

REVISION OF THE GENUS *PODOLEPIS* LABILL.

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(One hundred and fifty-three Text-figures.)

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Synopsis.

All described species have been critically examined and sixteen found to be valid. These, with two new species and one new variety, have been redescribed with text-figures of habit, chief diagnostic characters and distribution maps.

An introductory section includes a brief historical account of the genus and explanations of the taxonomic procedure adopted.

The taxonomic section is followed by a discussion of the origins and affinities of the species and suggestions are made as to the speciation processes at work within the genus.

INTRODUCTION.

Historical.

The genus *Podolepis* Labill. is widely spread throughout Australia where it is represented by eighteen species, only one of which extends to Tasmania.

The type-species, *P. rugata*, was described and figured by Labillardière (1806) from material he collected in Western Australia "in terrâ Van-Leuwin". In the same year, Sims erected the monotypic genus *Scalia* (*S. jaceoides*) to accommodate a plant grown in England from seeds collected in New South Wales.

Between 1806 and 1852 five other generic names were added to the literature: *Stylolepis* (*S. gracilis* Lehm., 1828), *Siemssenia* (*S. capillaris* Steetz, 1828), *Panaetia* (*P. Lessoni* Cass., 1829), *Scaliopsis* (*S. Lucaeana* Walp., 1840) and *Rutidochlamys* (*R. Mitchellii* Sond., 1852).

De Candolle (1838) recognized eight species of *Podolepis* and relegated the genera *Scalia* Sims and *Stylolepis* Lehm. to synonymy under *P. acuminata* R. Br. and *P. gracilis* Grah., respectively, and at the same time he transferred both *P. ferruginea* (Labill.) DC. and *P. rosmarinifolia* (Labill.) DC. to the genus *Ozothamnus*.

Bentham (1866) extended the generic concept still further by incorporating in it the genera *Scaliopsis* Walp., *Rutidochlamys* Sond., and *Siemssenia* Steetz, and recognizing twelve species of *Podolepis*.

Subsequent taxonomic history was concerned only with nomenclature and descriptions of new species.

The table (p. 246) sets out, in chronological order, the history of the genus and the taxonomic fate of all described species and varieties.

Distribution.

Podolepis Labill. is confined to Australia, and of the eighteen species described in this Revision only three are recorded in four or more of the States, and the remainder are confined to the eastern, southern or western portions of the Continent. New South Wales and Western Australia have the largest number of species, nine and eleven respectively, while only a single one represents this genus in Tasmania.

It is probable that further collecting in the northern regions of Australia will extend considerably the known range of many species, as well as producing others which are undescribed. This applies particularly to the large area of country north and east of the Fortescue River (W.A.), from which no species of *Podolepis* is recorded.

Date.	Name.	Current Name.
1806	<i>Podolepis rugata</i> Labill.	<i>Podolepis rugata</i> Labill.
	<i>Scalia jaceoides</i> Sims.	<i>P. jaceoides</i> (Sims) Voss.
1813	<i>P. acuminata</i> R.Br.	<i>P. jaceoides</i> (Sims) Voss.
1828	<i>Stylolepis gracilis</i> Lehm.	<i>P. gracilis</i> (Lehm.) R. Grah.
	<i>S. gracilis</i> Lehm. var. <i>glabra</i> Lehm.	<i>P. gracilis</i> (Lehm.) R. Grah.
	<i>S. gracilis</i> Lehm. var. <i>arachnoidea</i> Lehm.	<i>P. gracilis</i> (Lehm.) R. Grah.
1829	<i>Panaetia Lessoni</i> Cass.	<i>P. Lessoni</i> (Cass.) Benth.
1837	<i>Podolepis canescens</i> A. Cunn. ex DC.	<i>P. canescens</i> A. Cunn. ex DC.
	<i>P. aristata</i> Benth.	<i>P. canescens</i> A. Cunn. ex DC.
	<i>P. auriculata</i> DC.	<i>P. auriculata</i> DC.
	<i>P. divaricata</i> A. Cunn. ex DC.	<i>Gnephosis tenuissima</i> Cass.
	<i>P. ferruginea</i> (Labill.) DC.	<i>Helichrysium ferrugineum</i> (Labill.) Less.
	<i>P. inundata</i> A. Cunn. ex DC.	<i>P. canescens</i> A. Cunn. ex DC.
	<i>P. longipedata</i> A. Cunn. ex DC.	<i>P. longipedata</i> A. Cunn. ex DC.
	<i>P. rosmarinifolia</i> (Labill.) DC.	<i>Helichrysium diosmaefolium</i> Sweet.
1838	<i>P. contorta</i> Lindl.	(See Nomina dubia.)
	<i>Panaetia fulva</i> Lindl.	(See Nomina dubia.)
1840	<i>Scaliopsis lucaeana</i> Walp.	<i>P. longipedata</i> A. Cunn. ex DC.
1843	<i>Podolepis chrysantha</i> Endl.	<i>P. canescens</i> A. Cunn. ex DC.
1845	<i>Siemssenia capillaris</i> Steetz.	<i>P. capillaris</i> (Steetz) Diels.
	<i>P. filiformis</i> Steetz.	<i>P. gracilis</i> (Lehm.) R. Grah.
	<i>P. nutans</i> Steetz.	<i>P. nutans</i> Steetz.
	<i>P. rosea</i> Steetz.	<i>P. gracilis</i> (Lehm.) R. Grah.
	<i>P. rosea</i> Steetz. var. <i>molissima</i> Walp.	<i>P. gracilis</i> (Lehm.) R. Grah.
	<i>P. subulata</i> Steetz.	<i>P. canescens</i> A. Cunn. ex DC.
	<i>P. aristata</i> Benth. var. <i>chrysantha</i> (Endl.) Steetz.	<i>P. canescens</i> A. Cunn. ex DC.
1847	<i>P. Lucaeana</i> (Walp.) Walp.	<i>P. longipedata</i> A. Cunn. ex DC.
1848	<i>Rutidosia arachnoidea</i> Hook.	<i>P. arachnoidea</i> (Hook.) Druce.
1849	<i>P. tetrachaeta</i> (Schldt.) Walp.	<i>Leptorrhynchus tetrachaetus</i> (Schlechtld.) J. M. Black.
1851	<i>P. Gilberti</i> Turcz.	<i>P. Lessoni</i> (Cass.) Benth.
	<i>P. pallida</i> Turcz.	<i>P. auriculata</i> DC.
	<i>Rutidochlamys Mitchelli</i> Sond.	<i>P. arachnoidea</i> (Hook.) Druce.
	<i>P. affinis</i> Sond.	<i>P. canescens</i> A. Cunn. ex DC.
1852	<i>Panaetia Muelleri</i> Sond.	<i>P. Muelleri</i> (Sond.) G. L. Davis.
1859	<i>Podolepis hieracioides</i> F. Muell.	<i>P. hieracioides</i> F. Muell.
1864	<i>P. rhytidochlamys</i> F. Muell.	<i>P. arachnoidea</i> (Hook.) Druce.
1866	<i>P. Lessoni</i> (Cass.) Benth. (in part).	<i>P. Lessoni</i> (Cass.) Benth.
	<i>P. Lessoni</i> (Cass.) Benth. (in part).	<i>P. Muelleri</i> (Sond.) G. L. Davis.
	<i>P. microcephala</i> Benth.	<i>P. microcephala</i> Benth.
	<i>P. Rutidochlamys</i> Benth.	<i>P. arachnoidea</i> (Hook.) Druce.
	<i>P. Siemssenia</i> F. Muell. ex Benth.	<i>P. capillaris</i> (Steetz.) Diels.
	<i>P. aristata</i> Benth. var. <i>minor</i> Benth.	<i>P. canescens</i> A. Cunn. ex DC.
1874	<i>Helipterum Kendallii</i> F. Muell.	<i>P. Kendallii</i> (F. Muell.) F. Muell.
1883	<i>P. Kendallii</i> (F. Muell.) F. Muell.	<i>P. Kendallii</i> (F. Muell.) F. Muell.
1894	<i>P. jaceoides</i> (Sims) Voss.	<i>P. jaceoides</i> (Sims) Voss.
1895	<i>P. rubida</i> Maid. and Baker.	<i>P. canescens</i> A. Cunn. ex DC.
1898	<i>P. longipedata</i> A. Cunn. ex DC. var. <i>robusta</i> Maid. and Betche.	<i>P. robusta</i> (Maid. and Betche) J. H. Willis.
1905	<i>P. capillaris</i> (Steetz.) Diels.	<i>P. capillaris</i> (Steetz.) Diels.
	<i>P. Georgii</i> Diels.	<i>P. Georgii</i> Diels.
1907	<i>P. Kendallii</i> (F. Muell.) F. Muell. var. <i>nanus</i> Ewart.	<i>P. Kendallii</i> (F. Muell.) F. Muell.
	<i>P. Spenceri</i> Ewart.	<i>P. gracilis</i> (Lehm.) R. Grah.
1913	<i>P. cupulata</i> Maid. and Betche.	<i>P. Muelleri</i> (Sond.) G. L. Davis.
1917	<i>P. arachnoidea</i> (Hook.) Druce.	<i>P. arachnoidea</i> (Hook.) Druce.
	<i>P. jaceoides</i> (Sims) Druce.	<i>P. jaceoides</i> (Sims) Voss.
1918	<i>P. laevigata</i> Gdgr.	(See Nomina dubia.)
	<i>P. papillosa</i> Gdgr.	(See Nomina dubia.)
1929	<i>P. gnaphalioides</i> Domin.	(See Nomina dubia.)
	<i>P. angustifolia</i> Hort.	<i>P. gracilis</i> (Lehm.) R. Grah.
	<i>P. jaceoides</i> (Sims) Domin.	<i>P. jaceoides</i> (Sims) Voss.
1942	<i>P. acuminata</i> R. Br. var. <i>robusta</i> (Maid. and Betche) J. H. Willis.	<i>P. robusta</i> (Maid. and Betche) J. H. Willis.
1954	<i>P. robusta</i> (Maid. and Betche) J. H. Willis.	<i>P. robusta</i> (Maid. and Betche) J. H. Willis.
1956	<i>P. neglecta</i> G. L. Davis.	<i>P. neglecta</i> G. L. Davis.
	<i>P. Gardneri</i> G. L. Davis.	<i>P. Gardneri</i> G. L. Davis.
	<i>P. rugata</i> Labill. var. <i>littoralis</i> G. L. Davis.	<i>P. rugata</i> Labill. var. <i>littoralis</i> G. L. Davis.
	<i>P. Muelleri</i> (Sond.) G. L. Davis.	<i>P. Muelleri</i> (Sond.) G. L. Davis.

Economic Importance.

Podolepis spp. are never sufficiently numerous to assume weed proportions and there is no record of any poisonous properties. In the Armidale district it has been noticed that young buds of *P. jaccoides* (Sims) Voss are selectively eaten by rabbits but, apparently, only accidentally by stock.

Nomenclature.

Type selection has been made wherever possible and in the absence of co-type material the meaning of the name has been established by some other method, which is discussed, in each case, under the appropriate species.

In a few instances, however, the original descriptions are inadequate and it has not been possible for the present writer to examine the type specimens. The original descriptions are therefore quoted in full and the species listed as *nomina dubia*.

The nomenclature of types recommended by Furtardo (1937) and Davis and Lee (1944) has been followed throughout.



Text-fig. 1. Total distribution of *Podolepis* spp.

Categories.

In general, the principles formulated in an earlier paper (Davis, 1948) have been followed, but in this genus the taxonomic characters are not as definite as those of other genera revised by the present writer (*Brachycome* Cass., *Calotis* R.Br., *Lagenophora* Cass. and *Solenogyne* Cass.).

Variation within each species is continuous and usually proportional to the range. Since the erection of a separate category to accommodate each peak of variation would serve no useful purpose, certain species are merely stated to be polytypic, and these, usually, have a long synonymy. In the single instance of discontinuous variation within a species, varietal status was conferred.

The similarity of certain species and the fact that they replace each other geographically suggests Rassenkreiss formation in the past. Geographic subspeciation does not appear to be operative at the present time, since analysis of variation in each species has failed to reveal a geographic basis.

Specific Descriptions.

All species have been critically examined and redescribed on considerably more material than was available to the original authors and limits of natural variation are indicated in each case. Text-figures of habit and the chief diagnostic characters are provided for each species as well as distribution maps based on the specimens examined.

In each instance the locality data as cited in the original description are quoted in full under the heading "Type Data", and in the case of synonyms this information is supplied in parentheses in the text immediately following the first reference to the specific name.

More than seven hundred specimens are cited in the text, the location of each being indicated as follows: Department of Botany, Adelaide University (AD); State Herbarium of South Australia (AD); Waite Agricultural Research Institute, Adelaide (ADW); Botanical Museum and Herbarium, Brisbane (BRI); Herbarium of the Commonwealth Scientific and Industrial Research Organization, Canberra (CAN); Department of Botany, University of Tasmania (HO); National Herbarium, Melbourne (MEL); National Herbarium of New South Wales (NSW); Department of Botany, University of New England (NE); Herbarium of the late Mr. J. M. Black, Adelaide, now incorporated in the State Herbarium of South Australia (JMB); Herbarium of Professor J. B. Cleland, Adelaide (JBC); Herbarium of Mr. E. H. Ising, Stirling West, S.A. (I).

Evaluation of Taxonomic Characters.

Taxonomic treatment of this genus is made difficult by the fact that there are no *primary* taxonomic characters. The various species are, in fact, composed of certain combinations of *secondary* taxonomic characters, which are concerned with degree of development rather than of nature. These constitute what is referred to as the "look" of each species, which the present writer finds difficult to convey in words. It is hoped that the text-figures illustrating each species will supply this deficiency.

Specific characters, though consistent throughout each genus, do not necessarily apply to others, even related ones, and in revising a genus all parts of the plant must be considered afresh from this point of view.

Under their respective headings the various parts of *Podolepis* are now discussed in relation to their value in this taxonomic treatment.

Habit: This is essentially a genus of branching herbs whose habit depends on the degree of branching, which, in turn, is influenced by edaphic factors and length of growing period. A definite type of habit is not irrevocably associated with any species, although in certain of them a particular form tends to predominate, and so is of limited taxonomic value.

Indumentum: The presence of septate hairs on vegetative parts is a generic character, and since their density varies within most species, the degree of development of the indumentum has been found of no value in intra-generic classification.

Leaves: Leaf arrangement and, to a lesser extent, leaf shape, are to be regarded as secondary taxonomic characters, since a number of species can be identified on this basis alone. In certain species a cluster of radical leaves is a conspicuous feature of the mature plant, but in others this represents merely a juvenile stage. Variation in leaf shape is small and continuous, and this character, by itself, is of very limited value.

Inflorescences: In *P. arachnoidea* the inflorescences are almost sessile and form clusters at the ends of the branches, but in most other species the number of capitula is controlled by the degree of branching of the main axis, and this varies within species.

Involucre: The general shape is of some importance in identifying living material, but on pressing, the individual involucre bracts tend to separate and so alter or modify the characteristic involucre shape.

Involucre bracts: These, although commonly referred to as being whorled, are arranged as a compressed spiral of several rows, their shape varying according to their relative position. A gradual transition is noted from the normal green scale-leaves of the peduncle, to those with scarious tips and finally to the sessile outer involucre bracts of the capitulum. The shape and structure of the intermediate involucre bracts are characters of considerable importance in the classification of *Podolepis* and it is in these that the characteristic form is attained. The inner involucre bracts have reduced laminae and are not distinctive in any way except in *P. Muellieri*, where they become stiff at maturity and are united laterally to form a "cup". Certain

characters may be more conspicuous when the bracts are massed in the involucre than when examined individually. For example, the almost honeycombed involucre characteristic of *P. rugata* and *P. auriculata* are due to the mass-effect of the closely overlapping transversely rugose laminae, which conceal the herbaceous claws of adjacent bracts.

Ray florets: In most species, some at least of the peripheral florets are ligulate and female, but in *P. Lessoni*, *P. Muelleri*, and *P. Kendallii* they are tubular and can only be distinguished from the bisexual florets by the corolla being 3-4-toothed and bearing a single pappus bristle or none. In *P. Georgii* there are no female florets. Apart from the presence or absence of ligules, details of the ray florets are of very minor importance in classification, and their colour is usually yellow.

Disc florets: These are invariably yellow and the tubular corolla is usually 5-toothed, though occasional florets are 4-toothed. In *P. Georgii* only 16-20 of the outermost florets are bisexual, the remainder being male, with aborted styles, but in all other species these florets contain apparently functional stamens and pistils.

Pappus: Little variation is seen in the pappus of most species, but it is absent from the female florets in *P. Muelleri* and *P. Kendallii*, while in *P. Lessoni* it is represented only by a single bristle. The disc florets of each of these species bear a pappus of characteristic form. In *P. Georgii* it is unique in that the bristles are united towards the base into about eight bundles.

Fruits: In only two species, *P. Kendallii* and *P. Georgii*, are the fruits distinctive and diagnostic. In all others their similarity is almost an occasion for comment.

TAXONOMY.

COMPOSITAE, tribe GNAPHALIEAE, sub-tribe HELICHRYSSEAE.

PODOLEPIS Labill., *Nov. Holl. Pl.*, ii, 56, t.208 (1806).

Synonymy: *Scalia* Sims, *Bot. Mag.*, t.956 (1806); *Stylolepis* Lehm., *Sem. Hort. Hamb.*, (1828): 17; *Panaetia* Cass. in *Ann. Sc. Nat.*, Sér. 1, 17 (1829): 417; *Scaliopsis* Walp. in *Linnaea*, 14 (1840): 318; *Siemssenia* Steetz in *Lehm. Pl. Preiss*, 1 (1845): 467; *Rutidochlamys* Sond. in *Linnaea*, 25 (1852): 497.

Annual or perennial herbs with a variable amount of septate-hairy indumentum which is commonly deciduous, and occasionally hispid. *Leaves* entire, the cauline ones alternate, linear to lanceolate, commonly sessile and decurrent; radical leaves lanceolate, petiolate, forming a conspicuous basal cluster or only present on young plants. *Inflorescence* a capitulum, solitary and terminal on the main stem or axillary and numerous, occasionally clustered with very short peduncles. *Involucral bracts* in several rows with scarious, entire, smooth or wrinkled, erect laminae; the outer bracts sessile, the intermediate ones with herbaceous claws which sometimes have scarious margins and appear sessile. *Receptacle* flat, naked. *Ray florets* female (except in *P. Georgii* Diels), ligulate or tubular with fewer corolla-teeth than the 5-toothed disc florets. *Anthers* with fine tails and pointed terminal appendages. *Style branches* filiform in female florets, truncate in bisexual ones. *Pappus* of capillary bristles, finely barbellate or subplumose, often united at the base, rarely in bundles. *Fruits* usually terete and microscopically papillose, rarely thick and tuberculate.

Type species: *Podolepis rugata* Labill.

Key to the Species.

1. Peripheral florets with long conspicuous ligules, much exceeding the disc florets.
2. Intermediate involucral bracts with conspicuous claws.
3. Laminae more or less smooth, not transversely rugose, entirely scarious.
4. Ligulate florets yellow.
5. Laminae pale, chaffy, transparent, longer than broad; perennials with a cluster of radical leaves.
6. Laminae of intermediate bracts the same length or longer than their claws.
7. Sparsely woolly or hispid plants. Radical leaves linear to oblanceolate with flat margins. Widely distributed in the eastern States and Tasmania 1. *P. jaceoides*.
- 7.* Plants with a large amount of loose wool distally. Radical leaves spatulate with crinkled margins. Southern highlands of eastern Australia 2. *P. robusta*.
- 6.* Laminae of intermediate bracts shorter than their claws.

8. Bracts appressed, with triangular closely overlapping laminae concealing their claws. Queensland and northern New South Wales 3. *P. longipedata*.
- 8.* Bracts not closely appressed, with ovate laminae; claws partly exposed. Blue Mountains to Southern Alps; elevated districts in Victoria 4. *P. hieracioides*.
- 5.* Laminae reddish-brown, stiff, not transparent, broader than long; annuals; radical leaves present only on young plants. Swan River district (W.A.) 11. *P. nutans*.
- 4.* Ligulate florets pink. Widely distributed in Western Australia 10. *P. gracilis*.
- 3.* Laminae transversely rugose.
9. Laminae slightly rugose, their apices acute to acuminate; involucre shining.
10. Claws of outer and intermediate bracts truncate distally at the base of the entirely scarious laminae. Widely distributed throughout Australia 6. *P. canescens*.
- 10.* Claws of outer and intermediate bracts extending half-way or more along the median portion of the laminae. Meekatharra district (W.A.) 7. *P. Gardneri*.
- 9.* Laminae very deeply rugose; involucre not shining, with honeycombed appearance.
11. Bracts obtuse. Widely distributed in South and Western Australia 9. *P. rugata*.
- 11.* Bracts acuminate. Northern districts of Western Australia 8. *P. auriculata*.
- 2.* Intermediate involucreal bracts sessile, with a hard thick central portion and scarious margins rather stiff. Queensland and northern New South Wales 5. *P. neglecta*.
- 1.* Peripheral florets hardly exceeding those of the disc.
12. Intermediate bracts with slender claws and sharply demarcated scarious laminae. Florets all tubular, female ones with 3-4-lobed corolla.
13. Bracts smooth, shining, with shortly ciliate margins, the innermost basally united to form a "cup". Female florets 3-10, with no pappus. Bisexual florets with up to 13 shortly plumose bristles. South-western New South Wales; South Australia 13. *P. Muelleri*.
- 13.* Bracts slightly rugose, dull, with fringed margins. Female florets 8-16, with a single distally plumose pappus bristle. Bisexual florets with 3-4 distally plumose pappus bristles. Widely distributed in Western Australia 12. *P. Lessoni*.
- 12.* All bracts sessile, with a herbaceous central region.
14. Bracts acute, their scarious margins transversely rugose.
15. Capitula solitary and terminal on leafy branches. Florets all tubular. Female florets 4-6, with no pappus. Bisexual florets with 7-10 plumose pappus bristles. Fruits covered with long finger-like papillae. Western Australia 17. *P. Kendallii*.
- 15.* Capitula clustered and almost sessile. Female florets 5-7, with a short ligule. Pappus of 25-30 bristles. Fruits microscopically tuberculate. Queensland and western New South Wales 16. *P. arachnoidea*.
- 14.* Scarious margins of bracts not rugose.
16. Bracts rhomboidal with broad scarious margins. Florets all tubular, the outermost row bisexual with 150-200 pappus bristles united into about 8 bundles; remainder of florets male, with 1-10 distally plumose pappus bristles. Fruits heavily tuberculate with a smooth distal collar. Western Australia 18. *P. Georgii*.
- 16.* Intermediate and inner bracts with a median or submedian constriction. Female florets shortly ligulate, with no pappus; bisexual florets with 14-18 barbellate pappus bristles.
17. Bracts glabrous, shining. Female florets 9-12. Capitula longer than broad. Western districts of eastern States; widely distributed in South and Western Australia 14. *P. capillaris*.
- 17.* Bracts glandular on outer surface, not shining. Female florets 6. Capitula broader than long. Shark Bay district (W.A.) 15. *P. microcephala*.

1. *PODOLEPIS* *JACEOIDES* (Sims) Voss, in *Vilmorin's Blumeng.*, 1 (1894):537.

(Text-figs. 2-8.)

Synonymy: *Scalia jaceoides* Sims, *Bot. Mag.*, t.956 (1806); *Podolepis acuminata* R.Br. in *Ait. Hort. Kew*, ed. 5, (1813):82; *P. jaceoides* (Sims) Druce in *Rep. Bot. Exch. Cl. Brit. Isles* (1917):640; *P. jaceoides* (Sims) Domin in *Bibliothec. Bot.*, 89, (1929):676.

Type data: "Native of New South Wales—introduced by Mr. Loddices of Hackney." Cultivated in England.

Plants with a perennial stock from which one or more erect scape-like stems arise each year, reaching a height of 7-80 cm. A variable amount of loose white wool is usually present on the stem and undersides of leaves, which are frequently hispid above. *Radical* and lowest *cauline leaves* up to 20 cm. long, 2 cm. broad, linear to oblanceolate, acute, tapering proximally; remainder of leaves linear to lanceolate, sessile, stem-clasping or shortly decurrent, passing gradually into the bracts of the peduncle. *Inflorescences* usually solitary, terminating the scape-like stem, but occasionally plants are polycephalous with 2-8 capitula. *Involucres* up to 3 cm. diameter, 2 cm. long. *Involucreal bracts* with glandular linear claws and smooth scarious laminae; intermediate bracts up to 2 cm. long, the ovate laminae 5 mm. broad, obtuse to acute; innermost bracts shorter, the laminae hardly broader than the claws. *Florets* yellow, with 20-40

finely barbellate pappus bristles united at the base. *Ray florets* 30-40, female, the ligule up to 2.5 cm. long, 2.5 mm. broad, deeply 3-5-toothed. *Fruits* about 3 mm. long, 1 mm. broad, terete, shortly papillate, dark reddish-brown.

Habitat: Amongst grasses in open situations and forest land.

Range: Widely spread throughout eastern States and Tasmania, south-east of South Australia.



Text-figs. 2-16.

2-8. *P. jaceoides*.—2, Habit $\times 0.3$; 3-5, outer, intermediate and inner Involucral Bracts $\times 3$; 6, Ray floret $\times 3$; 7, Disc floret $\times 3$; 8, Distribution. 9-16, *P. robusta*.—9, Habit $\times 0.3$; 10-13, outer, intermediate and inner Involucral Bracts $\times 3$; 14, Ray floret $\times 3$; 15, Disc floret $\times 3$; 16, Distribution.

Specimens examined:

Queensland: Longreach, 10.1913, E. Jarvis (BRI); Copperfield, 1869, Slatter (MEL); Peak Downs, F. Mueller (MEL); Anakie Downs, P. O'Shanesy (MEL); Maryborough, 1874, F. Mueller (MEL); Toowoomba, 9.1921, R. J. Holdsworth (BRI); Stanthorpe, 11.1916, H. Wright (BRI); Southern border, 11.1884, E. Hickey (MEL).

New South Wales: Brunswick and Tweed Rivers (MEL); Tenterfield, C. Stuart (MEL); Glen Innes, 15.12.1914, E. Breakwell (NSW.25393), Stonehenge, 12.1899, J. H. Maiden (NSW.25405, 25418); Chandler's Peak, Guyra, pasture land, 3.1917, J. L. Boorman (NSW.25394); Ebor Falls, 4,200 ft., Basalt, grassy slopes, 1.1.1941, C. Davis (NE); Point Lookout, 5,500 ft., 3.1949, M. Slade (NE); Armidale, cleared woodland among grasses, 28.10.1955, G. L. Davis (NE); Walcha district, 11.1897, J. H. Maiden (NSW.25440); Moona R., Walcha, 12.1884, A. R. Crawford (MEL); Walcha Road, 12.1912, J. L. Boorman (NSW.25392); Tamworth, 1885, D. A. Porter (MEL); Tia Falls, 10.1900, W. Forsyth (MEL; NSW.25485); Moonan Brook, Scone, 1883, H. Carter (MEL); Upper William's River, 11.1.1934, L. Fraser and J. Vickery (NSW.25388); Dungog, 4.10.1911, W. F. Blakely (NSW.25385); Mt. Lindesay, 11.1909, R. H. Cambage (NSW. 25403); Warrumbungle Ranges, 10.1899, W. Forsyth (NSW.25486); Namoi R., Woolls (MEL); Castlereagh R., Woolls (MEL); Brewarrina, 11.1903, J. L. Boorman (NSW. 25483); between Warrego and Darling Rivers, 9.1885, E. Betche (MEL); Warrego R., 9.1885, E. Betche (NSW.25485); Bourke, 8.1948, R. McCall (NSW.25420); Paroo R. district (NSW.25412); between Nyngan and Nevertire, 23.9.1924, A. Morris (NSW. 25422; ADW.); Nevertire, 20.9.1886, E. Betche (NSW. 25484); Wallerawang, 12.1886, Deane (MEL); Mt. Victoria, 1889, J. J. Fletcher (NSW.25408); Mt. Werong, 4.12.1911, R. H. Cambage (NSW.25391); Mt. Werong-Ruby Creek, 3,500 ft., Granite hillside, 23.10.1951, L. A. S. Johnson and E. Constable (NSW.17996); Jenolan Caves, 10.1899, W. F. Blakely (NSW. 25389); Port Jackson, 1838, Siemssen (MEL); Otford, 10.1897, A. H. Camfield (NSW. 11961); Campbelltown, T. Aikin (BRI); Nepean Dam-Bargo Road, 1,000 ft., clay soil, E. Constable (NSW.26611); Cordeaux-Appin Road, 950 ft., shale, 9.11.1950, H. K. Mair and E. Constable (NSW. 16090); Mt. Kembla, 8.1900, A. G. Hamilton (NSW. 25384); Bowral, 20.11.1945, H. M. Rupp (NSW.858); Cambewarra, 1884, Bauerlen (MEL); Badgery's Crossing to Nowra, 9.1899, W. Forsyth and A. A. Hamilton (NSW. 25383); Huskisson, 50 ft., loam, 19.8.1939, F. A. Rodway (NE); Lake George, 1870, W. Woolls (MEL); Lachlan R., 1878, F. Mueller (MEL); Wentworth, Fone (MEL); Darling R., sandy soil with clay, saltbush, Vict. Exp. (MEL); Lower Edward's R., Mein (MEL); Wagga, 1886, R. Thom (MEL); Mulwala, 10.1890, J. J. Fletcher (MEL; NSW.25407); Gerogery, 11.10.1949, E. J. McBarron (NSW.25396); Albury, 11.1905, J. E. R. Fellowes (NSW. 25395); Mt. Bimberi, 6,000 ft., granite, 12.1931, A. Burges (NSW. 25413); Adaminaby-Talbingo Road, 3,000 ft., 4.12.1943, S. Copland (NE); near Kiandra, 12.1901, W. Forsyth (NSW.25382); Nimmitabel, 12.1916, J. L. Boorman (NSW. 11960; BRI); Barber's Creek, 10.1898, H. J. Rumsey (NSW.25390).

Victoria: Hume R., 1883, Jephcott (MEL); Upper Murray R., 1883, Findlay (MEL); Beechworth, 1871, Falck (MEL); Mt. Stanley, 3,300 ft., 3.1.1949, E. J. McBarron (NSW.25376); Myrtleford, 1883, Lucas (MEL); Snowy Crk., 1881, M. Cann (MEL); Snowy R., 11.1886, C. H. Grove (MEL); Omeo, undulating ranges, mica schist formation, 1.11.1882, (MEL); Swan Hill, Gummov (MEL); near the Avoca, mallee scrub, 4.12.1853, F. Mueller (MEL); Wycheproof, 9.1918, W. W. Watts (NSW.25361); Charlton, 1.10.1917 (NSW.25360); Walmar, Wimmera, plains, 18.9.1860, Dallachy (MEL); Nhill, St. E. D'Alton (MEL); Dimboola, 1903, St. E. D'Alton (NSW.25378); N.W. Horsham (MEL); Horsham, 11.1904, Thurmann (BRI); Donald, Curdie (MEL); Grampians, 10.1904, Combe (MEL); Moyston, 10.1881, D. Sullivan (MEL); Wandovale, pasture land, 2.10.1842, J. G. Robertson (NSW.25375); Rennick, 11.1950, G. C. Shepherd (MEL); Beaufort, 27.9.1932, (AD); Creswick Diggings, 1860, J. W. Whan (MEL); Daylesford, 1878, R. Wallace (MEL); Geelong, 1881, I. B. Wilson (MEL); St. Albans, basalt plains, 22.11.1941, J. H. Willis (MEL); fields around Melbourne, 9.1852, F. Mueller (MEL); Melbourne (AD); Frankston Bay, 10.1896, C. Walter (NSW.25359); Dromana, 10.1903, C. Walter (MEL).

Tasmania: Helliier R., 23.1.1928, E. Cheel (NSW.25373); Penguin, forest ridge, 11.11.1843, Gunn (MEL); hilly ground by the Cataract, Launceston, 12.1863 (MEL); Launceston, 11.1865, S. G. Hannaford (NSW.25371); near Perth, W. H. Archer (NSW.25370); Pieman Heads, 23.2.1930, H. F. Comber (HO); Cradle Valley, dry heath

flora, 3,000 ft., 1.1915, G. Weinderfer (NSW.11964); Detention Corner, Frenchman's Cap, 4.1842 (MEL); Miena, 11.1.1949, J. Garden (NSW.25368); New Norfolk, 15.11.1840, R. Gunn (NSW.25366); between Derwent Bridge and Bronte, on slope above swampy ground, 27.1.1947, N. T. Burbidge (HO); Glenorchy, open hillside, 900 ft., 15.11.1931, F. H. Long (HO); Knocklofty, amongst grass in stony soil, 27.10.1937, H. D. Gordon (HO); Domain, Hobart, 3.11.1934, V. V. Hickman (HO); near Hobart, A. Simpson (BRI); Sandy Bay, 1.1924, A. H. S. Lucas (NSW.25369); Mt. Wellington, Summit, 4,000 ft., 18.2.1843, R. Gunn (NSW.25372); Mt. Nelson, 11.1913, L. Rodway (HO).

South Australia: Moolooloo Station, between Beltana and Blinman, 10.1915, R. S. Rogers (NSW.25362); Appila Yarrowie, 1882, L. Wehl (MEL); near Jamestown, 2.11.1920, J. M. Black (JMB); Kadina, 15.10.1939, J. B. Cleland (JBC); Yorke Penin., 1879, Tepper (MEL); Snowtown, 10.10.1923, J. M. Black (JMB); Hallett's Cove, 9.10.1920, J. B. Cleland (JBC); Port Willunga, 24.9.1914, J. M. Black (JMB); Sandergrove, 2.10.1926, J. B. Cleland (JBC); Pinnaroo, 10.1920, J. M. Black (JMB); Bordertown, 14.10.1916, E. H. Ising (I.3855); Hynum and Robertson, on rendzina soil, natural untodpressed pasture, 3.11.1945, N. S. Tiver (ADW); between Narracoorte and Kingston, 12.1929, Richardson (JMB); Lake Bonney, 1874, C. Wehl (MEL); near Mt. Gambier, 1880, C. Wehl (MEL).

Kangaroo Is.: Rocky R., 9.1908, R. S. Rogers (NSW.25364); Rocky R., 4.12.1934, 24.11.1945, J. B. Cleland (JBC).

Curtis' Botanical Magazine contains descriptions of a number of plants grown in England last century from seeds sent from the New World, many of which were hitherto undescribed. Sims erected the monotypic genus *Scalia* (*S. jaceoides* Sims or "Knap-weed *Scalia*") to accommodate one such plant, "a native of New South Wales—introduced by Mr. Loddices of Hackney". The generic name, according to Sims, was "the name given by Theophrastus to a certain plant of this order", and the excellent coloured plate accompanying the description leaves no doubt as to the identity of the species, although no type material is available in Australia.

No other species were described in this genus, which Robert Brown (1813) reduced to synonymy under *Podolepis acuminata* ("Sharp-scaled *Podolepis*"), which he described from material collected personally in New South Wales and "introduced in 1803 by Colonel William Paterson".

Subsequent taxonomic history is concerned with the application of the Law of Priority, and no less than three authors independently reinstated the original specific epithet.

In its typical condition, *P. jaceoides* is a conspicuous plant with brilliant yellow capitula measuring 4 to 6 cm. across the expanded ray florets, and commonly overtopping the grasses among which it grows. In the New England district it grows in patches and throughout October and November is a common feature of the landscape. The plants are typically robust with a conspicuous cluster of radical leaves and a single leafy and unbranched stem with a terminal capitulum. The foliage is often harsh to the touch, due to the presence of short stiff hairs, but many specimens have been examined which bear only a small amount of white wool and others are almost glabrous. No geographic basis was found for these variations in indumentum.

Although it is usual for each plant to bear only a single capitulum, the perennial stock may give rise to more than one stem and sometimes buds develop in the axils of the upper leaves and the polycephalous condition results.

As well as this vigorous habit, which occurs throughout the entire range, a number of specimens have been examined which are slender in all vegetative parts and whose capitula are correspondingly reduced in size. The smallest specimen handled in the course of this work was from Frenchman's Cap (Tasmania) and, although only 7 cm. in height, bore a solitary capitulum of normal size.

Willis (1954b), referring to the variation of this species, expressed the opinion that "several forms of it exist in Victoria, some with very large solitary golden-yellow heads,

others with much paler heads flowering at a different time. It is possible that more than one species is involved, and that the whole group needs a competent systematic revision". Attempts by the present writer to discover discontinuities in this very widespread species have failed, and the variation in every character investigated has been found to be continuous and not associated in any way with geographic position. In view of this, the only practical taxonomic procedure is to treat *P. jaceoides* as a large polymorphic species.

2. *PODOLEPIS ROBUSTA* (Maid. and Betche) J. H. Willis, *Vict. Nat.*, 70 (1954): 227.

(Text-figs. 9-16.)

Synonyms: *P. longipedata* A. Cunn. ex DC. var. *robusta* Maid. and Betche, Proc. Linn. Soc. N.S.W., 23 (1898): 12; *P. acuminata* R.Br. in Ait., var. *robusta* (Maid. and Betche) J. H. Willis, *Vict. Nat.*, 59 (1942): 120.

Type data: Mt. Kosciusko, 5,500-6,000 ft., 1.1898, J. H. Maiden; Kiandra district, 2.1897, E. Betche; Walcha district, 11.1897, J. H. Maiden.

Lectotype (Willis, 1954a): Kiandra district, 2.1897, E. Betche (MEL).

Lectoparatypes (Willis, 1954a): Kiandra district, 2.1897, E. Betche (NSW.25440); Mt. Kosciusko, up to 5,500 ft., 1.1898, J. H. Maiden (NSW.25441).

Robust perennials with a single woolly-white scape-like stem up to 60 cm. high. *Radical leaves* up to 20.5 cm. long, 4.5 cm. broad, spatulate, obtuse to sub-acute, glabrous, often with crinkled margins, and tapering to a broad stem-clasping base. *Cauline leaves* up to 14.5 cm. long, 1.7 cm. broad, broad-linear, acute, stem-clasping, shortly decurrent; the lowest almost glabrous, the upper with a dense woolly-white indumentum. *Inflorescences* 6-11, forming a more or less dense terminal cluster on the stem. *Involucres* about 2.5 cm. diameter, 1.5 cm. long. *Involucral bracts* with broad-ovate, smooth, scarious, obtuse laminae; intermediate bracts up to 1.3 cm. long, the laminae and claw of equal length. *Florets* yellow, with 27-34 finely barbellate pappus bristles united at the base. *Ray florets* 30-40, the ligule up to 1.7 mm. long, 2.5 mm. broad, usually deeply 4-lobed. *Fruits* 2.5-4 mm. long, terete, smooth, contracted at summit.

Habitat: Amongst grasses in alpine pastures.

Range: Southern Alps at high altitudes.

Specimens examined:

New South Wales: Bimberi Peak, Upper Cotter R., 6,200 ft., granite, 15.1.1912, R. H. Cabbage (NSW.25330, 25481); Kiandra district, 2.1897, E. Betche (NSW.25442, Lectoparatype; MEL, Lectotype; BRI); Mt. Kosciusko Range, 1.1880, Findlay (MEL); Mt. Kosciusko, up to 5,500 ft., 1.1898, J. H. Maiden (NSW.25441, Lectoparatype); near Kosciusko Hotel, 2.1920, R. H. Cabbage (NSW.25332); Pretty Point, Mt. Kosciusko, 5,500 ft., 2.1901, R. Helms (NSW.25334; BRI); near Perisher Gap, 12.3.1949, C. Skottsberg (NSW.25335); Bett's Camp to Mt. Kosciusko, 16.2.1914, J. H. Maiden (NSW.25482); Snowy R., below Charlotte Pass, 5,700 ft., granite, 20.1.1951 (NSW.18834).

Victoria: Cobboras, 6,000 ft., 1.1854, F. Mueller (MEL); near Mt. Cobberas, upland flats between 2,000 and 6,000 ft., on Limestone R., Upper Silurian formation, quartz-porphry, Stirling (MEL); Bogong High Plains, ca. 5,700 ft., grassy slopes of Mt. Cope, at the head of Pretty Valley, 15.1.1946, J. H. Willis (MEL); Bogong High Plains, Pretty Valley, ca. 2 miles E. of Mt. Jim, 5,500 ft., 27.1.1952, C. I. Skewes (MEL); Mt. Feathertop to Mt. Hotham, 6,000 ft., A. J. Tadgell (MEL); Mt. Buffalo, summit, 1.1899, C. Walter (MEL; NSW.25338); Mt. Buffalo, 4,500 ft., common on alpine meadows, 21.1.1950, H. C. E. Stewart (BRI); Mt. Buffalo, 3.1930, P. R. H. St. John (MEL); 4,300 ft., granite, 19.1.1913, R. H. Cabbage (NSW.25339); Mt. Hotham, 1.1900, J. H. Maiden (NSW.25340); 6,100 ft., 13.2.1952, E. L. Robertson (ADW.7346); Dargo High Plains, 1883, Howitt (MEL); Mt. Buller (MEL).

Willis (1954a), in raising this population to specific status, gave an admirable summary of its previous taxonomic history, which is now quoted in full: "the first specimens, presumably, were collected by F. von Mueller near the summit of the Cobboras in January 1854. He labelled them '*Podolepis acuminata* var. *enervis* ferd.

Mueller' in allusion to the very indistinct nervation of the hyaline involucrel bracts; but he never published any description of his plant. Bentham (1866) merely listed the Cobboras collection under *P. acuminata*, but, in citing Mueller's later gathering (1861) of comparable material from Haidinger Range, he remarked: 'the lamina of the involucrel bracts almost obtuse'. It remained for Maiden and Betche to publish this alpine *Podolepis*—as a variety *robusta* of the east coast species *P. longipedata* A. Cunn. in DC. Why the authors should have allied *P. robusta* with *P. longipedata* is inexplicable, since the two entities have few features in common, either in habit, foliage, inflorescence, shape and areolation of involucrel bracts or achenes."

Willis nominated a lectotype and lectoparatypes from specimens of two out of the three localities of Maiden and Betche's type series. Their third locality, Walcha district, is not mentioned by Willis and, in the opinion of the present writer, this material is not conspecific with that from the other localities and is, in fact, a vigorous plant of *P. jaceoides* (Sims) Voss.

In its basal cluster of large glabrous leaves, loosely woolly stems and polycephalous condition, this species is very distinctive, and the frequently crinkled margins of the lower leaves are doubtless the source of the local name "Mountain Lettuce" (Willis, 1954a). The cauline leaves bear varying amounts of wool according to their position on the stem, the lowest being almost or quite glabrous. Woolly hairs are to be seen first along the lower midrib and scattered generally over the upper surface. In the upper leaves, which are woolly on both sides, the upper surfaces are the most densely clothed.

With such a restricted range it is not surprising that vegetative variation is small, but some was seen in the arrangement of capitula. These were either closely grouped on short peduncles at the apex of the stem or more loosely arranged on long peduncles arising from the axils of the cauline leaves at various levels.

The closest relative of *P. robusta* is *P. jaceoides*, with which there is a strong similarity in the shape and size of the involucrel bracts. This resemblance is most marked in polycephalous specimens of *P. jaceoides*, but the two species are easily distinguishable on vegetative characters. It is probable that *P. robusta* originated as a geographic sub-species of the widespread *P. jaceoides* (Sims) Voss.

3. *PODOLEPIS LONGIPEDATA* A. Cunn. ex DC., *Prod.*, 6 (1838): 163.

(Text-figs. 17-24.)

Synonymy: *Scaliopsis Lucaeana* Walp. in *Linnaea*, 14 (1840): 318; *Podolepis Mitchelli* Sond. in *Linnaea*, 25 (1852): 508.

Type data: "New South Wales. Sandy seashores of Moreton Bay. Cunningham."

Lectotype: Moreton Bay, Cunningham (MEL).

Lectoparatype: Moreton Bay, 10,1824, A. Cunningham (BRI).

Perennial(?) plants 25-94 cm. high with a loose woolly indumentum and a cluster of radical leaves. The main stem is commonly exceeded by the uppermost lateral branches. *Leaves* broad-linear to oblanceolate, acute, stem-clasping, glabrous, or with scattered septate hairs. *Radical leaves* 5-20 cm. long, 0.5-2.5 cm. broad; *Cauline leaves* slightly smaller, decurrent, becoming linear distally. *Inflorescences* 3-27. *Involucres* 1.5-2 cm. diameter, 1-1.5 cm. long. *Involucrel bracts* commonly reddish-brown, with triangular, smooth, finely torn-ciliate, acute and closely overlapping laminae; the claws shortly glandular; intermediate bracts 8.5 mm. long. *Florets* yellow, with a pappus of 20-30 finely barbellate bristles, united at the base. *Ray florets* about 40, the ligules 1.6-2 cm. long, 2-3 mm. broad, 3-lobed. *Fruits* 1.8 mm. long, 0.6 mm. broad, terete, minutely papillose, contracted distally.

Habitat: Sandy soil.

Range: Widely spread in Queensland extending into the north-west and far North Coast of New South Wales, with a single record from the Lachlan R.

Specimens examined:

Queensland: Mackenzie R., F. Mueller (MEL); Rockhampton, found only in loose sandy situations, 8,1912, J. L. Boorman (NSW.25348); Jericho, 4,1946, M. S. Clemens (BRI); the Virgin, Springsure, 6,1913, J. L. Boorman (NSW.25347); Mt. Playfair Sta.,

sandy country, 1934, A. M. McLaughlin (BRI); Fraser Is., 10.1921, F. C. Epps (BRI); Moreton Is., 9.1901, Field Nat. Excursion (BRI); Moreton Bay, 10.1824, Cunningham (MEL, Lectotype; BRI, Lectoparatype); Caloundra, on sand, 1.1912 (BRI); Chinchilla, amongst grasses on brown sandy soil, 992 ft., 7.1.1931, C. E. Hubbard and C. W. Winders n.6436 (BRI); Miles, in paddock amongst grasses, 993 ft., 19.10.1930, C. E. Hubbard n.5184 (BRI); Bungeworgorai, near Roma, very common in sandy soil, 25.10.1933.



Text-figs. 17-32.

17-24, *P. longipedata*.—17, Habit $\times 0.3$; 18-21, outer, intermediate and inner Involucral Bracts $\times 3$; 22, Ray floret $\times 3$; 23, Disc floret $\times 3$; 24, Distribution. 25-32, *P. hieracioides*.—25, Habit $\times 0.3$; 26-29, outer, intermediate and inner Involucral Bracts $\times 3$; 30, Ray floret $\times 3$; 31, Disc floret $\times 3$; 32, Distribution.

C. T. White n.9529 (BRI); Wallumbilla, 12.1916, E. W. Bick (NSW. 11968); Curragh Sta., near Cunnamulla, around bore in paddock, in brown loam, 620 ft., 6.1.1931, C. E. Hubbard and C. W. Winders n.6218 (BRI); Bumble Sta., 70 miles N. of Mungindi, 21.9.1922 (NSW.25349); Tropical Australia, 1846, Mitchell (MEL, Lectotype of *P. Mitchellii* Sond.).

New South Wales: Terranora, Tweed R., on sandy ridges (NSW.25350); Cape Byron to Tweed R., low sandy ridges (MEL); East Coast, 1802-5, R. Brown (MEL); 25-mile peg, Walgett-Lightning Ridge Road, 400 ft., red sandy loam, 27.5.1951, E. Constable (NSW.29288); Collarenebri, 1.1948, J. Waterhouse (NE); Lachlan R., 1879, Tucker (MEL).

Bentham (1866) listed as synonymous with *P. longipedata* the following species: *Scaliopsis Lucaeana* Walp., *P. Mitchellii* Sond. and *P. hieracioides* F. Muell. He stated "the northern specimens generally have an annual appearance, with smaller flower-heads than the southern ones, which have sometimes several stems from a hard stock, but Brown's specimens quite connect the two forms." After examining a considerable number of specimens, the present writer is in agreement with Willis (1954b), that Bentham's northern and southern forms are taxonomically distinct and that they correspond to the species *P. longipedata* A. Cunn. ex DC. and *P. hieracioides* F. Muell. respectively. *P. longipedata* is therefore treated here in its original restricted sense and corresponds only in part to that species in *Flora Australiensis*.

Two specimens collected by Cunningham in 1824 were examined, one of which, bearing a field label, was nominated lectotype, and the second, accompanied by a label written by Mueller was designated lectoparatype, since it is probably part of the original material examined by Mueller.

Type material of *Scaliopsis Lucaeana* Walp. ("New Holland, Lhotsky") has not been examined and the problem arose as to whether it was synonymous with *P. longipedata* or *P. hieracioides*. However, according to the original description, "the outer bracts are sessile, scarious-transparent; the inner ones with linear stalked leaf-like claws", and as this suggested *P. longipedata* rather than *P. hieracioides*, *S. Lucaeana* is listed as a synonym of the former species.

With regard to *P. Mitchellii* Sond. ("Sub-tropical Australia, Mitchell"), two specimens have been examined which were collected in 1846 by Mitchell. One of these is identified and extensively annotated by Sonder, so has been nominated lectotype, while the species itself is sunk in synonymy. Both specimens are complete plants and, although more slender than those collected by Cunningham, fall within the limits of *P. longipedata*.

Morphologically, this species resembles most closely *P. jaccoides* (Sims) Voss, from which it probably originated as a geographic sub-species.

4. *PODOLEPIS HIERACIODES* F. Muell., *Fragm.*, I (1859): 112.

(Text-figs. 25-32.)

Type data: "In grassy valleys beside the banks of the rivers Delatite, McAllister, Mitta Mitta, Omeo Creek and elsewhere. 2-4,000 ft."

Lectotype (Willis, 1954b): Macallister River, 1.1859, F. Mueller (MEL).

Lectoparatype: Grassy banks of Delatite River, 26.3.1853, F. Mueller (MEL).

Homoeotype (Willis, 1954b): Between the Upper Cann and Genoa Rivers, open Eucalypt forest, on gentle slope, 2½ miles N.E. of Cooponcambra Mt., 13.1.1953, R. Melville and N. A. Wakefield (MEL).

Robust polycephalous perennials with a leafy stem up to 70 cm. high arising from a cluster of radical leaves. A woolly indumentum of septate hairs is present on the stem and at the leaf-axils. *Radical leaves* up to 16.5 cm. long, 2.8 cm. broad, elliptical, acute, with a broad stem-clasping base, glabrous or with scattered short septate hairs. *Lower cauline leaves* up to 13 cm. long, 1 cm. broad, linear, acute, becoming narrower and shorter as they ascend the stem. *Inflorescences* 3-20, clustered. *Involucres* 1.5-2 cm. diameter, 1.5 cm. long. *Involucral bracts* with ovate, smooth, entire, obtuse to subacute laminae and densely glandular claws which are not entirely covered by laminae of adjacent bracts; intermediate bracts about 8.5 mm. long, 3.5 mm. broad. *Florets* yellow, with a pappus of 20-25 slender barbellate bristles, shortly united at the base. *Ray florets* 15-20, the laminae about 1.8 cm. long, 2 mm. broad, usually 3-lobed. *Fruits* about 3 mm. long, terete, microscopically papillose, contracted at summit.

Range: Highlands, from Blue Mountains to Gippsland.

Specimens examined:

New South Wales: Rydal, W. Woolls (MEL); near Little Hartley, 15.1.1892; J. J. Fletcher (NSW.25409); Widgidee Creek, Duckmaloi, dry hillside, 7.3.1935, V. May (NSW.25344); Edith, slaty shale, 4,250 ft., 9.3.1950, E. F. Constable (NSW.11435); Bargo R., 12.1.1902, J. L. Boorman (NSW.25342); Bowral, 1.1894, A. H. S. Lucas (NSW.11965); Moss Vale, 1.1928, K. Thorpe (ADW.8759); Queanbeyan, 3,700 ft., 16.1.1912, R. H. Cambage (NSW.11966); Braidwood district, 3,600 ft., 1.1885, W. Bauerlen (MEL); Michelago, 1.1909, J. L. Boorman (NSW.25343); Yarrangobilly Caves, 2.1897, E. Betche (NSW.25345); Island Bend, Snowy R., 4,000 ft., forests, 6.2.1953, M. Mueller (MEL); Snowy R., valley, above Island Bend, 4,500 ft., occasional in forest, granite, 23.1.1951, L. A. S. Johnson (NSW.15595); Mt. Kosciusko, Sawpit Creek, 1.1899, J. H. Maiden and W. Forsyth (NSW.25346); Mt. Kosciusko, up to 5,500 ft., 1.1898, J. H. Maiden (NSW.25341); Mt. Franklin road, 18 miles below Chalet, shallow soil on sedimentary rock, grey-brown podsollic soil, 17.2.1953, C. W. E. Moore (NSW.25598); Tantawanglo Mt. (MEL).

Victoria: Between Upper Cann and Genoa Rivers, open Eucalypt forest on gentle slope, 2½ miles N.E. of Cooponcambra Mt., with bracken, grasses, *Cynoglossum suaveolens*, *Wahlenbergia* spp., etc., 13.1.1953, R. Melville and N. A. Wakefield (MEL. Homoeotype); Tambo R., 1883, Howitt (MEL); Macallister R., 1.1859, F. Mueller (MEL. Lectotype); Ranges on the western branch of the Macallister, 1.1863, F. Mueller (MEL); Delatite R., 26.3.1853, F. Mueller (MEL. Lectoparatype).

As already pointed out in connection with the previous species, *P. hieracioides* F. Muell. was united by Bentham (1866) with *P. longipedata* A. Cunn. ex DC. With a much larger series of specimens than was available to Bentham, the present writer is in agreement with Willis (1954b) that the two species have little in common except the polycephalous condition. The shape of the involucre bracts is quite distinct, but the most conspicuous difference lies in their arrangement. Whereas in *P. longipedata* the triangular laminae are closely appressed and overlapping, so that their claws are concealed, in *P. hieracioides* the bracts are much fewer in number and are loosely arranged, with their long glandular claws partly or entirely exposed.

P. longipedata constitutes Bentham's "southern form", but his statement that these plants "have sometimes several stems from a hard stock" was only supported by one specimen (Michelago, Murrumbidgee River) in which four stems arose separately from the base.

Variation was seen in the development of the indumentum on the radical leaves, and even those which were apparently glabrous had a minute marginal fringe of hairs. Some specimens were sparsely septate-hairy on the upper surfaces of their radical leaves and in extreme instances hairs were sufficiently numerous on both surfaces to make the leaves harsh to the touch.

The capitula are arranged either as a dense terminal cluster on short peduncles or, while still clustered, are more loosely associated on longer peduncles arising from the axils of the cauline leaves. Only two specimens were seen in which the stem terminated in a single head. These were both from the same locality (Michelago, Murrumbidgee River) and accompanied by normal polycephalous plants.

Willis (1954b) refers to "a luxuriant specimen from the Upper Snowy River which . . . has a very broad spreading panicle bearing about 60 capitula". This, however, has the flattened stem and tufted appearance of fasciation and consequently the large number of heads is to be regarded as a pathological departure from the normal condition.

The number of lobes in the ligules of the ray florets, though commonly 3, is not invariable, since 2 or 4 teeth occur occasionally and specimens have been seen in which lobing has been completely suppressed.

As in the preceding species, the closest relative of *P. hieracioides* F. Muell. is *P. jaceoides* (Sims) Voss, and its present distribution suggests an origin as a highland sub-species which has spread along the Great Dividing Range.

5. *PODOLEPIS NEGLECTA*, n. sp.

(Text-figs. 33-40.)

Holotype and two *Paratypes*: Noosa Heads, Queensland, exposed situation among grasses on headland, 28.8.1955, G. L. Davis (NSW; BRI; MEL).

Herbae perennes, 13-63 cm. altae; stipitibus aut compluribus aut uno glabris vel exigue laniferis; foliis glabris aut hispidis aut non valde laniferis; foliis caulium usque ad 10 cm. longis, 2 cm. latis, oblongis aut etiam contractis lanceolatisque, acutis aut etiam acuminatis, sessilibus, arte decurrentibus; foliis radicalibus non dissimilibus sed in herbis novellis modoreperiendis; *capitulis* uno usque ad sedecim, sessilibus aut pedunculatis; *involucro* 1.5-2 cm. per lineam medianam, 2 cm. longo; squamis involucri lenibus nitentibus, rigidioribus, acutis, minime interruptis, ac cum parte media dura et crassa et minime scariosa; squamis intermediis fere 1 cm. longis, 2 mm. latis, oblongis in quibus laminae non sunt acute ex unguinibus separatae; *floribus* marginum flavis, 34-50 numero, 8-20 mm. longis, 1.5 mm. latis cum alte trifurcis ligulis; pappo composito e 16-26 setis tenuibus, exiguis hamatis et breviter in basi coniunctis; *frugibus* 2.5 mm. longis, 0.8 mm. latis, angustis oblongisque, cum spinis sursum inversis et exiguis.

Perennial plants 13-63 cm. high, with one or more glabrous or sparsely woolly stems. *Leaves* glabrous, hispid or slightly woolly; radical leaves present only on young plants. Cauline leaves up to 10 cm. long, 2 cm. broad, oblong to narrow-lanceolate, acute to acuminate, sessile, shortly decurrent. *Inflorescences* 1-16, sessile or pedunculate. *Involucres* 1.5-2 cm. diameter, 2 cm. long. *Involucral bracts* smooth, shining, rather stiff, acute, entire; the central region non-scarious, hard, thick and pale; intermediate bracts about 1 cm. long, 2 mm. broad, oblong, their laminae not sharply demarcated from the claws. *Florets* yellow, with a pappus of 16-26 fine microscopically barbellate bristles, united at the base. *Ray florets* 34-50, with ligules 8-20 mm. long, 1.5 mm. broad, and deeply 3-lobed. *Fruits* 2.5 mm. long, 0.8 mm. broad, terete, microscopically papillate.

Habitat: Well drained situations.

Range: Widely spread throughout Queensland, extending into the North Coast and mid-western districts of New South Wales.

Specimens examined:

Queensland: Rockhampton, sides of mountain, 2.5.1868, P. O'Shanesy (MEL); Rockhampton, on the top of one of the highest mountains, 2.2.1863, Dallachy (MEL); Rosedale, summit of granite mountain, 10.5.1936, L. G. Dovey (BRI); Burnett R., F. Mueller (BRI); Noosa Heads, on grassy cliff-side, 19.4.1946, S. T. Blake n.15942 (BRI); Noosa Heads, exposed situation among grasses on headland, 28.8.1955, G. L. Davis (NSW.Holotype; BRI, MEL. Paratypes); Glasshouse Mts., 2.1920, W. D. Francis (BRI); Moreton Bay, F. Mueller (BRI); Stradbroke Is., 10.1916, E. W. Bick (BRI); Dunwich, 3.1892 (BRI); Sunnybank, cleared Eucalypt-forest, amongst *Themeda australis*, *Capillipedium parviflorum*, *Imperata cylindrica* var. *Koenigii*, etc., sandy soil, 130 ft., 27.7.1930, C. E. Hubbard n.3445 (BRI); Logan R., 1881, Scortechini (MEL); Currumbin, forest land on hillsides, 10.12.1932, C. T. White n.8738 (BRI); Robert's Plateau, 28.5.1929, C. T. White n.6048 (BRI); Macpherson Range, open forest country, 1.1919, C. T. White (BRI); the Summit, sandy soil among big granite blocks, 22.11.1946, S. L. Everist and L. J. Webb n.1331 (BRI); Stanthorpe, 12.1875, F. M. Bailey (BRI); Wallangarra, 11.1904, J. L. Boorman (NSW.25406); Mistake Range, 11.1920, C. T. White (BRI; ADW); Mt. Mistake, Eucalypt forest, on rocky slope among *Themeda* and *Poa*, 1,800 ft., 24.11.1930, C. E. Hubbard n.5238 (BRI).

New South Wales: Mt. Lindesay, 11.1912, H. M. R. Rupp (NSW.25404); Acacia Plateau, Rain Forest, edge of road, 17.5.1947, E. F. Constable (NSW.3562); Brunswick and Tweed Rivers, open sandy ground (MEL); Richmond R., C. Fawcett (MEL); Timbarra, C. Stuart (MEL); Little Mt. Spirabo, *Eucalyptus campanulata* assoc., steep slope of quartzite hill, 21.4.1954, R. W. Jessup and M. Gray (CAN); Torington, J. L. Boorman (NSW.25401); Rivertree, Upper Clarence R., 7.9.1911, R. H. Cabbage (NSW.25399); Clarence R., Beckler (MEL); Coff's Harbour to Grafton, 11.1903, J. H. Maiden

and J. L. Boorman (NSW.25417); Bellinger R., (NSW.25416); Hat Head, Mt. Korogora Pt., 350 ft., occasional on slopes, conglomerate, 19.1.1953, E. Constable (NSW.22102); Glen Innes, 12.1913, J. L. Boorman (NSW.11963); Warialda, 1.1907, H. M. R. Rupp (NSW.25397); Howell, 12.1914, J. L. Boorman (NSW.25480); 6 miles from Bundarra,



Text-figs. 33-57.

33-40. *P. neglecta*.—33, Habit $\times 0.3$; 34-37, outer, intermediate and inner Involucral Bracts $\times 3$; 38, Ray floret $\times 3$; 39, Disc floret $\times 3$; 40, Distribution. 41-48. *P. canescens*.—41, Habit $\times 0.3$; 42-45, outer, intermediate and inner Involucral Bracts $\times 3$; 46, Ray floret $\times 3$; 47, Ray floret with supernumerary lobe $\times 3$; 48, Disc floret $\times 3$; 49, Distribution. 50-57. *P. Gardneri*.—50, Habit $\times 0.3$; 51-54, outer, intermediate and inner Involucral Bracts $\times 3$; 55, Ray floret $\times 3$; 56, Disc floret $\times 3$; 57, Distribution.

9.3.1954, M. Gray (CAN); Mt. Lindesay Sta., Nandewar Mts., 11.1909, R. H. Cambage (NSW.25402); Warrumbungle Ranges, 1.1883, E. Betche (MEL; NSW.25354); Gonoo Forest and Mendooran, 1947, G. W. Althofer (NSW.25355); Dubbo, 12.1907, J. L. Boorman (NSW.25480); Denman, 10.1908, W. Heron (NSW.11962); Paroo R. district (NSW.25412).

The specific epithet refers to the fact that, in spite of its wide range and distinct characters, this species is hitherto undescribed. While closest to *P. jaceoides* (Sims) Voss, it is distinguished by the unique nature of the involucre bracts in which the apex of the claw is thickened and its central region depressed. In all the living specimens examined this depressed area is green and the surrounding thickened portion is paler than the lamina, which is not sharply demarcated from the claw. The laminae are stiff, rather than papery as in *P. jaceoides*, and are very commonly reddish-brown. The type specimens, when living, had an urn-shaped involucre, but as this characteristic is lost on pressing, it is not known whether it is general. Vegetatively, *P. neglecta* can be distinguished from *P. jaceoides* by the lack, in established plants, of radical leaves, and even when these are present in young plants, they are few in number.

Variation in habit is associated with the age of the plants and probably environmental factors. In this connection a specimen from the roadside in Rain Forest (Acacia Plateau) is interesting in that it was the only one examined from such a situation, and its stem was lax and almost wiry. Another specimen (Robert's Plateau) was of relatively immense proportions with crowded broad-elliptical cauline leaves up to 18.5 cm. long and 4 cm. broad, with overlapping leaf-bases. There is a collector's note accompanying this specimen to the effect that it was 2 ft. in height, but only the lower 15 cm. and upper 32 cm. have been preserved. The three inflorescences closely grouped at the stem apex do not reflect the gigantism of the vegetative parts and are, in fact, of normal size.

A most remarkable example of phenocopy (the production by the environment of a replica of a hereditary variant with a different genotype) was seen in two specimens collected at Mt. Spirabo by R. W. Jessup and M. Gray. Both were identical in all vegetative respects yet, while one was *P. neglecta*, the other was *Helichrysum bracteatum* (Vent.) Andr. Neither specimen was vegetatively typical of its species, and had they not been in flower it would have been impossible to distinguish between them. In a personal communication, Mr. Gray stated that the two plants were growing within 10 feet of each other and it was their resemblance in the field which led him to collect them.

6. *PODOLEPIS CANESCENS* A. Cunn. ex DC., *Prod.* 6 (1837): 163.

(Text-figs. 41-48.)

Synonyms: *P. inundata* A. Cunn. ex DC., *Prod.* 6 (1837): 163; *P. aristata* Benth. in *Enum. Pl. Hueg.* (1837): 64; *P. chrysantha* Endl. in *Bot. Zeit.*, 1 (1843): 458; *P. subulata* Steetz. in *Lehm. Pl. Preiss.* 1 (1845): 465; *P. aristata* Benth. var. *chrysantha* (Endl.) Steetz in *Lehm. Pl. Preiss.* 1 (1845): 465; *P. affinis* Sond. in *Linnaea*, 25 (1852): 507; *P. aristata* Benth. var. *minor* Benth., *Fl. Aust.*, 3 (1866): 605; *P. rubida* Maid. and Baker, *Proc. Linn. Soc. N.S.W.*, 10 (1895): 587.

Type data: "On rocky hills around Croker's Range, New Holland, towards the western valley of Wellington, November flowering. Cunningham."

Lectotype: Croker's Range, 11.1825, A. Cunningham n.39 (BRI).

Branching annuals 6-83 cm. high with a varying amount of white wool on stems and lower surfaces of leaves. *Radical leaves* not always present, up to 7 cm. long, 1.5 cm. broad, oblanceolate, petiolate, acute. *Cauline leaves* up to 8 cm. long, 1.6 cm. broad, elliptical to lanceolate, sessile, decurrent, subacute to acute. *Inflorescences* 1-100, on peduncles up to 6 cm. long. *Involucres* 1.5-2.5 cm. diameter, 0.7-1.5 cm. long. *Involucre bracts* straw-coloured to golden- or reddish-brown, with microscopically serrulate, acute to acuminate, distally rugose laminae; intermediate bracts 0.6-1 cm. long, with oblong to lanceolate laminae 2-2.5 mm. broad, and long slender glandular claws. *Florets* yellow, with a pappus of 12-25 microscopically barbellate bristles. *Ray florets* 20-40, with a ligule 0.6-1 cm. long, usually 3-lobed. *Fruits* terete, 1.5-2 mm. long, 0.4-0.6 mm. broad, microscopically papillate.

Range: Western districts of New South Wales and Victoria; common throughout Northern Territory, South Australia and Western Australia.

Specimens examined:

New South Wales: Tibbooburra, 9.9.1923, MacGillivray (ADW); Caiwarro, Hungerford, 9.1885, T. Cotter (MEL); Paroo R. district, 9.1900, E. Beteche (NSW.25434);

Bourke, 9.1884, L. Henry (MEL; NSW.25473); Upper Darling R., 1878, P. Day (MEL); Tarcoon, 11.1903, J. L. Boorman (NSW.25448); Byrock, 11.1890, E. Betche (NSW.25437); Paldrumatta Bore, Wilcannia, 10.1901, P. Corbett (NSW.11958; MEL); Fowler's Gap, Gibber plains, 13.8.1955, N. C. W. Beadle (NE); Silverton, 1884, Harris (MEL); Broken Hill, 9.1918, E. C. Andrews (NSW.25431); Broken Hill district, MacGillivray (ADW); Mossgiel, 10.1885, J. Bruckner (MEL); Croker's Range, 11.1825, A. Cunningham (BRI. Lectotype *P. canescens* A. Cunn. ex DC.); Dubbo, 9.1883, E. Betche (NSW.25471); Gulgong (MEL); Hillend, 10.1885, Lauterer (MEL); Perth, 3.1901, J. L. Boorman (NSW.25472); Bathurst, 1894 (NSW.25439); between the Darling and Lachlan Rivers, 1877, Burkitt (MEL); Lachlan R., 9.1878, F. Mueller (MEL); Wyalong, 10.1903, J. L. Boorman (NSW.25438); Murrumbidgee R., 1878, G. Day (MEL); Tarcutta, 1876, Chamberlin (MEL); Wanganella, 11. 1903, E. Officer (NSW.25432).

Victoria: Wimmera, Dallachy (MEL); Lake Lalbert, 6.12.1853, F. Mueller (MEL); near Murtoa, 3.10.1892, F. M. Reader (MEL).

Northern Territory: Base of Mt. Gillan, Alice Springs, rocky slope, 27.9.1955, N. T. Burbidge and M. Gray n.4357 (CAN); 13 miles S. of Storm Creek, Alice Springs, sand dune, 24.11.1954, G. Chippendale (NSW); Ewaninga, 25.8.1931, J. B. Cleland (JBC); Bundooma, 23.8.1932, J. B. Cleland (JBC); near Haast's Bluff, 8.8.1932, J. B. Cleland (JBC); 9 miles from Hermannsburg, red sandhill, 23.9.1945, N. T. Burbidge and M. Gray n.4265 (CAN); between Ooraminna and James Ranges, 20.7.1894, R. Tate (AD); Deep Well, 25.8.1931, J. B. Cleland (JBC); Finke R., 12.1879, Kempe (MEL); 15 miles N. of Kulgera, mulga-*Cassia eremophila* into Composite herbage, 8.10.1955, N. T. Burbidge and M. Gray (CAN); 28 miles S. of Kulgera H.S., open mulga area, 5.8.1954, G. Chippendale (NSW).

South Australia: North Musgrave Ranges, 7.1926, H. Basedow (P; NSW.25436); between Musgrave and Everard Ranges, 28.9.1945, J. B. Cleland (JBC); Lambina, 21.8.1933, J. B. Cleland (JBC); Kopperamana, Cooper's Creek, 1883, J. Flierl (MEL); between Stoke's Range and Cooper's Creek (MEL); Mt. Distance, J. Langley (AD); between Cockburn and Mingary, 14.8.1881, A. Morris (JMB); Murray Bridge, 10.1911, H. H. D. Griffith (JMB); Murray, F. Mueller (MEL. Cotype *P. affinis* Sond.); Hallett's Cove, 28.10.1932, J. B. Cleland (JBC); Brighton, 9.1904, J. M. Black (JMB; NSW.25433); Enfield, 10.11.1918, J. M. Black (JMB); Dublin, 15.9.1927, H. H. D. Griffith (JMB); St. Vincent's Gulf (MEL); Yorke Penin. 1879, Tepper (MEL); Port Pirie, 9.1901, M. Koch (NSW.3573); Coronon, Iron Knob, 6.1905, W. L. Cleland (JBC); Tumby Bay, C. Wilhelmi (MEL); Dombey Bay, F. Mueller (MEL. Cotype *P. affinis* Sond.); Port Lincoln, F. Mueller (MEL. Cotype *P. affinis* Sond.); Lake Hamilton, 10.1882, A. Richards (AD); Venus Bay, Warburton (MEL); Denial Bay, 7.1907, Pulleine (JMB); Fowler's Bay, Richards (MEL); Euria, T. Richards (AD); Ooldea, 1932, Bates (JBC).

Kangaroo Island: Rocky R., 24.11.1945; 4.12.1934, J. B. Cleland (JBC).

Western Australia: Shark Bay, 10.1877, F. Mueller (MEL); between Murchison River and Shark Bay, 10.1877, F. Mueller (MEL); Greenough R., 11.1877, F. Mueller (MEL); Greenough Flats, C. Gray (MEL); Cue, 10.1909, J. H. Maiden (NSW.25454); Moora, 10.1908, J. B. Cleland (NSW.25306); Wongan Hills, 5.10.1903, A. Morrison (P); Moore R., sandy soil, 10.1901, E. Pritzel (AD); Mt. Caroline, 1886, G. A. Sewell (MEL); lower Swan R., 1887, Gribble (MEL); in sandy soil between woodland and the Canning R., Preiss n.52 (MEL. Cotype *P. aristata* Benth. var. *chrysantha* (Endl.) Steetz); North Mundaring, 11.1909, J. H. Maiden (NSW.25460); Woorlooloo, 10.1907, M. Koch (NSW. 25304); Northam-Perth highway, 4-6 miles from Northam, in bush and meadows, 30.10.1949, H. Selasso (NSW.25298); Northam, 10.1900, Gregory (P); near York, 1878 (MEL); Cowcassing Lakes, 9.1904, M. Koch (MEL; P; NSW.25307); between Grass Valley and Meenaar, gravelly soil, 22.10.1943, C. A. Gardner n.6507 (P); Boxvale, J. S. Wells (MEL); Cunderin, 10.10.1944, C. A. Gardner n.7459 (P); Tammin, 6.10.1914, C. H. Ostenfeld (P); Kellerberrin, 12.1903, F. H. Vachell (NSW.25465); Merredin, 9.10.1923, M. Koch (MEL; NSW.25309); Darling Range, 11.1907, M. Koch (P); Vasse district, barren muddy ground, Preiss n.54 (MEL); Hamelin Harbour, F. Mueller (MEL); Blackwood R., Oldfield (MEL); Wagin, 25.10.1920, C. A. Gardner (P);

between Swan R. and King George's Sound, 1881, J. Forrest (MEL); Stirling Range, 10.1867, F. Mueller (MEL); Plantagenet and Stirling Ranges (MEL); interior of King George III Gulf, Preiss n.60 (MEL); King George's Sound (MEL); Bremer Bay, 1900, J. Wellstead (P); Esperance Bay, 7.10.1930, Shell Oil Co. (MEL); near Mt. Squires, 25.8.1891, Elder Expl. Exped. (NSW.25452); W.A., J. Drummond, n.155 (MEL. Cotype *P. aristata* Benth. var. *minor* Benth.); W.A., 1854, J. Drummond, 6th Coll. n.155 (NSW. 25300. Cotype *P. aristata* Benth. var. *minor* Benth.); Hort. Bot. Hamburg, 9.1855, ex Hb. Sonder (MEL. Cotype *P. aristata* Benth. var. *chrysantha* (Endl.) Steetz).

P. canescens A. Cunn. ex DC. is a very widespread and variable species which, strangely enough, has not been recorded from Queensland.

The type locality, Croker's Range, is part of what are now known as the Harvey Ranges, near Wellington, and the lectotype is a slender plant with an almost glabrous, reddish stem and few leaves, while the capitula are surrounded by golden-brown, transversely wrinkled involucre bracts.

Bentham (1866) listed *P. inundata* A. Cunn. ex DC. and *P. affinis* Sond. as synonymous with *P. canescens* which he considered to be confined to the eastern half of Australia. Type material of *P. inundata* ("Flooded banks of the Lachlan R.") has not been examined and Cunningham did not make clear in what respect this species differed from *P. canescens*, which was described at the same time. Comparing the original descriptions of these two species, the only difference of any significance is that the involucre bracts of *P. canescens* were stated to be "subrugose", whereas those of *P. inundata* were not mentioned in this respect. Since Bentham cited Cunningham's material as having been personally examined, the synonymy is accepted on his authority.

Cotype specimens of *P. affinis* ("Murray, Port Lincoln. Dombey Bay") from Sonder's herbarium have been examined from each type locality, and found to be conspecific with each other and the lectotype of *P. canescens*.

The identity of *P. aristata* Benth. ("Swan River, Hugel") has been established by the present writer in a somewhat devious manner, since no type material is available in Australia. In the National Herbarium, Melbourne, there are two specimens collected by Preiss (n.60) from "the Interior of King George III Sound", one of which was originally from Lehmann's herbarium, and the other from that of Steetz. The second specimen is annotated by Steetz "this specimen agrees in all parts with the authentic specimen of Hugel, examined by the famous Bentham", and the first is mentioned by Steetz (1845) as "compared with Hugel's actual specimen in the Imperial Herbarium of Vienna". Both these specimens have accordingly been used as a basis of comparison for *P. aristata*, and both agree very closely with *P. canescens*. At the time of publication of *P. aristata* it is doubtful whether Bentham was aware of *P. canescens*, since both were described in the same year, but later (1866) he distinguished between them by referring to *P. canescens* as an eastern species with acute, smooth or slightly rugose bracts, and to *P. aristata* as a western species with very acuminate, smooth bracts. After handling a considerable number of specimens, the present writer is of the opinion that none of the bracts are, in fact, smooth, and in all specimens they are, to some extent, rugose. There being, then, no morphological discontinuity between these two species, *P. aristata* is reduced to synonymy.

P. chrysantha Endl. ("South-west New Holland") was relegated by Steetz (1845) to varietal status under *P. aristata*, with the note "the authentic specimen having been compared and examined repeatedly, I am satisfied that Endlicher's plant is nothing more than a variety of *Podolepis aristata* Benth. Cultivated plants are extremely variable both in size and indumentum". Two specimens are cited by Steetz in connection with his var. *chrysantha*: "Canning River, Preiss n.52", and "Cultivated in the Botanic Gardens of Hamburg". Both of these are in the National Herbarium, Melbourne, and have been nominated Cotypes for the variety, which is now abandoned as merely being a natural expression of that variability observed by Steetz under cultivation.

Cotype material of *P. subulata* Steetz ("Vasse R. district") was cited by Bentham (1866) in connection with his description of *P. aristata* var. *minor*, consequently the

same specimen is a cotype of both names. Although this specimen is considerably taller than the lectotype of *P. canescens*, its capitula are very similar, and both *P. sublata* and *P. aristata* var. *minor* are accordingly reduced to synonymy under that species.

P. rubida Maid. and Baker ("Bathurst, W. J. C. Ross") was described on material which exactly matches the lectotype of *P. canescens* and was, in fact, collected not far from the type locality of that species. According to the authors, *P. rubida* is distinguished from *P. canescens* by the inner bracts being rugose whereas those of the latter species are "not rugose". This statement is in complete disagreement both with Cunningham's original description and his actual specimens, and the name *P. rubida* is consequently abandoned.

Typically *P. canescens* has a greyish-green appearance due to its woolly indumentum and, when many-stemmed, it may assume a rather bushy habit. Variation in height is considerable, from an upper limit of 83 cm. (Vasse R. district, Preiss n.54) to certain small ephemeral-like specimens 3.7-7 cm. high from the Stirling Range and the Wimmera district. That environmental factors are operative in such a great size range is suggested by a specimen from Waroona, W.A., where the elliptical leaves reach a length of 12.5 cm., and which is accompanied by the note "does well under cultivation, forming large branching plants 30 inches high, and 3 ft. through".

Since the involucre bracts vary in colour, size, and details of their apices, their salient feature is their slight rugosity, which involves only the terminal portion of the laminae and is often more distinct in the complete involucre than in the individual bracts.

7. *PODOLEPIS GARDNERI*, sp. nov.

(Text-figs. 50-57.)

Holotype and *paratype*: Meekatharra, Western Australia, Quartz rises, rays yellow, 20.7.1931, C. A. Gardner n.2358 (P).

Herbae annuae (?) multum furcillatae, usque ad 24 cm. altae; stipitibus rubeis et prope glabris; foliis caulium usque ad 7 cm. longis, 3 mm. latis, late linearibus, sessilibus, arte decurrentibus, obtusis, cum pilis brevibus et saeptatis; foliis radicalibus usque ad 7 cm. longis, 5 mm. latis, paululo prope basim contractioribus; capitulis 11-20 numero, in pedunculis quae sunt filii similes et nudae dispositis; involucre 9 mm. longo, 15 mm. lato; squamis involucri lenibus aut parum rugosis, minime interruptis cum apicibus subacutis; squamis intermediis fere 8 mm. longis, cum brevi ungula quae extenditur pro fere dimidium mediae partis laminae rhomboeoidis quae est 4 mm. lata; floribus omnino fulvis, cum pappo a saetis fere 15 numero, tenuibus, exiguissimis, barbillatis, capillaribus composito; floribus marginis fere 30 numero cum ligulis 9.5-11 mm. longis, 2 mm. latis, bifurcis, qui habent unam quasi lobam digitalem quae exstat e basi ligulae ipsa sola; floribus disci quinque furcillatis, cum styli brachiis acutis ac longis caudis antherorum; frugibus maturis nondum visis.

Much-branched annuals (?) up to 24 cm. high with reddish, almost glabrous stems. *Cauline leaves* up to 7 cm. long, 3 mm. broad, broad-linear, shortly decurrent, obtuse, with short septate hairs. *Radical leaves* up to 7 cm. long, 5 mm. broad, tapering slightly to the base. *Inflorescences* 11-20, on filiform, naked, peduncles. *Involucre* 9 mm. long, 15 mm. broad. *Involucre bracts* smooth or slightly wrinkled, entire, with sub-acute apices; intermediate bracts about 8 mm. long, 4 mm. broad, with a short claw which continues about half-way along the centre of the rhomboidal lamina. *Florets* all yellow, with a pappus of about 15 fine microscopically barbellate capillary bristles. *Ray florets* about 30, the ligule 9.5-11 mm. long, 2 mm. broad, 2-lobed, with a finger-like, independent lobe arising from the base of the ligule. *Disc florets* 5-lobed, with pointed stylar arms and long tails to the anthers. *Fruits* not seen mature.

Specimens examined: Type series only.

The habit and the rhomboidal shape of the involucre bracts of this species suggest a close relationship with *P. Georgii* Diels but, on the other hand, the clawed nature of the intermediate bracts and the presence of female florets with well-developed ligules indicates that any similarity between the two species is due to convergent evolution

rather than close relationship. The lobing of the ligule into two teeth will probably be found not to be an invariable character when further specimens are collected, but the presence of a supernumerary independent lobe at the base of the ligule is interesting. This structure has been observed in only one other species, *P. canescens*, where its occurrence is rare.

P. Gardneri has been named after its collector, Mr. C. A. Gardner, Government Botanist of Western Australia, and placed in this revision, close to *P. canescens* A. Cunn. since the intermediate bracts are clawed, and the scarious portions of their laminae are slightly wrinkled. The relationship, however, if any, is not close.

8. *PODOLEPIS AURICULATA* DC., *Prod.*, 6 (1837): 162.

(Text-figs. 58-65.)

Synonymy: *P. pallida* Turcz., *Bull. Soc. Nat. Mosc.*, 24 (1851): 78.

Type data: "in New Holland, at Shark Bay, collected by Gaudichaud and sent to me."

Lectotype: Shark Bay, 1830, M. Gaudichaud (GENEVA).

Probably annuals, usually many-stemmed, with an indumentum of woolly hairs on the lower portions of the stems and the undersurfaces of the leaves. *Radical leaves* oblanceolate, acute, only present on young plants. *Lower cauline leaves* up to 7 cm. long, 1 cm. broad, lanceolate to broad-linear, acute, sessile, decurrent. *Inflorescences* 2-33, on peduncles up to 8 cm. long. *Involucre*s up to 1.8 cm. broad, 1.5 cm. long. *Involucral bracts* with very deeply rugose triangular laminae, apices very acuminate; intermediate bracts 8-10 mm. long with slender microscopically glandular claws equal in length to the laminae. *Florets* with a pappus of 19-24 capillary bristles, minutely barbellate for the upper two-thirds of their length. *Ray florets* about 70, the ligule 1.5 cm. long, 3 mm. broad, 3-4-lobed. *Fruits* 2 mm. long, 0.6 mm. broad, terete, microscopically papillate.

Range: North-western districts of Western Australia, from the Fortescue to the Murchison River.

Specimens examined:

Western Australia: Between the Gascoyne and Fortescue Rivers, 1885, H. S. King (MEL); near Exmouth Gulf, 1885, Carey (MEL); Mia Mia Homestead, Minilya R., red loamy soil, 28.8.1932, C. A. Gardner n.3197 (P); head of Minilya R., 1882, J. Forrest (P; MEL); Kennedy Range, 8.9.1948, G. A. Thomas (MEL); Gascoyne R., with *Kochia*, 1882, J. Forrest (MEL); 20 miles E. of Carnarvon, red sand on rises in Wanum country, 20.9.1941, C. A. Gardner n.6027 (P); near Mt. Hale, 1884, C. Crossland (MEL); W.A., J. Drummond n.387 (MEL. Hapotype of *P. pallida* Turcz.).

From the original description of *P. auriculata*, in which de Candolle referred to the involucral bracts as being "transversely rugose and acuminate", it was clear that the specimen he handled was conspecific with either *P. canescens* A. Cunn. ex DC. or *P. pallida* Turcz. It not being possible to decide to which of these two species *P. auriculata* belonged, an appeal for information was made to the Botanic Gardens at Geneva, where de Candolle's herbarium is housed. The following is an extract from the reply by Mr. Raymond Weibel, Curator of the Herbarium: "The bracts of the involucre of *P. auriculata* are very rugose, as those of *P. pallida* Turcz. The capitulum is of a larger diameter than the one of *P. canescens*; the involucre of *P. auriculata* reaches, in sicco, a diameter of 1.5 cm.; the one of *P. canescens* seldom reaches 1 cm." The label of Gaudichaud's specimen bears the following information: "Baie des ch. (= chiens) marins" (Bay of Dogfish = Shark Bay). Also photographs of *P. canescens* and *P. auriculata* Type specimens were taken and sent, together with some of the involucral bracts from Gaudichaud's specimen. As a result of the careful observations and comparisons made by Mr. Weibel, and the photographs and material supporting those observations, there is no doubt that *P. auriculata* is not only synonymous with *P. pallida*, but has priority in nomenclature. A similar conclusion was reached by Diels (1905).

A hapotype of *P. pallida* ("West Australia", J. Drummond 5th Coll. no.387) was selected from five specimens in the National Herbarium, Melbourne, which bear the

type data. There is no evidence that Turczaninow handled these specimens, and it is probable that they are duplicates of the type series.

The most distinctive feature of *P. auriculata* is the almost honeycombed appearance of the involucre, due to the deeply rugose nature of the laminae. This is a character which is shared only with *P. rugata* and relationship can be assumed.



Text-figs. 58-83.

58-65. *P. auriculata*.—58, Habit $\times 0.3$; 59-62, outer, intermediate and inner Involucral Bracts $\times 3$; 63, Ray floret $\times 3$; 64, Disc floret $\times 3$; 65, Distribution. 66-74. *P. rugata*.—66, Habit $\times 0.3$; 67-70, outer, intermediate and inner Involucral Bracts $\times 3$; 71, Ray floret $\times 3$; 72, Disc floret $\times 3$; 73, *P. rugata* var. *littoralis*, Habit $\times 0.3$; 74, Distribution, *P. rugata* (x), var. *littoralis* (•). 75-83. *P. gracilis*.—75, Habit $\times 0.3$; 76-80, outer, intermediate and inner Involucral Bracts $\times 3$; 81, Ray floret $\times 3$; 82, Disc floret $\times 3$; 83, Distribution.

9. *PODOLEPIS RUGATA* Labill., *Nov. Holl. Pl.*, II, 57 (1806):208.

Perennial plants 5-58 cm. high, glabrous or with a varying amount of loose white wool. *Cauline leaves* up to 10 cm. long, 3-13 mm. broad, oblanceolate, elliptical or linear, acute to acuminate, tapering to a shortly decurrent base; *radical leaves* up to

8 cm. long, seldom present. *Inflorescences* 1-24 or more. *Involucres* 3 cm. broad, 2 cm. long. *Involucral bracts* reddish-brown, with very deeply rugose, obtuse laminae; claws glandular; intermediate bracts about 6.5 mm. long with broadly ovate laminae. *Florets* with a pappus of 35-80 finely barbellate bristles, united at the base. *Ray florets* 35-70, the ligule 8.5-15 cm. long, 2-3 mm. broad, 3-lobed. *Fruits* 2.7 mm. long, 0.8 mm. broad, terete, microscopically papillate.

Key to the varieties.

Leaves of normal texture. Glabrous or woolly plants with erect habit var. *α rugata*.
Leaves fleshy. Glabrous plants with stunted often semi-prostrate habit var. *β littoralis*.

P. RUGATA Labill. var. *α RUGATA*.

(Text-figs. 66-72.)

Type data: "Van Leuwin's Land."

Erect perennials with elliptical or linear cauline leaves of normal texture.

Specimens examined:

Victoria: On the Glenelg R., 1857, F. Mueller (MEL); mouth of the Glenelg, W. Allitt (MEL).

South Australia: Coombe, 11.1952, W. H. Litchfield (ADW.8945); Murray Bridge, 26.10.1939, K. E. Orchard (ADW.3884); Wynarka, 10.1932, E. Ising (I.3856); Karoonda, 7.10.1915, J. M. Black (JMB); Pallamana, 26.10.1943, Erdman (ADW.5057); Sedan, 10.1924, J. M. Black (JMB); Mylor, 15.10.1925, J. M. Black (JMB); Birdwood, 10.1929, E. Ising (I.3854); Grange, 11.1897, O. E. Menzel (AD); Henley Beach, 24.10.1904, J. M. Black (NSW.25296; JMB); between Glenelg and Brighton, sandhills, 16.10.1906, J. M. Black (JMB); Brighton, sea coast, 11.1897, O. E. Menzel (NSW.25294); Eden, 30.10.1937, E. Ising (I.3849); Pt. Noarlunga, on cliffs, 5.11.1926, J. B. Cleland (JBC); Aldinga, 31.10.1928, J. B. Cleland (JBC); Yorke Penin., Tertiary soils, 1879, Tepper (MEL); Port Augusta, 1885, A. Richards (MEL); Cape Spencer, 1.1950, H. A. Behrens (MEL); Port Lincoln, F. Mueller (MEL); between Port Lincoln and Streaky Bay, 1882, Richards (MEL); Coffin Bay, Richards (AD); Lake Hamilton, 10.1882, A. Richards (AD); Venus Bay, Warburton (MEL); Koonibba, 19.8.1928, J. B. Cleland (JBC); Fowler's Bay, 10.1907, T. Brown (NSW.25435).

P. RUGATA Labill. var. *β LITTORALIS* var. nov.

(Text-fig. 73-74.)

Holotype and two *Paratypes*: Cape Conedie, Kangaroo Island, 1.1907, R. S. Rogers (NSW.25380).

Herbae semi-pronae aut non nunquam erectae, 9.5-26 cm. altae. Foliis caulium oblanceolatis aut etiam spatulatis, breviter acutis, saepissime stipatis.

Semiprostrate or occasionally erect plants 9.5-26 cm. high, with oblanceolate to spatulate, fleshy, shortly acute leaves which are often crowded.

Range: Kangaroo and Thistle Islands; neighbouring portions of the South Australian Coast.

Specimens examined:

South Australia: Aldinga, 31.10.1928, J. B. Cleland (JBC); Pt. Noarlunga, on cliffs, 5.11.1926, J. B. Cleland (JBC); Willunga, 24.9.1904, J. M. Black (JMB); Cape Spencer, 1.1950, H. A. Behrens (MEL).

Kangaroo Island: Between Kingscote and Vivonne Bay, 16.11.1924, J. B. Cleland (JBC); Vivonne Bay, 2.12.1934, J. B. Cleland (JBC); Pennington Bay, 6.3.1926, J. B. Cleland (JBC); d'Estrea Bay, sea cliffs, 12.1881, R. Tate (AD); Cape Conedie, 1.1907, R. S. Rogers (NSW.25380. *Holotype*. *Paratypes*); Rav. des Casvars, 31.1.1950, J. B. Cleland (JBC); Mouth of the Rocky R., 31.1.1940, J. B. Cleland (JBC); Kangaroo Is., 10.1908, H. H. D. Gordon (JMB).

Thistle Island: 1.1907, J. H. Maiden (NSW.25381).

P. rugata was described by Labillardière from specimens he collected at Cape Van Leeuwin, in the south-western corner of Western Australia, and the description was accompanied by figures of the habit and floral details. Further specimens were

collected at Princess Royal Harbour by L. Preiss and referred by Steetz (1845) to this species, with the comment "I have not seen Labillardière's specimen, but have no doubt that these are the same, although their ligules are much more deeply incised than those of Labillardière. I have noticed that in other species of this genus, i.e. *P. acuminata*, the ligules vary in one and the same specimen, very often some having deep incisions and some very slight".

Labillardière's excellent drawings, in conjunction with his description, leave no doubt as to the identity of this species, in the absence of type material.

The only variation of any significance in *P. rugata* is the stunted, often semi-prostrate, habit and oblanceolate, rather fleshy leaves of a number of plants from Kangaroo Island and neighbouring parts of the mainland. Although this habit may be associated with an exposed habitat, normal plants have been collected from some of the same localities. The present writer is of the opinion that this variation has a genotypic basis, and consequently has accorded it varietal status.

P. rugata is closest in all respects to *P. pallida* Turcz., but particularly in the very rugose bracts which, *in situ*, give a honey-combed appearance to the involucre of both species. Since these species replace each other geographically the suggestion is that they had a common origin, perhaps from the widespread and variable *P. canescens* A. Cunn. ex DC., and that they diverged as geographic subspecies.

10. *PODOLEPIS GRACILIS* (Lehm.) R. Grah. in *Edinb. N. Phil. Journ.* (1828): 379.

(Text-figs. 75-83.)

Synonyms: *Stylolepis gracilis* Lehm. var. *glabra* Lehm., *Sem. Hort. Hamb.* (1828): 17; *S. gracilis* Lehm. var. *arachnoidea* Lehm., *l.c.*; *Podolepis rosea* Steetz in *Lehm. Pl. Preiss*, 1 (1845): 463; *P. filiformis* Steetz in *Lehm. Pl. Preiss*, 1 (1845): 465; *P. rosea* Steetz in *Lehm. var. mollissima* Walp., *Rep.* 6 (1847): 236; *P. Spenceri* Ewart in *Proc. Roy. Soc. Vict.*, N.S. 20 (1907): 83.

Type data: "Habitat in New Holland. Seeds sent from England" (i.e. to Hamburg).

Slender, usually branching annuals, 3-50 cm. high, sparsely woolly on the stems, leaf axils and lower leaf surfaces. Lowest *cauline leaves* up to 8 cm. long, 8 mm. broad, oblanceolate to broad-linear, sessile, shortly decurrent, acute to acuminate. *Radical leaves* seldom present. *Inflorescences* 1-25, on filiform peduncles. *Involucres* 0.9-2 cm. broad, 1 cm. long. *Involucral bracts* straw-coloured to reddish-brown, smooth and shining with a distinct midrib; intermediate bracts about 7 mm. long, the laminae smooth, triangular and acute, or ovate and subacute with a short mucro; claws slender, glandular, equal in length to the laminae. *Florets* with a pappus of 6-20 minutely barbellate bristles. *Ray florets* pink, the ligules 1-1.5 cm. long, 1.3-2.5 mm. broad, 2-3-lobed. *Fruits* 1-1.4 mm. long, 0.5 mm. broad, terete.

Range: Coastal belt of Western Australia from the Murchison River to King George's Sound.

Specimens examined:

Western Australia: Murchison R., Oldfield (MEL); between the rivers Murchison and Irwin, Sewell (MEL); Gingin and Moore Rivers, 12.1879, J. Forrest (MEL); upper Swan R., 1884, Sewell (MEL); between York and Perth, Jarrah woods, 11.1877, F. Mueller (MEL); near York, grassland, 11.1877, F. Mueller (MEL); Greenmount, 25.8.1897, R. Helms (P; NSW.25319); Midland Junction, wet places, 3.12.1902, C. Andrews (NSW.25312; 25315); Welshpool to Kalamunda, 9.1909, J. H. Maiden (NSW.25458); Bassandeen, sandy places among dense shrubs, L. Preiss n.51 (MEL); near Perth, 1878, Forrest (MEL); Perth, 10.1909, J. H. Maiden (NSW.25457; 25461); in fallow land not far from Perth, L. Preiss n.56 (MEL); South Perth, 1902, A. G. Hamilton (NSW.25323); near Limekilns, sandy woods not far from Perth, L. Preiss n.55 (MEL. Lectotype and lectoparatype *P. rosea* Steetz); Sandy rather shady places on the Swan R., above Perth, L. Preiss n.53 (MEL. Lectotype *P. rosea* var. *mollissima* Steetz); Wooroloo, 10.1906, M. Koch n.1509 (MEL. Holotype and paratype *P. Spenceri* Ewart.); Wooroloo, 10.1907, M. Koch (MEL; NSW.25316; 25320; 25324); Subiaco, 10.1912, F. Stoward (NSW.25474); Cottesloe, 22.9.1898, R. Helms (NSW.25464); Fremantle, Oldfield (MEL);

near Woodman's Point, L. Preiss n.57 (MEL); Cotypes *P. filiformis* Steetz); Armadale, 28.8.1897, R. Helms (P); Serpentine R., sandy meadows, 11.1877, F. Mueller (MEL); Pinjarra, 3.12.1877, F. Mueller (MEL); Pinjarra, 16.10.1920, C. A. Gardner (P); Harvey R., meadows, 5.12.1877, F. Mueller (MEL); Lowden, 12.1909, M. Koch (P; MEL; NSW.25313); Busselton, 1870, A. and E. Preis (MEL); Darling Ranges, moist places, 11.1907, M. Koch (NSW.25446; MEL); Balingup, 12.1917, R. H. Pulleine (NSW.25468); Blackwood R., 1875, McHard. (MEL); Bridgetown, gravelly soil, 29.1.1947, R. D. Royce (P); Manginup, 12.1921, M. Koch (P); Lake Muir, (MEL); 8-10 miles from Nornalup, 12.1917, R. H. Pulleine (NSW.25467); upper Hay R., 1870, M. Warburton (MEL); King George's Sound, coast heath, 10.1867, F. Mueller (MEL); W.A., J. Drummond n.327 (MEL); ex hort. bot. Hamburg, 1834 (MEL).

According to Lehmann (1828), plants were raised at the Botanic Gardens, Hamburg, from "seeds sent from England under the name of *Centaurea* sp.". He described these in the new monotypic genus *Stylolepis* (*S. gracilis*) and recognized two varieties, *glabra* and *arachnoidea*. There is a specimen from Sonder's collection in the National Herbarium, Melbourne, which is labelled "*Stylolepis gracilis* Lehm. ex hort. bot. Hamburg, 1834". Since the date given is six years after the publication of the name, it seems probable that this specimen is a descendant of the original material, and consequently it has been used as a basis of comparison for the species.

Graham (1828) independently gave the name *Podolepis gracilis* to a plant cultivated at Edinburgh and stated "the seeds of this plant were sent to us from New South Wales in November last by Mr. Fraser, as a specimen of *Centaurea*. The plants have been kept in the greenhouse of the Royal Botanic Gardens and will produce very few seeds". Since both authors mention *Centaurea* it would seem that the unspecified English source of Lehmann's material was Graham.

Variation in the involucre bracts, while small, was the basis of two species described by Steetz (1845), *P. filiformis* and *P. rosea*. With the reasonably large series of specimens now available, the characters used by Steetz are found to vary continuously so, although type selection has been made, both names are relegated to synonymy under *P. gracilis*.

P. Spencersi ("Woorooloo, 1906, M. Koch") was placed by Ewart "between *P. Lessoni* and *P. rugata*", both of which are very distinctive species with no resemblance to the specimens handled by Ewart, which are typical plants of *P. gracilis*. Again, type specimens have been nominated but the name abandoned.

P. angustifolia Hort. ex Vilmorin's Blumeng. (ed. 3, Sieb. and Voss, 1 (1894): 537) was published as a synonym of *P. gracilis*, and according to Art. 40 of the International Rules of Botanical Nomenclature "a name of a taxonomic group is not validly published when it is merely cited as a synonym". The name, therefore, has no standing under the rules and should not be listed in Index Kewensis (Suppl. 9).

P. gracilis shows considerable variation in size, and the degree of branching. The smallest specimens examined were only 3 cm. high and with the typical ephemeral habit, but at the other extreme were much-branched plants 50 cm. in height with many capitula. An attempt was made to break up this species on details of the intermediate involucre bracts in investigating the validity of *P. filiformis* Steetz, since in certain specimens these bracts taper gradually to a fine point, and in others they end more abruptly so that the midrib projects as a short mucro. However, the number of specimens which occupied an intermediate position on this basis was so great that separate categories could not be upheld and it can only be assumed that this species varies, in this character, between the two conditions.

The colour of the ray florets was not always recorded by collectors, but in all the specimens cited a trace of pink pigmentation still remains and, although the ligules are usually 2-3 lobed, occasional capitula have been seen where lobing of the ligules is suppressed.

According to Sieber and Voss (1894) "ligulate florets numerous, tongue-shaped, fairly long, entire-margined, anteriorly truncate or somewhat emarginate, purple to

purplish-violet, in var. *rosea* rose-red to flesh-coloured rose, in var. *alba* mother-of-pearl white, and var. *superba* hort. has only a fresher flower-colour than the parent form". They also state "flowering time: 10 weeks after commencement of sowing; July to September" (in Europe).

11. *PODOLEPIS NUTANS* Steetz in *Lehm. Pl. Preiss*, 1 (1845): 464.

(Text-figs. 84-91.)

Type data: "New Holland (Swan R. Colony), in sandy low-lying ground, L. Preiss, n.58."

Lectotype and Lectoparatypes: type data (MEL).

Branching annuals (?) with white woolly indumentum chiefly on young parts and lower surfaces of leaves. *Cauline leaves* up to 6 cm. long, 8 mm. broad, lanceolate, sessile, shortly decurrent, acute. *Radical leaves* only present on young plants. *Inflorescences* up to 35, on filiform peduncles. *Involucres* 1 cm. diameter, 0.8 mm. long. *Involucral bracts* reddish-brown, smooth and shining, without a distinct midrib; intermediate bracts 5.5 mm. long, 3.7 mm. broad, the laminae transversely elliptical with a short, acute, outwardly curved apex, and the claws slender and glandular. *Florets* with a pappus of 10-15 fine barbellate bristles, slightly thickened upwards. *Ray florets* about 20, the ligules 5 mm. long, 1 mm. broad, 3-lobed, "yellow tinged with purple at the apex". *Fruits* 1 mm. long, 0.4 mm. broad, terete, microscopically papillate.

Range: Swan R. district and King George's Sound.

Specimens examined:

Western Australia: Swan River Colony, in sandy low-lying ground, L. Preiss n.58 (MEL, lectotype and two lectoparatypes); near Perth, "ray yellow tinged with purple at the apex", W. V. Fitzgerald (NSW.25317); King George's Sound, R. Brown (MEL).

If the number of herbarium specimens of any species is proportional to its occurrence in the field, *P. nutans* must be regarded as rare and may no longer be in existence. Although very similar in habit to *P. gracilis*, *P. nutans* is distinguished by the varnish-like appearance of the involucral bracts, whose laminae are broader than they are long, the outermost being kidney-shaped.

Bentham (1866) was of the opinion that *P. nutans* is a variety of *P. gracilis*, but the present writer considers that it is of specific status, although probably it originated as a local variant of that species.

12. *PODOLEPIS LESSONI* (Cass.) Benth. *Fl. Aust.*, 3 (1866): 606.

(Text-figs. 92-100.)

Synonymy: *Panaetia Lessonii* Cass., *Ann. Sci. Nat.*, 17 (1829): 417; *Podolepis Gilberti* Turcz. in *Bull. Soc. Nat. Mosc.*, 24 (1851) 1: 195.

Type data: "This plant is found in the neighbourhood of the Port of King George, where it was collected in 1826 by M. Lesson. We have described it on specimens belonging to M. Mérat."

Annual plants 6.5-41 cm. high, with pseudo-dichotomous branching and seldom unbranched. Stems sparsely woolly on lower portions. *Cauline leaves* up to 7 cm. long, 1.5 cm. broad, lanceolate, sessile, decurrent, acute, sparsely septate-hairy on upper surface, densely woolly below. *Radical leaves*, when present, up to 4.5 cm. long, 1.2 cm. broad, oblanceolate, tapering to the base. *Inflorescences* 1-80, on naked filiform peduncles. *Involucres* 3-7 mm. long, 0.6-1.2 cm. broad. *Involucral bracts* pale, semi-transparent, soft, shallowly wrinkled, acute with fringed margins; intermediate bracts about 5.4 mm. long, the laminae triangular, 3 mm. broad with slender claws. *Ray florets* 8-16, slender and tubular, with 3-4 deep lobes and a single pappus bristle sub-plumose distally, which equals or exceeds the length of the corolla tube. *Disc florets* 4-5-lobed with 3-4 pappus bristles plumose distally. *Fruits* 1 mm. long, 0.4 mm. broad, terete, almost smooth.

Range: Western Australia from the Murchison River district to King George's Sound, and inland to Coolgardie.

Specimens examined:

Western Australia: Mt. Narryer, Murchison R., 12.1907, J. Tyson (MEL:P); Murchison R., Oldfield (MEL); between Moore and Murchison Rivers, among shrubs in sandy soil, 11.1901; E. Pritzel (NSW.25249); Champion Bay, 1871, Guerin (MEL);



Text-figs. 84-117.

84-91. *P. nutans*.—84, Habit $\times 0.3$; 85-88, outer, intermediate and inner Involucral Bracts $\times 3$; 89, Ray floret $\times 3$; 90, Disc floret $\times 3$; 91, Distribution. 92-100. *P. Lessoni*.—92, Habit $\times 0.3$; 93-97, outer, intermediate and inner Involucral Bracts $\times 3$; 98, Ray floret $\times 3$; 99, Disc floret $\times 3$; 100, Distribution. 101-109. *P. Muelleri*.—101, Habit $\times 0.3$; 102-104, outer and intermediate Involucral Bracts $\times 3$; 105, inner Involucral Bracts forming "cup" $\times 3$; 106, Ray floret $\times 3$; 107, outer Disc floret $\times 3$; 108, inner Disc floret; 109, Distribution. 110-117. *P. capillaris*.—110, Habit $\times 0.3$; 111-114, outer, intermediate and inner Involucral Bracts $\times 3$; 115, Ray floret $\times 6$; 116, Disc floret $\times 6$; 117, Distribution.

between Geraldton and Pethara, 9.1930, E. Ashby (ADW); Upper Irwin R., 11.1877, F. Mueller (MEL); Wongan Hills, grey sandy loam, 13.9.1947, R. D. Royce (P); New Forest Road, 20 miles from New Norcia, 10.9.1932, W. E. Blackall (P); Cowcowing

Lakes, 9.1904, M. Koch (NSW.25253); Upper Swan R., 1882, Sewell (MEL); Swan R., M. Price (MEL); Cottesloe Beach, 1902, A. G. Hamilton (NSW.25252); Fremantle, on limestone rocks, 11.1901, W. V. Fitzgerald (NSW. 25247); vicinity of Perth, 1915, Davis (NSW. 25246); King's Park, Perth, 10.1909, J. Sheath (BRI); Darlington, soils derived from granite, 17.10.1949, B. A. Roark (AD); Welshpool to Kalamunda, 9.1909, J. H. Maiden (NSW.25243); Woorooloo, 10.1906, M. Koch (MEL); Kelmscott, 11.9.1898, R. Helms (P; NSW.25251); Armadale, 11.1911, F. Stoward (NSW.25329); Toodyay, 8.1911, F. Stoward (NSW.25328); Northam-Perth highway, 3-4 miles from Northam, 11.9.1949, K. Salasoo (NSW.25238); Cunderdin, 9.1908, J. B. Cleland (NSW.25255; P); Tammin, 9.1909, J. H. Maiden (NSW.25459); Merredin, 5.10.1923, M. Koch (MEL); Coolgardie, 1900, L. C. Webster (NSW.25248); 3 mls. S. of Narrogin, open ground on railway clearing in Wandoo woodland, 9.9.1947, N. T. Burbidge (BRI); Wagin, 25.10.1920, C. A. Gardner (P); Pinjarrah, 10.1872, I. S. Price (MEL); Busselton, 1870, A. and E. Pries (MEL); Blackwood R., J. Forrest (MEL); Manjimup, 11.1920, M. Koch (MEL); Lake Muir, Muir (MEL); Gordon R., Oldfield (MEL); forest meadows towards the Kalgan R., 10.1857, F. Mueller (MEL); Kalgan R., Oldfield (MEL; NSW.25444); abundant on some of the more fertile forest ridges towards Mt. Barker, 10.1857, F. Mueller (MEL); Mt. Barker, 10.1900, B. T. Goadby (NSW.25250); King George's Sound, 1860, S. Hannaford (NSW.25256); King George's Sound, coast heaths, 11.1867, F. Mueller (MEL); interior of King George III Gulf, 8.11.1840, L. Preiss (MEL); Mt. Manypeaks, 8.1939, C. A. Gardner (P); plains S. of the Stirling Range, 10.1857, F. Mueller (MEL); basaltic meadows N. of the Stirling Range, 10.1857, F. Mueller (MEL); New Holland, 1852, Drummond n.386 (MEL); W.A., J. Drummond n.329 (MEL).

Cassini (1829) erected the monotypic genus *Panaetia* (*P. Lessonii*) to accommodate specimens collected near "Port of King George" (presumably the locality now called King George's Sound), and another species was added in 1852 when Sonder described *P. Muellerei* ("between Crystalbrook River and Spencer Gulf"). Bentham (1866) transferred both species to *Podolepis*, combining them under the name *P. Lessoni*. The present investigation shows that there are, in fact, two valid species involved, and that these correspond to the two species of *Panaetia*. These are each now given separate status and the name *Podolepis Lessoni* is used in its original restricted sense.

The identity of *P. Gilberti* Turcz. ("Western New Holland, Gilbert Coll. n.269 and 282") is somewhat in doubt, because no type specimens are available in Australia and the original description is of no assistance in deciding whether it is synonymous with Cassini's or with Sonder's species. However, since the ranges of these two species do not overlap, and the type locality of *P. Gilberti* is in Western Australia, it seems safe to assume its synonymy with *P. Lessoni* in its restricted sense.

The habit of *P. Lessoni* is variable in that plants either have a single main stem which subsequently branches, or branching may take place at or below ground level to give a many-stemmed condition. Although usually quite robust herbs, specimens from Stirling Range, plains south of Stirling Range, and Merredin have a typical ephemeral habit. The smallest of these is 6.5 cm. high, unbranched, with a single capitulum and 1-3 cauline leaves, but unfortunately no ecological notes accompany these specimens.

The ray florets are very inconspicuous and may account for the discrepancy in collectors' records of the colour, where Oldfield states "fls. pink" and Fitzgerald "fls. yellow". Possibly the first refers to the ray florets and the second to those of the disc.

13. *PODOLEPIS MUELLERI* (Sond.), comb. nov.

(Text-figs. 101-109.)

Synonymy: *Panaetia Muellerei* Sond. in *Linnaea*, 25 (1852):505; *Podolepis Lessoni* (Cass) Benth., *Fl. Aust.*, 3 (1866):606 (in part); *P. cupulata* Maid. and Betche in Proc. Linn. Soc. N.S.W., 38 (1913):249.

Type data: "Between Crystalbrook River and Spencer's Gulf. Oct."

Lectotype: Between Crystalbrook River and Spencer's Gulf, 10.1851, F. Mueller (MEL).

Annual, usually branching, plants, 5–22 cm. high, the stems sparsely woolly towards the base. *Radical* and *lower cauline* leaves up to 5.5 cm. long, 1 cm. broad, lanceolate to broad-linear, sessile, decurrent, acute, sparsely hairy on upper surface, densely woolly on lower. *Inflorescences* 1–70, on naked filiform peduncles. *Involucres* 5–8 mm. long, 3.5–7 mm. broad, slightly longer than broad. *Involucral bracts* smooth, shining, semi-transparent, acute, golden brown; intermediate bracts spade-shaped with a slender claw and a scarious shortly torn-ciliate lamina 3 mm. broad; innermost bracts with hard thick claws united at the base to form an erect cup enclosing the florets. *Florets* 20–50, tubular, of four kinds: (1) 3–10 of the outermost, female with 3–4 finger-like corolla lobes and no pappus. (2) 3–7 of the outermost, bisexual with 5 finger-like corolla lobes and no pappus. (3) 1–3 inner florets, bisexual with 5 finger-like corolla lobes and a single pappus bristle. (4) Central florets, bisexual with 5 corolla lobes and 6–13 shortly plumose pappus bristles. *Fruits* 1.5 mm. long, 0.6 mm. broad, terete, minutely papillate.

Range: Western and south-western New South Wales to the eastern half of South Australia.

Specimens examined:

New South Wales: Cuttabri, Pilliga scrub, large masses in low moist alluvial places, 8.1913, J. L. Boorman (NSW.25236); Moree to Narrabri, plains, 8.1917, O. D. Evans (NE); Nea, via Curlewis, 11.1949, A. S. Taylor (NSW.25237); Tarella, Wilcannia, 8.1889, W. Bauerlen (NSW.25478); Darling R. (MEL); Lachlan R., 9.1878, F. Mueller (MEL); Hay-Balranald Road, open plain, in grey clay-pan, 10.10.1947, E. F. Constable (NSW.4476); Wanganella, 10.1903, E. Officer (NSW.25259; 25443, Holotype *P. cupulata* Maid. and Betche); Zara, Wanganella, 9.1915, E. Officer (NSW.25487; BRI; AD).

South Australia: Mt. Lyndhurst, 9.1898, M. Koch (MEL; BRI; AD); the Crabholes, Pimba, 8.1947, A. R. R. Higginson (JBC); between Spencer's Gulf and Flinders Range, 10.1851, F. Mueller (MEL); Hookina, 25.8.1883, R. Tate (AD); Hawker, 3.9.1941, J. B. Cleland (JBC); Carrieton, 29.9.1916, J. M. Black (JMB); Baroota, 21.9.1906, J. M. Black (JMB); Crystal Brook, F. Mueller (MEL); between Crystalbrook R. and Spencer's Gulf, 10.1851, F. Mueller (MEL. Lectotype and lectoparatypes of *Panaetia Muelleri* Sond. and *Podolepis Muelleri* (Sond.) G.L.D.); St. Vincent's Gulf, 1898, F. Mueller (MEL); Marino, 11.8.1906, J. M. Black (JMB; N.S.W.25254); Hallett's Cove, 9.10.1920, J. B. Cleland (JBC); Clarendon, 1852, Tepper (MEL); Willunga, 24.9.1904, J. M. Black (JMB; NSW.25240); Aldinga Bay, cliffs, 31.10.1928, J. B. Cleland (JMB; JBC); Sellick's Beach, cliffs, 18.10.1941, J. B. Cleland (JBC).

Originally described by Sonder as *Panaetia Muelleri* ("between the Crystalbrook River and Spencer's Gulf"), this species was transferred by Bentham (1866) to *Podolepis* as a synonym of *P. Lessoni* (Cass.) Benth. Both species are, however, distinct and replace each other geographically, in that *P. Muelleri* occurs in South Australia and Western New South Wales, while *P. Lessoni* is confined to Western Australia. Although there is a strong superficial similarity between these two species, they are readily distinguished by the involucral bracts of *P. Muelleri* being smooth and shining whereas those of *P. Lessoni* are softly wrinkled and dull. The chief diagnostic character of *P. Muelleri*, however, is the partial union of the innermost bracts to form a cup-like structure which encloses the florets. This "cup" is best seen at maturity of the capitulum, when the claws of the bracts are hard and thick, and is the character on which Maiden and Betche based *P. cupulata*, which is now reduced to synonymy.

Only relatively few of the florets of the outermost whorl are female, and these are thought to be sterile, since none have been seen with normal fruit.

The statement by various authors that the pappus bristles of the outer florets are readily deciduous has not been substantiated, and dissection of a number of capitula shows that in all the outermost florets, whether female or bisexual, pappus development is suppressed.

Variation in habit involves size and degree of branching which, in turn, controls the number of inflorescences.

14. *PODOLEPIS* *CAPILLARIS* (Steetz) Diels, *Engl. Jahrb.*, 35 (1905): 621.
(Text-figs. 110-117.)

Synonymy: *Siemssenia capillaris* Steetz in *Lehm. Pl. Preiss*, 1 (1845): 467; *P. Siemssenia* F. Muell. ex Benth., *Fl. Aust.*, 3 (1866): 607.

Type data: "In limosis porrectis illustribus sylvae haud procul a rustico cl. J. Moore, terrae superioris cl. 10. Sept. 1839, Herb. Preiss no. 72."

Lectotype and Lectoparatype: Type data (MEL).

Annual plants up to 43 cm. high with slender wiry branches. Stems commonly reddish with a grey waxy coating, and glabrous except for small clusters of septate hairs at the leaf axils. *Cauline leaves* 0.5-4 cm. long, 0.5-1.5 mm. broad, sessile, linear, entire, obtuse to sub-acute, with strongly recurved margins. *Radical leaves* up to 4.5 cm. long, 1.1 cm. broad, elliptical, flat, present only on young plants. *Inflorescences* 6 to 100 or more, on filiform peduncles, naked or with a single bract. *Involucres* 6-7 mm. long, 6 mm. broad, obovate. *Involucral bracts* golden-brown, shining, glabrous, obtuse, entire, sessile, the broad scarious margins indented about half-way along each side; intermediate bracts up to 5 mm. long, 1.5 mm. broad. *Ray florets* 9-12, the ligule 2.5 mm. long, 0.8 mm. broad, 3-lobed with frequently a purple line along the central lobe; pappus absent. *Disc florets* 17-22, with a pappus of 15-18 delicate barbellate capillary bristles. Fruits 1 mm. long, 0.3 mm. broad, terete, microscopically papillate.

Habitat: Sandy soil, often among stones on hillsides.

Range: Western districts of the eastern States, throughout Central and South Australia and southern half of Western Australia.

Specimens examined:

Queensland: Mulligan River, 2.1904, H. Clarke (NSW.25280); Bulloo River, 1887, L. Morton (MEL).

New South Wales: Tibooburra, 700 ft., erect spreading habit, on stony ground, granite, 24.10.1949, E. F. Constable (NSW.10737); Paroo R. district, 9.1900, E. Betche (NSW.25477); Mt. Robe, 23.8.1925, A. Morris (NSW.25271; ADW); Darling R., Goodwin and Dallachy (MEL; NSW.25261).

Victoria: Shifting sandhills on the Murray (MEL); between Euston and Mildura, 18.8.1946, J. Vickery (NSW.2040); Lake Coorong, mallee, 10.1825 (MEL); Lake Albacutya, 1901, St. Eloy d'Alton (NSW.25277); Rainbow, d'Alton (MEL).

Northern Territory: 11 mls. W. of Alice Springs, on Hermannsburg Road, flat plain, 4.10.1955, N. T. Burbidge and M. Gray (CAN.4537); Rudall's Creek, 1886, H. Kempe (MEL); about 4 miles S. of Eridunda Sta., base of low red sand dune, 9.10.1955, N. T. Burbidge and M. Gray (CAN.4568).

South Australia: Between Ernabella and Morrilyanna, 20.8.1933, J. B. Cleland (JBC); west of Everard Ranges, S. A. White (JMB); Arceoilinna, 25.5.1891, R. Helms (NSW.25264); Wantnapella Swamp, near Alberga R., 21.8.1914, J. M. Black (JMB); 20 mls. W. of Lambinna, 23.8.1914, S. A. White (JMB); Macamba R., 2.1.1927, J. B. Cleland (JMB); Ross' Waterhole, Macamba R., 21.1.1927, J. B. Cleland (JMB; JBC); between Stoke's Range and Cooper's Creek, Wheeler (MEL); Hergott to Strangeways, W. L. Cleland (JBC); Mt. Lyndhurst, 10.1899, M. Koch (NSW.25263); Flinder's Range, entrance to Wilpena Pound, stony rocky hillsides about 1,800 ft., 30.8.1946, S. T. Blake n.16870 (BRI); Wilpena Pound and Hawker, 10.1937, (ADW.2740); near Stuart's Range, 1885, Winnecke (MEL); Termination Hill, 6.1883, R. Tate (AD); Mt. Eba, 1880, E. Giles (MEL); Arcoona, bluebush flat, 8.1927, J. B. Murray (AD); near Lake Torrens, 8.1906, L. Gee (JMB); Monalena, 7.1909, H. Deane (NSW.25270); Ooldea, 31.10.1916; 1.1917, J. M. Black (JMB); Barton, on ridges and slopes of low sandhills, in reddish-brown sand, 23.4.1931, C. E. Hubbard n.8336 (BRI); Pidinga, 1880, Richards (AD; MEL); Tarcoola, 19.9.1920, J. M. Black (JMB); 17 miles N.W. Tarcoola, 30.10.1929, J. B. Cleland (JBC); Koonibba, 18.8.1928, J. B. Cleland (JBC); N. of Fowler's Bay, E. Giles (MEL); Gawler Range, W. of Yardea, 19.10.1953, J. B. Cleland (JBC); W. of Nonning, 12.10.1954, J. B. Cleland (JBC); Nonning, 23.8.1928, J. B. Cleland (JBC); Minnipa,

11.11.1951, J. M. Black (JMB); Wudinna, 5.9.1938, E. H. Ising (I.3816); Kyancutta, 25.8.1928, J. B. Cleland (JBC); near Spencer's Gulf, 1881, Lattorf (MEL); Nonning, 3.1931, Pulleine (JBC); between Belo Hill, Bookaloo and Yudnapinna Sta., 26.8.1951, E. Robertson (ADW.7114); Mt. Gunson, 9.1913, Berkwith (JMB); 30 mls. N. of Pt. Augusta, 9.11.1928, J. B. Cleland (JBC); Burunga Range, 22.7.1884, S. Dixon (AD); Blanchetown, R. Tate (AD); Loxton, 15.10.1909, J. M. Black (JMB); Berri, 11.1923, H. W. Andrews (JMB); Loveday, 23.8.1937, E. H. Ising (I.3814).

Western Australia: South Hutt, Oldfield (MEL); Geraldton, 10.1907, J. B. Cleland (NSW.25274); Greenough R., 11.1877, F. Mueller (MEL); Upper Irwin's R., 11.1877, F. Mueller (MEL); Minginew, 10.1909, J. H. Maiden (NSW.25265; BRI); Lat. 31° 11' S., Long. 119° E., A. Forrest (MEL); between Coorow and Arrino, 15.9.1932, W. E. Blackall (P); Cowcowing, 9.1904, M. Koch (MEL; P); 2 mls. E. of Carrabin, 22.8.1929, W. E. Blackall (P); Merredin, 15.9.1923, M. Koch (MEL; NSW.25273); Hine's Hill, 2.10.1923, M. Koch (NSW.25272); Kellerberrin, loamy woodland soil, 4.1943, C. A. Gardner (P); Tammin, 9.1909, J. H. Maiden (NSW.25266); Northam, 9.1900, E. Pritzel (AD; NSW.25275); Avon district, cleared forest land near Northam, 11.1900, E. Pritzel (AD); Flooded parts of the Bannister, Oldfield (MEL); 100 miles N. of Stirling Range, 1879, Muir (MEL); Fraser's Range, 1876, Dempster (MEL); between Esperance Range and Fraser's Range, 1876, Dempster (MEL); Cape Arid Bay, sandy places, mouth of Thomas R. (MEL); half-way between Mt. Ragged and Victoria Springs, 1886, S. Brooke (MEL); west end of Great Bight, 1877, Carey (MEL); Coolgardie, 10.1900, E. Kelso (P); Kalgoorlie, 8.10.1914, C. H. Ostenfeld (P); Skull Creek, Laverton, alluvial soil, 9.8.1931, C. A. Gardner (P); Laverton, 9.1909, J. H. Maiden (NSW.25268); 5 miles S. of Lawlers, 18.10.1945, C. A. Gardner (P); "in limosis porrectis illustribus sylvae haud procul a rustico cl. J. Moore, terrae superioris, cl. 10.Sept.1839, Herb. Preiss no. 72 (MEL. Lectotype and lectoparatype); W.A., J. Drummond n.171 (MEL); W. A., J. Drummond, 2nd Coll., 1844, n.171 (NSW.25262).

P. capillaris (Steetz) Diels is a very widespread species in the drier parts of Australia, and is remarkable for its lack of variation. The most characteristic vegetative feature is the frequent pseudo-dichotomous branching of the slender, rather wiry stem, each branch terminating in an inflorescence. The leaves are never numerous, and show some variation in size. In a specimen from Cowcowing Lakes the maximum leaf-size is 3 mm., but as the plant is incomplete it is possible that the lower leaves were of larger size.

The capitula, with their shining involucre and the greyish "bloom" on the stems, are both constant and distinctive features, and the whole plant has a delicate appearance.

The shape of the involucre bracts is unusual and is seen elsewhere in the genus only in *P. microcephala* Benth.

15. *PODOLEPIS MICROCEPHALA* Benth., *Fl. Aust.*, 3 (1866): 607.

(Text-figs. 118-125.)

Type data: Shark's Bay, Milne.

Slender branching annuals up to 22 cm. high, the stems reddish-purple with a waxy grey bloom. *Leaves* cauline, up to 3.5 cm. long, 1.5 mm. broad, linear, sessile, obtuse, the margins recurved. *Inflorescences* up to 10, on filiform peduncles bearing small ovate leaf-like bracts. *Involucre* 8 mm. broad, 5 mm. long. *Involucre bracts* sessile, the median portion herbaceous and densely glandular, with narrow scarious margins; laminae acute, entire; margins of intermediate and inner bracts laterally constricted at the centre. *Ray florets* 6, the ligule 4-lobed, 2 mm. long, 0.5 mm. broad, pappus absent. *Disc florets* with a pappus of about 14 barbellate capillary bristles. *Fruits* 0.8 mm. long, 0.4 mm. broad, terete, microscopically tuberculate.

Range: Confined to the Shark Bay district of Western Australia.

Specimens examined:

Western Australia: Shark Bay, 10.1877, F. Mueller (MEL; NSW.25281; P); Carnarvon, 1906, W. V. Fitzgerald (NSW.25282); Hamelin Harbour (? Pool), 10.1877, F. Mueller (MEL).

In the absence of type material, specimens collected from the type locality and identified by Mueller were used as a basis of comparison. These agreed with Bentham's description and there is no reason to doubt that they are conspecific with the material he handled.



Text-figs. 118-141.

118-125. *P. microcephala*.—118, Habit $\times 0.3$; 119-122, outer, intermediate and inner Involucral Bracts $\times 3$; 123, Ray floret $\times 3$; 124, Disc floret $\times 3$; 125, Distribution. 126-133. *P. arachnoidea*.—126, Habit $\times 0.3$; 127-130, outer, intermediate and inner Involucral Bracts $\times 3$; 131, Ray floret $\times 3$; 132, Disc floret $\times 3$; 133, Distribution. 134-141. *P. Kendallii*.—134, Habit $\times 0.3$; 135-138, outer, intermediate and inner Involucral Bracts $\times 3$; 139, Ray floret $\times 3$; 140, Disc floret $\times 3$; 141, Distribution.

Since Hamelin Harbour is at the south-west of the State it is assumed that this name was written in mistake for Hamelin Pool, which is in the type-district. Support is lent to this view by the fact that the specimen was collected by Mueller in the same month and year as others from Shark Bay.

Owing to the very limited material, little can be said about variation, which apparently concerns the degree of branching and the size of the leaves.

An unusual condition, however, was seen in certain of the outermost florets, in which a deeply bi-lobed tongue of corolla tissue arises from the apex of the corolla tube at a point where it passes into a broad 3-lobed ligule. These florets are therefore 2-lipped, and the fact that they are bisexual and bear a normal pappus indicates that they belong, morphologically, to the disc rather than the ray.

The peculiar "hour-glass" shape of the involucre bracts of *P. microcephala* suggests a close relationship with *P. capillaris* and its restricted distribution indicates its origin as a local variant of that species and is now, perhaps, extinct.

16. *PODOLEPIS ARACHNOIDEA* (Hook.) Druce in *Rep. Bot. Exch. Cl. Brit. Isles* (1917):640. (Text-figs. 126-133.)

Synonymy: *Rutidosia arachnoidea* Hook. in *Mitch. Trop. Austr.*, (1848):341; *Rutidochlamys Mitchellii* Sond. in *Linnaea*, 25 (1852):497; *Podolepis rhytidochlamys* F. Muell., *Frag.*, 4, (1864):79 (cited as *P. rutidochlamys* F. Muell. by Bentham, *Fl. Aust.*, 3 (1866):603).

Type data: Entry in Mitchell's Journal for 6th Oct. "a new *Rutidosia*, a tall herbaceous perennial". (Mitchell's position on that date was on the flats at the base of the ranges, apparently near Mt. Pluto, Mt. Playfair and Mt. Hutton, to the south-west of the Warrego, Maranoa and Nive.)

Many-stemmed perennials up to 80 cm. high, forming large clumps; white woolly indumentum on the stems and both surfaces of the young leaves. *Radical leaves* clustered, up to 13.5 cm. long, 1.8 cm. broad, oblanceolate, acute, petiolate, woolly on both surfaces or only on the lower. *Cauline leaves* up to 11 cm. long, 1.6 cm. broad, acute, broad-linear, stem-clasping, decurrent. *Inflorescences* very numerous, in clusters of 3-10, almost sessile at the ends of branches. *Involucres* 10 mm. long, 6 mm. broad, reddish-brown. *Involucre bracts* narrow elliptical, acute, hardly clawed, the scarious laminae apically rugose with minutely torn-ciliate margins; intermediate bracts about 1 cm. long, 2 mm. broad. *Florets* with a pappus of 25-30 microscopically barbellate bristles. *Ray florets* 5-7, yellow, the ligule 2.5 mm. long, 1.5 mm. broad, 3-4-lobed. *Fruits* 2 mm. long, 0.5 mm. broad, terete, minutely papillate.

Range: Throughout Queensland; north-west and western districts of New South Wales.

Specimens examined:

Queensland: Endeavour R., 1883, Persich (MEL); 12 miles from Ravenshoe, 2,900 ft., sandy soil, 11. 1943, C. Davis (NE); Ravenswood, 1879, S. Johnson (MEL); Charters Towers, 1.1891, C. F. Plant (BRI); Upper Burdekin R., F. Mueller (MEL); Bowen (MEL); Port Denison (MEL); Emu Park, sea shore, Thozet (MEL); Burnett R., F. Mueller (MEL); Fraser Is., near Ocean Beach, 5.1925, C. T. White n.25757 (BRI); Fraser Is., on sand hill near sea, in open place, with *Helichrysum*, 15-16.10.1930, C. E. Hubbard, n.4428 (BRI); Sunshine Beach, Noosa Heads, on old sand dune behind beach, 30.8.1955, G. L. Davis (NE); Miles, 12.1890, F. M. Bailey (BRI); Brisbane R., 1876, Bailey (MEL); Bybera, very sandy soil, *Angophora lanceolata* forest, 20.1.1934, C. T. White n.9704 (BRI); Warwick, 3.1911, J. L. Boorman (NSW.24323); Glen Niven, 5.1921, E. Cheel (NSW.25426); Applethorpe Swimming Hole, granite sand on flat in Stringybark forest, 22.11.1946, S. L. Everist and L. J. Webb n.1324 (BRI); Stanthorpe, grassland, cleared *Eucalyptus* forest, granite residue soil (sandy grit), 3,000 ft., 11.3.1931, C. E. Hubbard n.5672 (BRI); Wallangarra, common in open forest lands, 11.1904, J. L. Boorman (NSW.25427); sources of the Thomson R., 1871, Birch (MEL); Jericho, 4.1946, M. S. Clemens (BRI); Nive R., in yellow sand, 10.1939, S. L. Everist n.1911 (BRI); near Adavale, 29.8.1923, W. MacGillivray (BRI; ADW); Charleville, 9.1920, A. J. Turner (BRI); Cooper's Crk., sandhills, 10.7.1884, J. McLeod (AD); Bokkara Crk., undulating forest ground, 22.12.1845 (MEL).

New South Wales: Wallangra, 11.1912, J. L. Boorman (NSW.25475; BRI); Warialda, 11.1905, H. M. Rupp (NSW.25429); Tingha, 3.1917, J. L. Boorman (NSW.25476); Liver-

pool plains, C. Moore (MEL); near Queensland border, N. of Bourke, 9.1884, L. Henry (MEL); Bourke, 8.1884, L. Henry (NSW.25428); Tibooburra, 625 ft., sandy ridge, 25.10.1949, E. F. Constable (NSW.10744); Evelyn Crk., north of Barrier Range, 1887, A. King (MEL); Lachlan R., 1879, Tucker (MEL); Darling plains, Neilsen (MEL); Murray R. (MEL).

In the National Herbarium, Melbourne, there is a specimen from Sonder's collection, collected by Mitchell ("camp near the Pyramids, 27.10.1846"), which is accompanied by a draft description of *Rutidochlamys Mitchelli* Sond. This has been nominated lectotype of that species, but unfortunately no type material has been examined either of *Rutidosia arachnoidea* Hook. or *Podolepis rhytidochlamys* F. Muell. With regard to the latter species, several specimens of Mueller's have been examined from the type locality ("from the northern plain of the Burdekin River, through dry country to near the Murray R."); these are undated, however, and may have been collected after publication of the name.

Bentham (1866), in citing this species as *P. rutidochlamys*, was, presumably, correcting Mueller's original epithet which was derived from his former genus *Rutidochlamys*.

P. arachnoidea is a very distinct species which, in spite of its wide range, shows virtually no variation. Its relationships are obscure, although the slightly rugose nature of the involucrel bracts suggests an affinity with *P. canescens* A. Cunn. ex DC. From the ecological data supplied by collectors, *P. arachnoidea* shows a strong preference for sandy situations.

17. *PODOLEPIS KENDALLII* (F. Muell.) F. Muell. in Wing, *South. Sci. Record*, 3 (1883): 68.
(Text-figs. 134-141.)

Synonymy: *Helipterum Kendallii* F. Muell., *Frag. Phytog. Austr.*, 8 (1874): 168; *P. Kendallii* F. Muell. in Wing, var. *nanus* Ewart in *Proc. Roy. Soc. Vict.*, 20 (1907): 83.
Type data: "near Champion Bay, Miss Guerin."

Holotype and *paratype*: Champion's Bay, 1871, Guerin (MEL).

Slender annuals (?) with one to many stems, 9.5-35 cm. high, sparsely woolly on young parts, otherwise glabrous. *Leaves cauline*, up to 5 cm. long, 2 mm. broad, linear to filiform, subacute, stem-clasping, shortly decurrent, crowded. *Inflorescences* 1-27, terminal on leafy stems. *Involucres* 1.2 cm. long, 1.7-2 cm. broad. *Involucrel bracts* light brown, elliptical, acuminate, the scarious laminae rugose, with a marginal fringe of short hairs; intermediate bracts clawed, 8 mm. long, 3 mm. broad. *Florets* all tubular, apparently yellow; 4-6 florets of the outermost row female, slender, with a 4-lobed corolla and no pappus; remainder of the florets bisexual, 5-lobed with a large pappus of 7-10 shortly plumose capillary bristles. *Fruits* 2 mm. long, 1 mm. broad, thick, with long finger-like papillae.

Range: Neighbourhood of the Murchison River, Western Australia, and westward to Laverton.

Specimens examined:

Western Australia: Murchison district, 9.1903, W. V. Fitzgerald (NSW.25289); Champion's Bay, 1871, Guerin (MEL. Holotype and paratype of *Helipterum Kendallii* F. Muell. and *P. Kendallii* (F. Muell.) F. Muell.); Arrino, 9.1903, W. V. Fitzgerald (NSW.25291); Beria, clay soil, C. A. Gardner n.2455 (P); Watheroo Rabbit Fence, 8.1906, M. Koch n.1359 (MEL); NSW.25290. Syntypes *P. Kendallii* var. *nanus* A. J. Ewart); Laverton, 9.1909, J. H. Maiden (NSW.25325; 25326); Laverton, 8.1931, W. E. Blackall (P); W.A., J. Drummond (MEL).

Herbarium specimens suggest that in many-stemmed plants, some branches are ascending, rather than erect. Radical leaves are represented only in young plants, and as it was on one of these, with a single stem and inflorescence that Ewart described his var. *nanus*, this variety is now abandoned as representing merely a growth-form.

In the nature of the fruits with long papillae, and the linear leaves, this species is quite distinct and variation concerns only the degree of branching and the height of the plant.

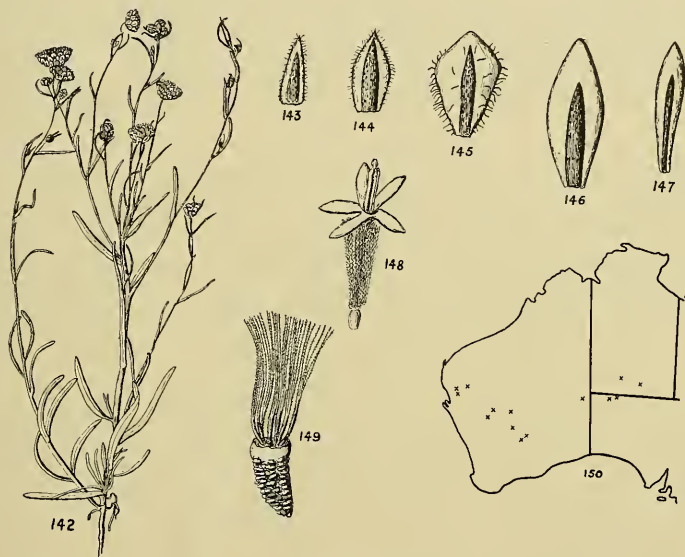
18. *PODOLEPIS GEORGII* Diels. in *Engl. Jahrb.*, 35 (1905): 619.

(Text-figs. 142-150.)

Type data: "In the Austin district near Murrinmurrin, from whence it was sent by the collector W. J. George."

Clastotype: Murrinmurrin, 1902, George (MEL).

Branching annuals (?), 11-40 cm. high, with a sparse septate-hairy indumentum. *Leaves cauline*, up to 7 cm. long, 7 mm. broad, narrow-lanceolate to broad-linear, obtuse, sessile, not decurrent. *Inflorescences* up to 50, on slender peduncles with 1-2 bract-like leaves. *Involute* 1.5 cm. diameter, 1 cm. long. *Involucral bracts* rhomboidal, with a broad scarious margin and a central green, glandular portion, sessile, acute, entire; outermost bracts bear long hairs laterally; intermediate bracts about 7 mm. long, 5 mm. broad. *Florets* all tubular, slender, with a 5-lobed corolla; outermost row bisexual, with 160-200 barbellate pappus bristles, united at the base into about 10



Text-figs. 142-150.

142-150. *P. Georgii*.—142, Habit $\times 0.3$; 143-147, outer, intermediate and inner Involucral Bracts $\times 3$; 148, Disc floret $\times 3$; 149, Fruit $\times 3$; 150, Distribution.

bundles; remainder of the florets male with aborted stylar arms, and distally plumose pappus bristles. *Fruits* 4 mm. long, 2 mm. broad, thick, dark brown, with a smooth distal collar forming an apical cup-like depression enclosing the base of the persistent pappus.

Range: Central Australia into the north-western portion of South Australia, and from the Central to the North-Western Divisions of Western Australia.

Specimens examined:

Northern Territory: Mt. Liebig, 11.8.1932, J. B. Cleland (JBC); 9 miles N. of Alice Springs, 22.8.1932, J. B. Cleland (JBC); Alice Springs, 23.8.1932, J. B. Cleland (JBC).

South Australia: Mann Ranges, 22.8.1954, J. B. Cleland (JBC); between Musgrave and Mann Ranges, 21.8.1954, J. B. Cleland (JBC); Musgrave Ranges, 19.8.1954, J. B. Cleland (JBC); Kenmore Park, 17.8.1954, J. B. Cleland (JBC); Camp 15, 6.7.1891, Elder Expl. Exped. (NSW.25449).

Western Australia: Kennedy Range, 8.9.1948, C. Teichert (MEL); near Jimba Jimba, sandy clay in watercourse, 21.9.41, C. A. Gardner n.6087 (P); south of Meekatharra, red stony soil in creek, 7.1931, C. A. Gardner n.2297 (P); Cue, 30.7.1903, C. Andrews (NSW.25469); 10 miles from Willuna, red sand, 16.10.1945, C. A. Gardner

n.7915 (P); Mt. Sir Samuel, 8.1931, C. A. Gardner (P); between Melahur and Laverton, 8.8.1931, W. E. Blackall (P); Murrinmurrin, 1902, George (MEL. Clastotype); near Mt. Squires, 24.8.1891, Elder Expl. Exped. (NSW.25450).

A small piece of Diels' type specimen is in the National Herbarium, Melbourne, and has been nominated a clastotype.

This species shows several unusual features, the most remarkable being the absence of female florets, whose place in the capitulum is taken by a single row of 16-18 bisexual ones and the remainder are functionally male. It is apparently the end of an evolutionary tendency concerning reduction in size and number of the female ray florets, which in *P. Kendallii* are reduced to 4-6 with tubular corollas, and in *P. Georgii* are absent altogether. The nature of the pappus is also unique in this genus, as is the structure of the fruits, and the question arises as to whether a species which departs from a generic concept in so many particulars should be retained within it. The writer is of the opinion that since *P. Georgii* does not conform to any other genus more satisfactorily, the difficulty could be met only by erecting a new monotypic genus. This action, at present, would be precipitate, and it seems preferable, for the time being, to treat this species as an atypical *Podolepis*, since it is possible that further collecting to the north of its present recorded range will produce related and undescribed forms.

NOMINA DUBIA.

The identities of the following species are in doubt, since neither type material nor named specimens are available in Australia. In each case the original description has been translated and is quoted in full.

It is to be regretted that when overseas botanists describe new species of Australian plants they rarely deposit a specimen in any of the Australian public herbaria. The result of this omission is that the Types are inaccessible to the very botanists who have most need to refer to them, and Australian taxonomy is burdened with names the application of which is either uncertain or unknown. In the early days of Australian botany, explorers of necessity took or sent their collections to England or Europe for identification, and there was no place for storage of duplicates in Australia; but the National Herbarium was established in Melbourne a century ago, and a similar institution in Sydney slightly later. There is now a public herbarium in each State, and it would seem only reasonable that at least one type specimen of every species should be permanently retained in the country of its origin. These remarks apply particularly to a purely Australian genus such as *Podolepis*, in which three species have been described by European botanists this century, yet the meaning of each of these names is unknown and cannot be established in Australia.

PANAETIA FULVA Lindl. in *Bot. Reg.*, 1 (1838): Misc. 47.

"Leaves oblong, acute, sessile, entire, with a cobweb-like indumentum. Inflorescences clustered. Involucral bracts linear-lanceolate, acute, scarcely serrulate, the intermediate ones fringed. Pappus bristles of the ray [florets] 5-6, of the disc 9-10." (Trans. ex Latin.)

"A beautiful little annual plant with the habit of a *Gnaphalium*, introduced from the Swan River by R. Mangles Esq. It flowered in May 1838, and proved to differ from *P. Lessoni* in the shape of the involucral scales, in the number of setae of the pappus, and in being a larger plant covered with a cobweb-like hoariness. The flower-heads are of the red-gold colour of *Helichrysum bracteatum*, dry like many everlasting flowers, and although small, very pretty."

Apart from the original description, the only reference to this species in the literature is in Index Kewensis where it is listed in italics. Presumably its transfer to *Podolepis* was assumed, when Bentham (1866) incorporated both *Panaetia Lessoni* and *P. Muellieri* into that genus, but the new combination was never made.

Lindley's comments on the plant raise considerable doubt that it is a *Podolepis*.

PODOLEPIS CONTORTA Lindl. in *Bot. Reg.*, 1 (1838): Misc. 64.

"Erect rather glabrous plants with oblong fleshy sessile leaves, indistinctly 3-veined, pedunculate leaves longer and sparsely scabrous; single inflorescence, at first pendulous but erect at maturity. The involucre bracts are cordate, acuminate and glabrous; the outer ones are sessile, the intermediate clawed and the inner ones are linear-lanceolate. Ligules 3-toothed, twisted to the left." (Trans. ex Latin.)

"A native of Van Diemen's Land, whence seeds of it were sent to the Horticultural Society by Mr. J. Bunce. It is a pretty perennial, with dark green fleshy leaves, a flower stem from 6-9 inches high, and solitary golden yellow flower heads. The latter are the size and form of the common *Amberboa moschata* or Yellow Sultan, and are remarkable for the florets of the ray having all a distinct twist to the left, so as to give the flower-head the appearance of what is called a Catherine Wheel. The species will perhaps be hardy, at least it will only require moderate protection in winter. It is very different from the old *Podolepis acuminata* figured in the Botanical Magazine, t.956, under the name of *Scalia jaceoides*, in its leaves not being sagittate, and in its much dwarfer habit. As, however, M. de Candolle takes no notice of the remarkable sagittate leaves of *P. acuminata*, it must be doubted whether he had that plant, or the present one, before him when he framed his definition for the Prodrômus."

This species is probably *P. jaceoides*, which is the only species recorded from Tasmania and with which Lindley's description agrees in all respects except the reported "contortion" of the ligules. This peculiarity has not been referred to in the literature before or since. It has been noticed by the present writer that when a large number of ray florets are developed in the capitulum of *P. jaceoides*, some of the ligules are frequently twisted for mutual accommodation. Since Lindley's specimens were raised from seeds, under cultivation, it is possible that they were more than usually luxuriant and an extreme condition resulted whereby all the ligules assumed the orientation he described.

PODOLEPIS GNAPHALIOIDES Domin in *Biblioth. Bot.*, 89 (1929):676.

"An erect branching plant, probably perennial, about 4 dm. high, with a hoary-white, very soft woolly indumentum; the branches elongated, one-headed, naked distally or with small narrow bracts. Basal leaves broad, sessile, oblong-spathulate, or oblong to linear-oblongate, acuminate; the broad leaves up to 5 cm. long and 1.2 cm. wide, the narrow leaves up to 3.5 cm. long and 3-4 mm. broad. Inflorescences shiny, straw-coloured, 1.6 cm. diameter across the base. Involucre hemispherical, the bracts very numerous, scarious, acute but not very sharp; the outer bracts wrinkled, with glandular hairs, shortly acute with a rather stiff apex at the end of an opaque line; the inner bracts sessile, straight, about 5-5.6 mm. long, dorsally keeled. Receptacle flat, naked, about 8 mm. diameter after fruiting. Florets yellow, almost equal, very numerous, crowded, markedly exceeding the involucre, 5-lobed. Fruits glabrous, pappus bristles numerous, white, very shortly barbellate, shortly united at the base." (Trans. ex Latin.)

"Queensland: Mt. Remarkable as well as Savanna forests near Pentland." (Domin III.1910.)

"This species is very different from the other Australian *Podolepis* species, but it is hard to place in another genus. The bracts are not radiating and, although they are scarious, are not as thin as in the rest of the typical representatives of this genus. The outer bracts are on short claws and sharply bent backwards, while the inner ones are sessile, and all of them are finely pointed. I have not seen any female outer florets, only bisexual ones, and all are of the same form. The anthers have an appendage which is only very short." (Trans. ex German.)

Despite the detailed description, the identity of this species is a mystery. Only one species (*P. Georgii*) is known in which no female florets occur, and this is quite different in details of the involucre bracts and vegetative characters. Had it not been for the statement that the stems are single-headed, the widespread *P. arachnoidea* could be considered as a possibility since the female florets in that species are few and easily

overlooked. The specific epithet, presumably, implies that the plant is *Gnaphalium*-like, but that genus is polycephalous, and it is to be regretted that Domin did not clarify his choice of epithet.

Until the type specimens are located and compared with other species, the possibility must remain, therefore, that this is indeed a valid species.

PODOLEPIS LAEVIGATA Gdgr. in *Bull. Soc. Bot. France*, 65 (1918): 46.

"Completely glabrous plants with greyish linear leaves. Involucral bracts obtuse, whitish, much shorter than the florets. Pappus snowy. Australia, Victoria at Wimmera (Reader), Keilor Plains (Walter) and Mentone (Tovey)." (Trans. ex Latin.)

PODOLEPIS PAPILLOSA Gdgr. in *Bull. Soc. Bot. France*, 65 (1918): 46.

"Roughly hispid on the lower parts of the plant with papillose hairs. Leaves broad linear. Involucral bracts lanceolate, pale yellow, considerably surpassed by the florets. Pappus yellowish. Australia, N. S. Wales at Warrumbungle Range (Forsyth), Victoria (Walter)."

"Both these species are related to *P. acuminata* R. Br. The stem is a foot in length, stiff, with a single flower, and they are conspicuous with their large, silvery, very scaly inflorescences." (Trans. ex Latin.)

There are no specimens of either *P. laevigata* or *P. papillosa* in any Australian herbarium and Gandoger stated neither the source of his material nor the location of the Type specimens.

Although Gandoger admitted that both species are related to *P. acuminata* (i.e. *P. jaceoides*) he made no comparison and the present writer is of the opinion that when the Type specimens of both species are examined they will prove to be conspecific with *P. jaceoides*.

ORIGINS AND AFFINITIES OF THE SPECIES.

The distributions of the various species of *Podolepis* suggest that this genus would be a rewarding field for cytological studies of speciation processes. While certain species fall readily into well-defined groups of an *Artenkreiss* nature, the affinities of others can only be guessed at, and the question as to whether these originated as a result of step-by-step evolution, allopolyploidy or even intergeneric crosses, can be solved only by a cytological approach.

The two great species of *Podolepis* are *P. jaceoides* and *P. canescens*, of which the latter occupies the larger area. Both species are variable and apparently strongly heterozygous, and both successfully maintain themselves against competition. These two species have a number of characters in common and, on morphological grounds, appear to be at the same level of evolutionary development. Since both have retained generalized morphological characteristics, the present hypothesis is that one originated from the other, and each subsequently gave rise to further species.

The fact that *Podolepis* is represented in Tasmania only by *P. jaceoides* and that this is the predominant species in Victoria, suggests that the two populations, now separated by Bass Strait, were once panmictic. It is suggested that colonization took place from Subantarctica and that *P. jaceoides* became established in Tasmania and spread to the mainland of Australia by means of the land connections which existed intermittently in late Tertiary times. Since specimens from Tasmania and Victoria are identical it would seem that the species had evolved to its present level before the last land connection was severed. From Victoria, *P. jaceoides* now extends throughout New South Wales into the central western districts of Queensland and the eastern half of South Australia.

P. canescens, on the other hand, is chiefly a species of central and western Australia, and probably originated as an early geographic subspecies of *P. jaceoides*. At the present time it appears to be migrating eastwards and has come slightly to overlap the westerly range of the parent species.

Four of the five other eastern Australian species have distributions indicative of origins as independent geographic subspecies of *P. jaceoides*.

With overlapping centres of distribution in south-east Queensland are *P. longipedata* and *P. neglecta*, which extend as divergent tongues deep into New South Wales.

In the south there are two highland species, *P. robusta* and *P. hieracioides*, which also share a common centre of distribution in the Kosciusko Plateau and extend north and south along the highlands.

P. canescens occupies the southern half of Western Australia, the whole of South Australia, and extends into the Northern Territory and the western districts of New South Wales and Victoria. Around the southern, western and northern borders of its range, *P. canescens* either co-exists with or is replaced by some other species, and the fact that these other species replace each other geographically can only be interpreted as the expression of a clearly defined *Artenkreiss*. Three of these species, *P. rugata*, *P. gracilis* and *P. auriculata*, occupy the southern, western and north-western coastal



Text-fig. 151.—Relative distributions of *Podolepis* spp. forming an *Artenkreiss*.

belts respectively and their origin as geographic subspecies of *P. canescens* seems clear. Towards the centre of the area occupied by *P. gracilis* there is the closely related *P. nutans*, which probably originated as a local variant and may well now be extinct.

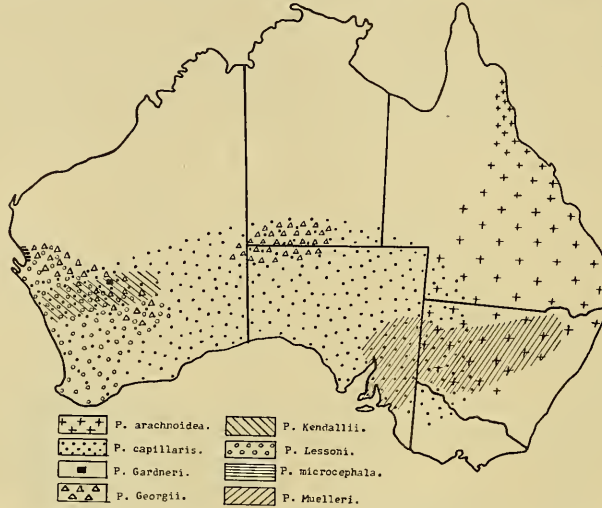
The origins of the remaining eight species of *Podolepis* are not so clearly indicated, although certain of them occupy a large territory.

P. capillaris, for example, occurs throughout the whole of South Australia, the western districts of the eastern States, the southern portion of the Northern Territory, and the southern half of Western Australia. Throughout the whole of its range its lack of variation is extraordinary, and the only other species with which it can be compared is *P. microcephala*, which replaces it in the Shark Bay district of Western Australia.

P. Lessoni and *P. Muelleri* form another pair of species which replace each other geographically, the former apparently with its centre of origin in the south-west of Western Australia and western New South Wales. Both these species are extraordinarily similar in habit and gross morphology, and in both the ray florets are tubular and considerably reduced in size and number. This peculiarity of the florets may indicate an evolutionary tendency continued in *P. Kendallii* (which replaces *P. Lessoni* to the north) and reaching a climax in *P. Georgii*, in which no female florets are present. Both *P. Kendallii* and *P. Georgii* are, however, very distinct species and a hybrid origin is indicated.

The newly-described *P. Gardneri* is known, so far, only from Meekatharra (W.A.) and its relationships are obscure. Vegetatively it is very similar to *P. Georgii*, but certain features of the involucre bracts suggest *P. canescens*. Since it occurs at the overlap between these two species, a hybrid origin is possible.

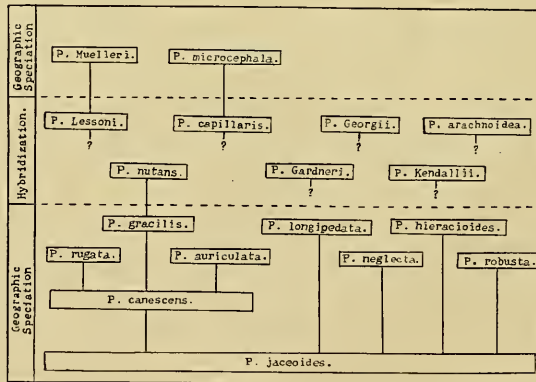
P. arachnoidea extends from northern Queensland into the western districts of New South Wales, and is a very distinctive species entirely lacking in variation, and



Text-fig. 152.—Relative distributions of *Podolepis* spp. of uncertain affinities.

cannot be associated with any others. It is hoped that a cytological study will throw some light on its origin.

The present distribution of the species of *Podolepis* strongly indicates Rassenkreis formation in the past, leading to the establishment of nine (possibly ten) species in an Artenkreis. This appears to have been followed by hybridization (perhaps intergeneric



Text-fig. 153.—Diagram to illustrate the apparent patterns of speciation.

as well as interspecific) and further subspeciation to give rise to the two brackets of species, *P. Lessonii*–*P. Muelleri* and *P. capillaris*–*P. microcephala*. If hybridization was responsible for the origins of the four isolated species, *P. arachnoidea*, *P. Kendallii*, *P. Georgii* and *P. Gardneri*, geographic subspeciation has not yet occurred, and there is only the apparent evolutionary pattern of the genus to suggest that it will do so in the future.

Acknowledgements.

In a revision of a genus, the need to examine as many specimens as possible, from all available sources, unfortunately involves a number of people in considerable inconvenience. For example, the time involved in sorting and packing specimens for despatch is considerable and, perhaps more important, the trustees or owners of the specimens are denied access to the material of a complete genus for a protracted time. But despite what can only be described as the "nuisance value" of my requests of this nature, they have been invariably received with the greatest cooperation from all concerned. I would like to thank, therefore, the Directors and Staffs of all the institutions from which I have borrowed specimens, as well as Professor J. B. Cleland of Adelaide and Mr. E. H. Ising of Stirling West (S.A.) who made their private herbaria available to me.

I wish, also, to thank Mr. Raymond Weibel, Curator of the Herbarium of the Botanic Gardens, Geneva, for photographing and making a detailed examination of certain of de Candolle's type specimens on my behalf. These photographs of *P. canescens* and *P. auriculata* have now been deposited in the National Herbarium, Melbourne.

Finally, my thanks are due to Dr. Adair Dale of the Classics Department, University of New England, who devoted considerable time and thought to the translation of original descriptions and texts, and was responsible for compiling the Latin diagnoses of the new species described in this Revision.

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