneider (1916) was the last to survey the genus *Porana,* albeit incompletely. His purpose was to describe new taxa collected in China by E.H. Wilson, and his synopsis served mainly to propose relationships between his new taxa and those already assigned to the genus. Material, and even the descriptions, of several taxa were unavailable to him. A single fruiting specimen (*J. Drummond* 223 (A)) of the Australian plant was available to him for study. Based on his examination of this sheet, and the literature, Schneider excluded the Australian plant from *Porana* on the basis of its solitary, axillary flowers, linear leaves with short petioles, flower shape, and silky pubescence. Aside from the flower shape, which Schneider could not have observed firsthand, the other characters he enumerated do set the Australian plants apart from the rest of the genus. I believe they should be evaluated in light of the desert habitats where the plants grow; these characters are reinterpreted in the discussion of relationships which follows.

Roberty (1952) divided *Porana* sensu lato into several segregate genera, recognized *Duperreya,* and attempted to ally them with plants of more distant affinities, e.g. *Cardiochlamys* D. Oliver, another genus of the Poraneae, and *Turbina* Raf., a genus belonging to another subfamily. This approach allied morphologically similar plants without carefully analyzing the nature of their similarities, failed to distinguish shared common features from cases of parallel or convergent evolution, and obscured the natural affinities within the family. Like other recent workers, I find little merit in Roberty's superficial system of generic classification and elect to deal only with the nomenclatural changes he effected.

Examination of herbarium material of Australian *Porana* revealed two morphologically distinct entities. After further study it was clear that these are indeed two species, which have long passed under one name. Collections of the Australian plants are few in most herbaria and only when loans from several institutions were examined at one time was sufficient material available for differences to become apparent. The specific epithet *"commixta"* denotes this case of mistaken identity.

Description

1. **Porana commixta** Staples, sp. nov. (Figure 1)

Suffrutex volubilis, ad multos annos cum *P. sericea* confusus, sed indumento argyreo, et sepalis per anthesin anguste elliptico-lanceolatis, post anthesin anguste elliptico-oblongis vel subovatis, differt.

Typus: Western Australia, 52 km W of Wiluna, 29 Aug. 1970, *P. G. Wilson* 8965 (holo: PERTH!; iso: A!, CANB, K!).

Perennial, *suffrutescent twiner* to 4 m. *Indumentum* shining silvery-gray in the dried state, consisting of two-armed hairs, up to 1 mm long; the arms mostly opposite, equal, appressed (Figure 2c, d), occasionally erect and unequal; vegetative organs with equal-armed, appressed hairs, sepals with a few unequal-armed hairs also, the longer arms pointing toward the sepal apex, the corolla with equal numbers of equal and unequal-armed hairs, the longer arms

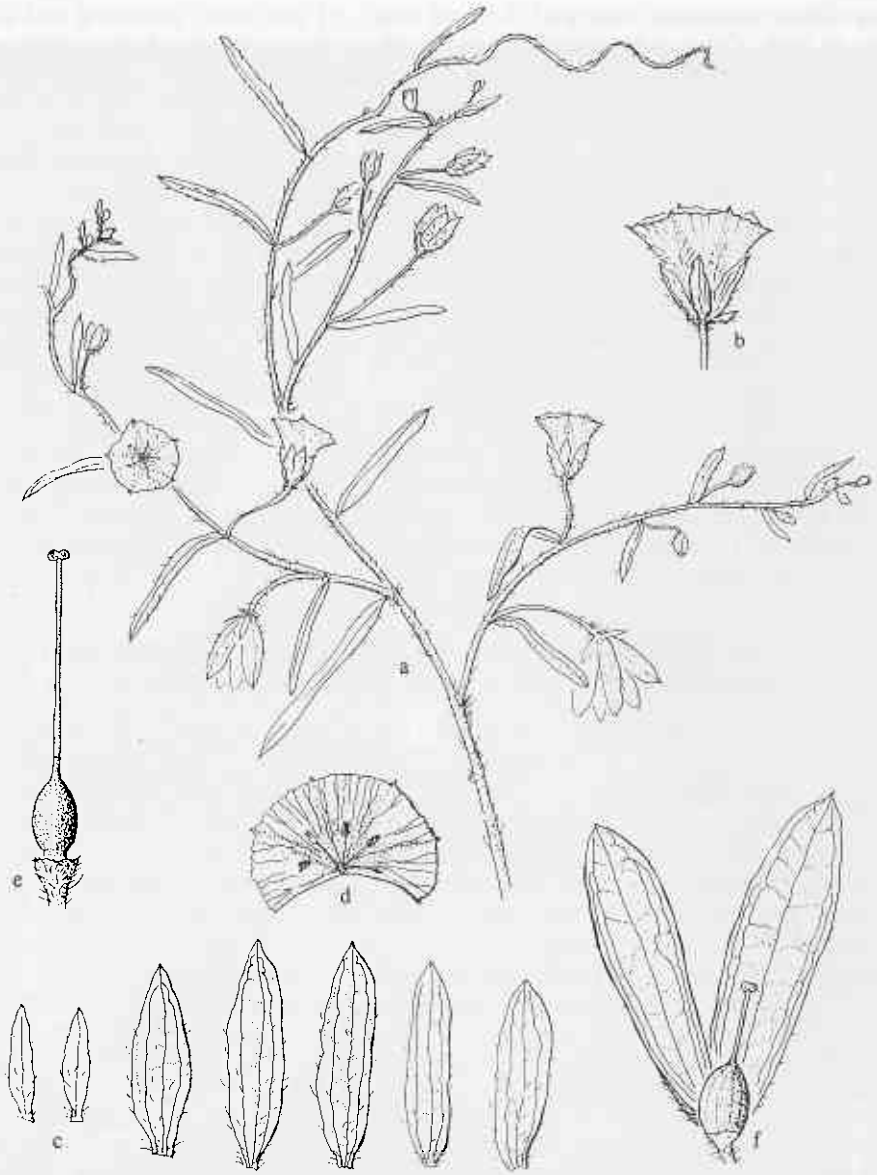

Figure 1. *Porana commixta* Staples, a) habit x1; b) flower x2; c) bracts and sepals, sequentially from outermost (left) to innermost (right) x7; d) corolla opened, with androecium, x2; e) gynoecium x10; f) utricle and fruiting sepals x4; after *Wilson* 8965 (A) and *Mitchell* N657A (A).

pointing toward the corolla apex. *Older stems* woody, cylindrical, smooth to faintly longitudinally fissured, 3-5 mm diameter, glabrate, brownish-red, with sparse paler lenticels, bark peeling with age; younger stems smooth, cylindrical, densely appressed silvery sericeous. *Leaves* alternate, horizontal to erect; *petiole* slender, <1 mm long; *blade* linear to narrowly lanceolate or narrowly oblong, 16-57 x 1.5-5 mm, herbaceous, smooth, densely sericeous and lighter coloured below, sparsely appressed pubescent and darker above, base cuneate to obtuse, margins simple, entire, apex acuminate to acute, rarely obtuse or rounded, midvein prominulous below. Axillary buds densely pubescent. *Flowers* axillary, solitary, epedicellate, erect, diurnal; buds ellipsoidal, apex obtuse. *Peduncle* slender, up to one half the length of the subtending leaf, 6-8 mm long. *Bracts* 2, subopposite, immediately subtending the calyx,

narrowly elliptic- lanceolate, subequal, 2-5 mm long, < 1 mm wide, persisting and slightly enlarging in fruit. *Calyx* quincuncial, imbricate, about ¾ the length of the corolla, which is visible between the sepals. *Sepals* equal in length, outer 2 broader than inner 3, narrowly elliptic to tapering lanceolate, 5-7 x 1-2.5 mm, chartaceous when dry, sparsely pubescent on backs, glabrous within, base rounded to truncate, margins entire, apex acute, visible longitudinal nerves 3; sepals accrescent in fruit, all approximately equally enlarged, narrowly elliptic-oblong to narrowly ovate, 11-15(-20) x 3-6(-10) mm, divergent from the utricle, chartaceous, glabrate, with 5 longitudinal nerves evident. *Corolla* contortiplicate in bud, campanulate at anthesis, as broad as long, limb entire to toothed or shallowly lobed with obtuse, apiculate lobes, 7-13 x 8-15 mm, blue, purple-blue, purple or white, membranous, glabrous except for small tufts on the tips of the interplicae. *Stamens* alternate with petals, subequal, included within corolla tube; filaments basally fused to tube, free above, glabrous, 2-3 mm long; anthers dorsifixed, introrse, parallel, 1.5-2 mm long, dehiscing in bud; pollen 3-colpate, minutely punctate, non-spinose (Figure 2a, b). *Ovary* ovoid-ellipsoid, glabrous, unilocular, c. 1 mm tall; ovules 2, basal, erect; disc annular, dark brown; style simple or with a joint just above ovary, filiform, glabrous, 3.5-5 mm long; stigma barely exserted from corolla tube, biglobose, wrinkled, < 1 mm diameter. *Utricle* ellipsoid, apiculate by style or style base, 5-5.5 x 3.5-4.5 mm, chartaceous, brownish-tan with darker striations, glabrous or nearly so, sometimes with a few hairs apically. *Seed* ellipsoid to nearly spherical or obovoid, smooth, 4 mm diameter, glabrous, reddish-brown.

Specimens examined. QUEENSLAND: Warrego district, Cunnamalla area, Feb. 1972, *J.D. Pike* 24 (BRI); Norley Homestead, c. 30 km N of Thargomindah, 3 June 1955, *L. S. Smith* 6344 (BRI).

NEW SOUTH WALES: Cobar, 5 Feb. 1912, *Archdeacon Haviland* s.n. (F, G, US).

WESTERN AUSTRALIA: South Barbee Range, 7 Sept. 1959, *A. Robinson* s.n. (PERTH); Belele Station, NW of Meekatharra, Yarbingulla paddock, 5 Nov. 1965, *D.W. Goodall* 3271 (UWA); Dale Gorge, 24 Aug. 1960, *A.S. George* 1029 (PERTH); Discovery Gorge, Edmund Station, 20 Aug. 1961, *R.D. Royce* 6622 (PERTH); Laverton, 25 Sept. 1920, *C.A. Gardner* 820 (PERTH); Laverton, Aug. 1963, *H.H. Kretchmar* s.n. (PERTH); Cape Range, 6 km from Learmonth Camp, on Wapet #4 well road, S 250 miles, 1 Sept. 1964, *Y. Chadwick* 1490 (PERTH); Cape Range, 31 Aug. 1964, *Y. Chadwick* CR8101 (UWA); 10 km S of Meekatharra, July 1931, *C.A. Gardner & W.E. Blackall* s.n. (PERTH); Meekatharra, 2 Oct. 1958, *N.H. Speck* 1501 (L, PERTH); 15 miles from Meekatharra, Carnarvon road, 16 Oct. 1962, *D.W. Goodall* 95 (UWA); Mt Magnet, Sept. 1903, *W.V. Fitzgerald* s.n. (PERTH), Sept. 1905, *J. Staer* s.n. (E); 3 miles S of Mt Magnet, 10 Oct. 1963, *F. Lullfitz* 2542 (PERTH); Mullewa to Mt Magnet, 13 July 1973, *C.G.G.J. van Steenis* 21919 (L); 30 km W of Turce Creek, 4 Oct. 1978, *A.A. Mitchell* N657A (A, PERTH); Williambury, E side of Lynden-Williambury road, 9 Aug. 1981, *R.J. Cranfield* 1842 (PERTH); near Wilson's Creek and Lake Darlot, 13 Sept. 1927, *C.A. Gardner* 2164 (PERTH, mixed with *P. sericea*); 52 km W of Wiluna, 29 Aug. 1970, *P.G. Wilson* 8965 (A, K, PERTH); 21 miles [34 km] S of Wiluna, 20 Aug. 1963, *T.E.H. Aplin* 2407 (PERTH, MO 2312124); 51 km from Wiluna, road to Agnew, no date, *A. Strid* 20160 (K); Windich Springs, Canning Stock Route, Aug. 1964, *R. Aitken & D. Hutchinson* HA62 (PERTH); Wittenoom Gorge, 18 Aug. 1963, *J.S. Beard* 2871 (PERTH); Sept. 1957, *K. Stewart* 6 (PERTH); 9 miles E of Wittenoom, 16 Aug. 1965, *A.C. Beauglehole* 11546 (PERTH); between Yampire (Gorge) and Dale Gorge, Oct. 1959, *C.A. Gardner* 12286 (PERTH); no locality, 21° 35′ to 21° 58′ S, 121° 11′ to 120° 47′ E, 10 Aug. 1979, *G.Davis* 112 (PERTH).

Distribution and ecology. Porana commixta occurs primarily in inland situations of southwestern and northeastern Western Australia. Three collections have been seen from eastern Australia in southeastern Queensland and northwestern New South Wales (Figure

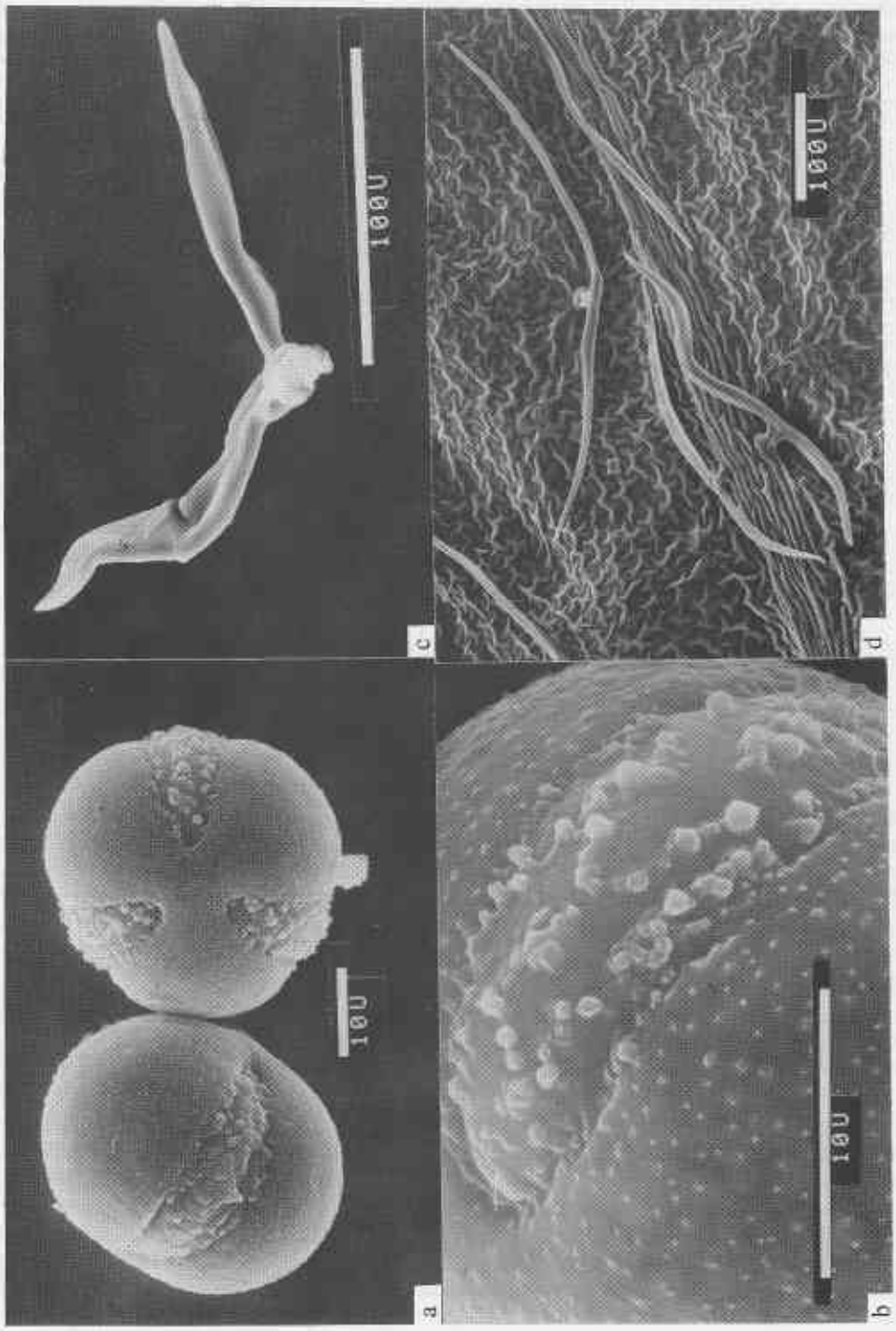

Figure 2. Pollen and trichomes of *P. commixta*, a) pollen grains x1500; b) enlargement of colpus region x5000; c) detached leaf trichome x520; d) trichomes on the abaxial surface of a fruiting sepal x170; a, b after *Wilson* 8965 (A), c, d after *Mitchell* N657A (A).

3). It seems likely that the species occurs in the intervening region of Australia as well; further collections are necessary to document this distribution. The range of *P. sericea* is primarily coastal in Western Australia; it overlaps with *P. commixta* in the central area of that state.

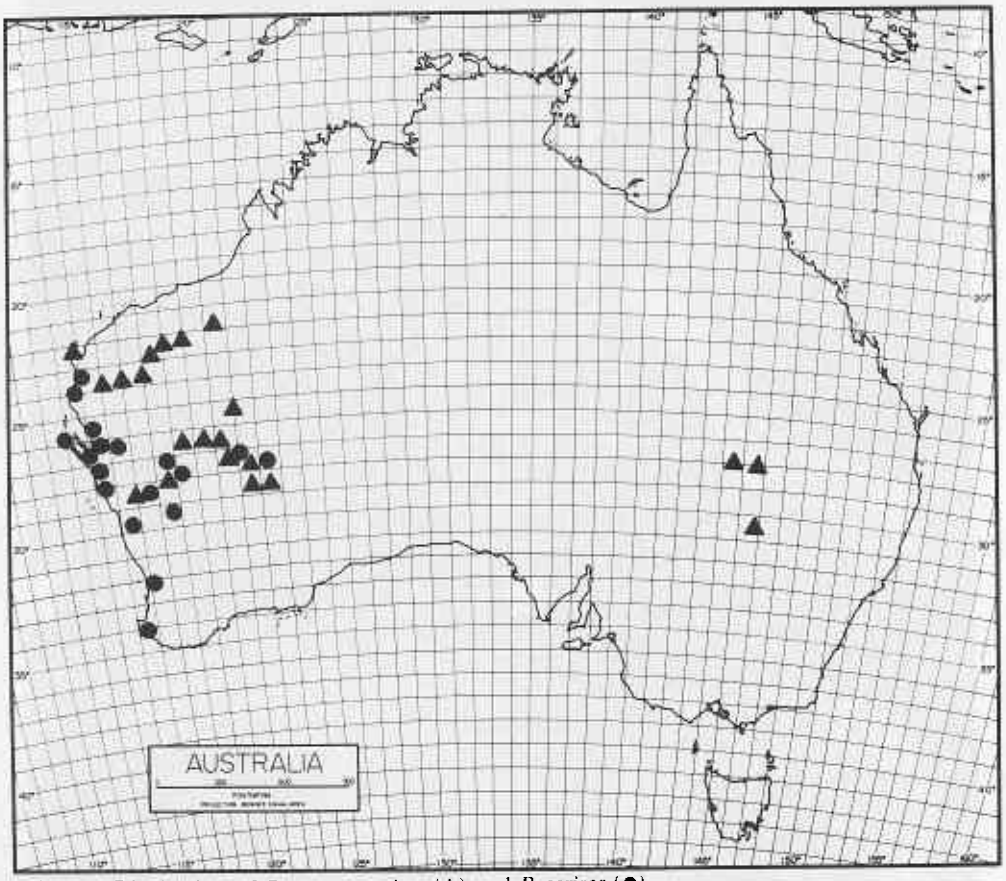

Figure 3. Distributions of *Porana commixta* (▲), and *P. sericea* (●).

Porana commixta has been collected in dry habitats near pools or watercourses on sandy, loamy or sandy-clay soils. It has been found growing on mulga, bloodwood and in lancewood escarpments. Like most members of the Convolvulaceae it prefers sunny situations and is reported from thickets, among rocks or at forest margins. Elevational data are few but range from sea level to about 200 m.

Phenology. Flowering collections have been made between the months of July and October, with the greatest number in August. Fruiting specimens have been collected sporadically between August and February.

2. **Porana sericea** (Gaudich.) F. Muell., Fragm. Phyt. Austral. 6: 100. (1868). *Duperreya sericea* Gaudichaud in Freycinet, "Voyage Autour du Monde" 1: 452, t. 63 (1826). *Type:* Novae Hollandiae ora occidentali (baie des Chiens-Marins), *C. Gaudichaud* s.n. (holo: P!; iso: G!) (Figure 4).

Ipomoea modesta F. Muell., Fragm. Phyt. Austral. 2: 22 (1860). *Type:* Australia, "in virgultis ad flumen Murchison," *A.F. Oldfield* s.n. (holo: MEL; iso: K!).

A detailed description and discussion of this species will be presented in the forthcoming revision. The following specimens have been examined to date.

Specimens examined. WESTERN AUSTRALIA: W of Ajana, 28 Sept. 1962, *J.S. Beard* 2082 (PERTH); Barnong Station, 20 Sept. 1951, *A.W. Humphries* s.n. (PERTH); Blackwood River, sine date, *A.F. Oldfield* s.n. (K); S of Cue, ca. 560 km NNE of Perth, 25 Aug. 1963, *T.E.H. Aplin* 2547 (K, PERTH); Dirk Hartog Island, near Sandy Point, 4 Sept. 1972, *A.S. George* 11533 (K, PERTH); S of Gravaloo Homestead, 3 Sept. 1970, *A.S. George* 10185 (A, PERTH); between Moore and Murchison Rivers, anno 1853, *Drummond* 223 (K, L); Murchison River, 4 Oct. 1980, *N. Byrnes* 4028 (BRI), *A.F. Oldfield* 288 (K), *A.F. Oldfield* s.n. (K); Nanga Station, 20 miles W of Overlander, *J.S. Beard* 3636 (PERTH); Northwest Coastal Highway, near #2 Tank, 22 Aug. 1967, *A.M. Ashby* 2266 (PERTH); Payne's Find, 10 Oct. 1963, *E. Lullfitz* 2527 (PERTH); Sandstone, July 1918, *D.A. Herbert* s.n. (PERTH); Shark Bay Road, 17 Oct. 1972, *Demarz* D4037 (PERTH), 27 Aug. 1931, *C.A. Gardner & W.E. Blackall* 552 (PERTH); Shark Bay (Baie des Chiens-Marins), sine date, *C. Gaudichaud* s.n. (G, P); Swan River, anno 1854, *J. Drummond* 223 (G); Talisker Station, 14 Aug. 1971, *H. Demarz* D3326 (PERTH); Tamala Station road, 1.5 miles from turnoff of Denham Road, 16 Mar. 1968, *S.G.M. Carr* 376 (PERTH); near Wilson's Creek and Lake Darlot, 13 Sept. 1927, *C.A. Gardner* 2164 (PERTH, mixed with *P. commixta*); Woodleigh Station, E of Perth-Carnarvon road, 2 Sept. 1959, *N.T. Burbidge* 6456 (BRI); near Yandal, 56 km SE of Wiluna, Sept. 1927, *C.A. Gardner & W.E. Blackall* s.n. (PERTH); sine loc., anno 1854, *J. Drummond* 223 (A, BM, P).

Relationships

Porana commixta is morphologically similar to *P. sericea,* with which it has been confused until now. The differences are apparent when the two are seen together. *Porana sericea* (Figure 4), in the dried state, often has an overall golden to tawny aspect due to its distinctly yellowish indumentum; the sepals are broadly ovate, elliptic to broadly elliptic, widest near the middle at flowering, enlarging to elliptic-ovate or subcircular in fruit; the stigma is bilobed, with each lobe cordiform in shape and deflexed in presentation. In contrast, *P. commixta* (Figure 1) has an overall silvery-gray aspect, the flowering sepals are narrowly elliptic to slenderly lanceolate, gradually tapering from the base, enlarging to narrowly elliptic-oblong or narrowly ovate in fruit; the stigma is biglobose with each half wrinkled and directed horizontally from the style. The corolla of *P. commixta* is clearly visible between the narrow sepals whereas that of *P. sericea* is covered by the wider sepals of that species. While the shapes of stigmas are an important characteristic in identifying species and even genera of Convolvulaceae, the descriptive vocabulary is inadequate and confusing and it is difficult to visualize the shapes based only on written descriptions. The situation is further complicated by the distortion of the delicate tissues which takes place during drying; thus some individual flowers may not have representative stigma shapes. Nonetheless the character is useful in separating these two similar taxa, though several flowers must be examined to gain an idea of its variability.

The endemic Australian species of *Porana* stand apart from the mainland Asiatic species in several characteristics. As noted by Schneider (1916) the solitary, axillary flowers, linear leaves, and appressed indumentum differ from the racemose or paniculate inflorescences, cordate-ovate leaves, and sparse to tomentose indumentum of the remainder of the genus. I interpret the former characters as adaptations to desert conditions. Reductions in leaf area and inflorescence size, and development of an appressed indumentum are characters associated with life in xeric conditions; similar reductions are known in other genera of the Convolvulaceae, e.g. *Wilsonia* R. Br. (Austin & Staples 1985) and in desert-dwelling species belonging to large genera known primarily from mesic habitats, e.g. *Bonamia* Thouars, *Ipomoea* L., and *Merremia* Dennst.

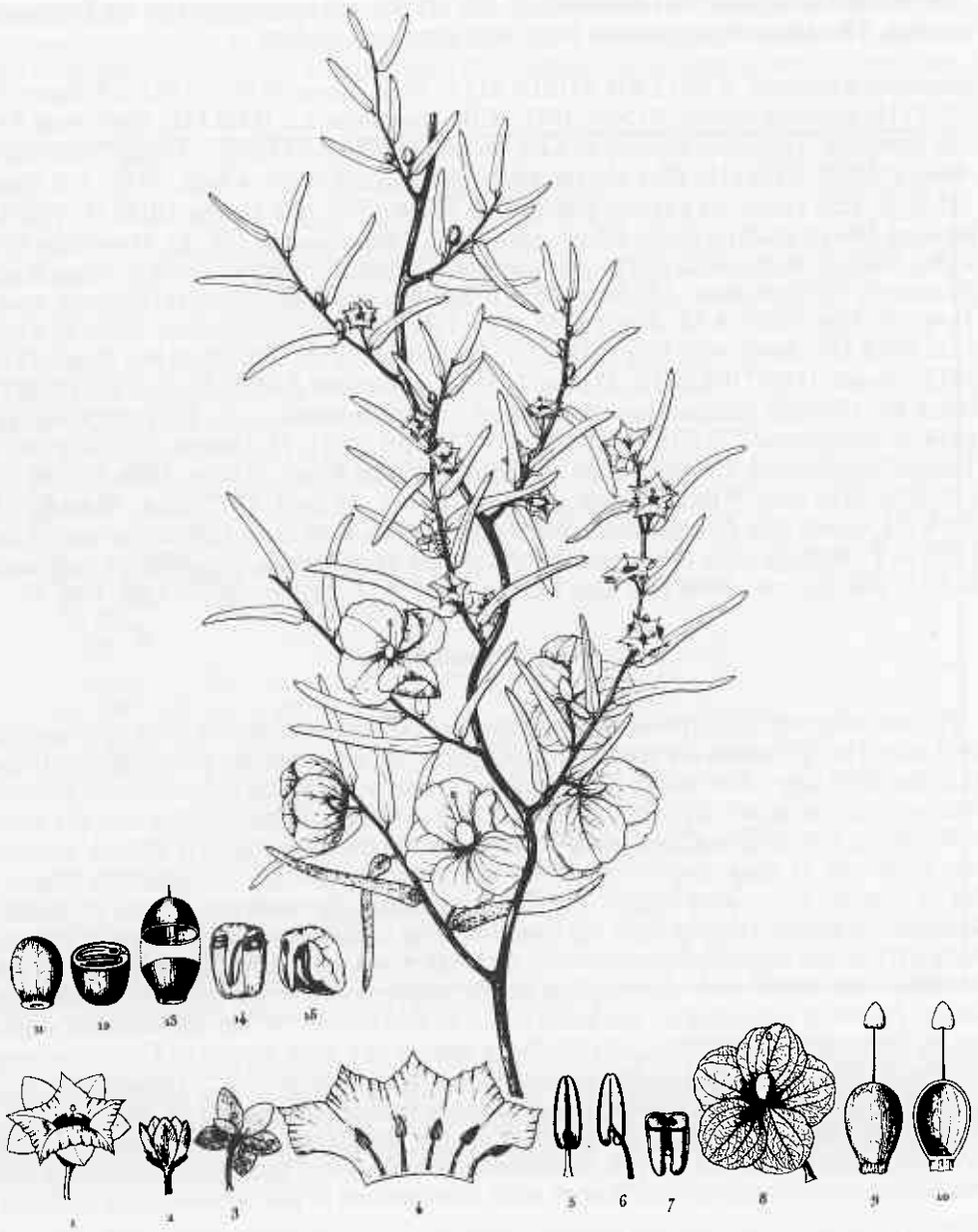

Figure 4. *Porana sericea,* reproduced from the original plate of *Duperreya sericea* Gaud.

Schneider, however, erred in stating that the floral morphology of *P. sericea* was unlike that of the other species in the genus. It is actually similar to that of *P. volubilis:* the enlarged calyx, covering ¾ the length of the corolla, the campanulate corolla, and the pistil morphology are all remarkably similar and I interpret these as indicating relationship. *Porana commixta, P. sericea,* and *P. volubilis* form a group of closely related species within *Porana* sensu lato. Additional characters shared by these taxa include the presence of lenticels on the stems, and the arrangement and proportions of the fruiting sepals. This suite of characters sets these three species apart from the remaining members of the genus which are alike in having smooth

to striate stems lacking lenticels, palmate leaf venation, small flowering sepals which just cover the base of the corolla tube, funnelform, campanulate-funnelform, or salverform corollas, and fruiting sepals which are unequally enlarged and clasp the utricle, or if they are equally enlarged then they are more or less markedly reflexed from the utricle at maturity. The relationships of the species of *Porana* will be discussed fully in the forthcoming revision.

In terms of distributions, most *Porana* species are mainland Asiatic, ranging from Pakistan across India south of the Himalayas, through Burma and China into Southeast Asia. *Porana volubilis'* range fringes that of its congeners, extending from Southeast Asia south and eastward through Malaysia and Indonesia. The Australian species are isolated from the rest of the *Porana* species and occupy the extreme geographic range of the genus.

Cultivated species

Two species of *Porana* are cultivated as ornamentals in various areas of the world. One of these, *Porana paniculata* Roxb., has been recorded from Australia (QUEENSLAND: Tinana, via Maryborough, May 1974, *F. Nebe* s.n. (BRI)). This is an expansive woody climber, whitish or tawny tomentose on the vegetative parts, with palmate leaf venation and large paniculate inflorescences of small, white, fragrant flowers. The species is native to northern India and the countries bordering the southern flank of the Himalayas.

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