

## **Rumex (Polygonaceae) in Australia: a reconsideration<sup>1</sup>**

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### **Abstract**

Rechinger, K. H. *Rumex* (Polygonaceae) in Australia: a reconsideration. Nuytsia 5(1): 75-122 (1984). Descriptions and a key are provided for the 8 indigenous and 9 alien species of *Rumex* within Australia. Of the indigenous taxa *R. alcockii*, *R. stenoglottis*, *R. x comaumensis* (*R. bidens* x *R. brownii*) and *R. x johannis-moorei* (*R. brownii* x *R. crispus*) are described as new. *Rumex dumosiformis* is reduced to a variety of *R. dumosus* and *R. flexuosiformis* is relegated to synonymy under *R. drummondii*. Notes on 4 hybrids between alien species are included. A classification for subgen. *Rumex* is proposed in which three new subsections within section *Simplices* are described: subsect. *Amphibii*, subsect. *Australienses* and subsect. *Acrancistrum*. The following taxa are included in this account. Indigenous species: *Rumex alcockii* Rech. f., *R. bidens* R. Br., *R. brownii* Campderá, *R. crystallinus* Lange, *R. drummondii* Meisn., *R. dumosus* A. Cunn. ex Meisn., *R. stenoglottis* Rech. f. and *R. tenax* Rech. f. Alien species: *Rumex acetosella* L., *R. bucephalophorus* L., *R. conglomeratus* Murr., *R. crispus* L., *R. frutescens* Thouars, *R. obtusifolius* L., *R. pulcher* L., *R. sagittatus* Thunb. and *R. vesicarius* L. Hybrids: *R. x comaumensis* Rech. f. (*R. bidens* R.Br. x *R. brownii* Campderá), *R. x johannis-moorei* Rech.f. (*R. brownii* Campderá x *R. crispus* L.), *R. x schulzei* Hausskn. (*R. conglomeratus* Murr. x *R. crispus* L.), *R. x muretii* Hausskn. (*R. conglomeratus* Murr. x *R. pulcher* L.), *R. x pratensis* Mertens & Koch (*R. crispus* L. x *R. obtusifolius* L.) and *R. xpseudopulcher* Hausskn. (*R. crispus* L. x *R. pulcher* L.).

### **Introduction**

*Rumex* is a world-wide genus of about 160 species, a considerable number of which comprise geographical races which could be interpreted as subspecies. The genus as a whole has been monographed twice, once by Campderá (1819) and once by Meisner (1856). Both these treatments are now outdated. In a series of contributions towards a new generic monograph I have either revised the genus on a regional basis (South America 1933b, Australia and New Zealand 1935a, North America 1937, Asia 1949, Africa 1954) or have dealt with individual species-complexes (1932, 1933a and 1939). These papers, together with my treatments of *Rumex* for Flora Europaea (1964) and for the second edition of Hegi's Flora von Mitteleuropa (1958) include all known species except for a small endemic Hawaiian group which is still in need of revision.

My account of the Australian (and New Zealand) species (1935a) was based on the limited herbarium material available at the time. It was felt that the Australian species should be reappraised before summarizing the results of my studies in this genus. The current study was conducted during a visit to Western Australia from October to December 1982.

In this account the eight indigenous and nine alien species of *Rumex* currently known from Australia are described. These are the same species as in my 1935a revision except for the following: two new indigenous species, *R. alcockii* and *R. stenoglottis*, are described; two new hybrids, *R. x comaumensis* (*R. bidens* x *R.*

<sup>1</sup>The present paper is to be regarded as "Vorarbeiten zu einer Monographie der Gattung *Rumex* IX". See references for previous publications.

*brownii*) and *R. xjohannis-moorei* (*R. brownii* x *R. crispus*) are described; *R. dumosiformis* has been reduced to a variety of *R. dumosus*; three alien species, *R. frutescens*, *R. sagittatus* and *R. vesicarius*, not previously recorded are included; notes on four hybrids between alien species are included viz. *R. xschulzei* (*R. conglomeratus* x *R. crispus*), *R. xmuretii* (*R. conglomeratus* x *R. pulcher*), *R. xpratensis* (*R. crispus* x *R. obtusifolius*) and *R. xpseudopulcher* (*R. crispus* x *R. pulcher*).

Species are arranged within the text according to the infrageneric classification which is outlined below. In most cases only a selection of specimens seen has been listed. Those herbaria from which material was examined are given in the Acknowledgements. The study was conducted at herb. PERTH and it is believed that the specimens examined there included the majority of those currently housed in Australia.

I here take the opportunity of correcting some misprints in my 1937 publication.

- p. 7, description of subsect. *Densiflori*, first line: read valvae ecallosae instead of callosae.
- p. 8, description of subsect. *Hydrolapatha*, second line: read latitudine instead of longitudine.
- p. 8, description of subsect. *Obtusifolii*, first line: read latitudine instead of longitudine.
- p. 8, description of subsect. *Dentati*, second line: read latitudine instead of longitudine.
- p. 8, description of subsect. *Maritimi*, second line: read latitudine instead of longitudine.
- p. 18 line nine (key): pedicels short, thick, about as long as the fruit instead of: long, slender, nearly twice as long as the fruit.

#### Geographical distribution and ecology of indigenous species

For the first time the distributions of indigenous Australian *Rumex* species have been mapped. I am of the impression that except for some areas of south eastern Australia, these distributions are incomplete. This may reflect a certain lack of interest in the genus by collectors within certain areas. I hasten to add, however, that following three months in Western Australia where field work was conducted between Kalbarri and Albany, I was successful in locating only two indigenous species of *Rumex* (*R. brownii* and *R. dumosus*). Indigenous species are evidently either rare or geographically very restricted, at least in this part of Australia. This experience raises the question as to whether or not *R. drummondii* has become extinct.

Most of the indigenous Australian species are centred in the south-east of the continent. One of the most geographically restricted species is *R. bidens*, a semi-aquatic plant which is found in freshwater swamps (Figure 11A). Its thick, hollow, creeping rhizome is at least temporarily submerged and from this arise short, usually unbranched inflorescences. It is known from New South Wales near the Murray River, Victoria, Tasmania and parts of South Australia. *Rumex brownii* is widespread in both coastal and inland areas of south eastern Australia but there are scattered, disjunct occurrences in Queensland, Central Australia and south-west Western Australia (Figure 13A). This species is also recorded for New Zealand, New Guinea, Timor and Java and it is not known what comprised its original area of occurrence.

*Rumex alcockii*, here segregated from *R. brownii*, is mainly confined to the Eyre and Yorke Peninsulas and the Flinders and Gawler Ranges in South Australia. This species occurs near the western limit of distribution of *R. brownii* in S.A. (compare Figures 13A and B). *Rumex tenax* has a fairly wide south-east Australian distribution but in contrast to (the unrelated) *R. brownii* it is evidently confined to the interior parts of the country west of the Great Dividing Range (Figure 11B). *Rumex crystallinus*, the only annual among the indigenous Australian species, inhabits the borders of temporarily submerged depressions and watercourses in arid/semi-arid inland areas. It is certainly not a weedy species and its few scattered records in the central and more northern parts of the continent and the one single very disjunct locality in Western Australia may well reflect undercollecting in the intervening areas (Figure 14).

*Rumex dumosus* and *R. stenoglottis* are also south-east Australian species. As I am unable to distinguish these two species when in flower, many herbarium specimens could not be named. Therefore the distributions shown in Figures 12A and 12B are rather incomplete. From available information *R. dumosus* (including var. *dumosiformis*) predominates in the south-east of Australia; the more northerly Queensland localities shown on Figure 12B look to represent a true disjunction.

In contrast to *R. dumosus*, *R. stenoglottis*, with few exceptions, has a more northerly, inland distribution occurring from 27° to 37°S and diagonally from 146° to 151°E (Figure 12A). *Rumex drummondii*, the third representative of the *dumosus*-group, is a little-known south-west Western Australian endemic.

### Aliens

The European and Mediterranean species *R. acetosella* s.l., *R. crispus*, *R. pulcher*, *R. conglomeratus* and *R. obtusifolius* seem to have accompanied the early settlers in the first half of the last century. These species occasionally grow together and except for *R. acetosella*, hybrids occur between them (see below).

*Rumex vesicarius* (subgen. *Acetosa*), a saharo-sindian species which is widespread throughout desert and semidesert areas of North-Africa and Southwest Asia, seems to be the most recent immigrant to Australia. In 1921 Domin described this as a new species, *R. clementii*; later it was partly misnamed as *R. roseus* L., a closely allied but clearly distinct species. Today *R. vesicarius* is spread over vast areas of Australia and it attracts public attention by its large, often purplish tinged valves and its pale green, somewhat succulent leaves. One may speculate that this species was introduced to Australia by Afghan camel drivers during the latter half of last century. The South American *R. frutescens* is reported here as new to Australia. It was first recorded from Coode Island, Melbourne, a locality no longer existing owing to harbour works at the mouth of the Yarra River. It was rediscovered in 1981 at William Bay, 70 km west of Albany, W.A., by John Moore. Its main distributional area is South America but it is also known from two small islands in the South Atlantic: Gough Island and Tristan da Cunha. *Rumex sagittatus* (subgen. *Acetosa*) is a climber with tuberous roots and sagittate leaves. This South African species represents a garden escape within Australia. *Rumex bucephalophorus*, an extremely polymorphic, predominantly annual Mediterranean species, is a rare and evidently casual alien in Australia.

The most frequent alien of the genus is definitely *R. acetosella* (subgen. *Acetosella*). Its frequency can be judged from its representation in the major Australian herbaria as well as from my own field observations. When making excursions

in various directions from Perth, I have seen it practically everywhere along roadsides and on other disturbed sites. It covers huge areas of neglected fields south-west of Capel.

The most frequent species of the subgenus *Rumex* is beyond doubt *R. crispus*. Its strict habit is very characteristic and is unlike all other *Rumex* species occurring within Australia. *Rumex crispus* fruits somewhat earlier than the other species of subgen. *Rumex* but there is sufficient overlap of flowering times to permit hybridization to occur. Probably *R. pulcher* with its two subspecies is the third most common alien species of *Rumex* in Australia where its spread seems to have been favourably influenced by its high drought-tolerance. In the past this alien species was confused with the indigenous *R. dumosus* and *R. drummondii*, an error dating back to Bentham's (1870) treatment of *R. pulcher* (see sp. no. 9 below for further details). *Rumex conglomeratus* and *R. obtusifolius* are of only minor importance as aliens within Australia.

*Rumex hymenosepalus* Torrey, Botany Mexican Boundary 177 (1858), from the Southwestern United States and Mexico, is recorded in the NSW census (Jacobs and Pickard 1981) as naturalized (sporadically) in N.S.W. and Victoria. It is characterized by tuberous roots, somewhat succulent stems without axillary branches, fleshy, lanceolate, acuminate leaves with cuneate base and large, delicate, entire valves lacking callosities. Its taxonomic position within subgen. *Rumex* is isolated. The large valves lacking callosities are somewhat similar to those of *R. vesicarius*, but the latter species is an annual and belongs to subgen. *Acetosa*. *Rumex hymenosepalus* inhabits the most arid parts of SW North America and is there locally frequent on sandy and sometimes saline soil. For details see Rechinger (1937: 89-92).

### Hybridization

Hybridization occurs frequently between most of the species of subgen. *Rumex*. These hybrids are usually highly sterile therefore back-crossing seems rare and hybrid introgression is absent. Pollen sterility is easily recognized by the grains either being of more or less unequal size or sometimes clumped together and forming an amorphous mass which is not released from the anthers.

In nature, hybrids of *Rumex* may be recognized by their appearance. The primary panicle sheds most of the sterile flowers but the plants continue to grow and tend to form secondary flowering panicles. Thus the hybrids are often taller than the parents and assume an untidy habit. Additionally most hybrids fail to set fruit because the flowers dry and fall off before full development of the valves (i.e. the three inner perianth segments) occurs. The few fruits which do reach full size combine the characters of the parents in various ways. Often these hybrid nuts, even if reaching full size, are not viable and can be compressed between the fingers.

From the large amount of Australian herbarium material examined, all the hybrids detected, with two exceptions, had European species as both parents. The most frequent hybrid is *R. crispus* x *R. obtusifolius* and this has been recognized by collectors in several cases. In Europe it is found wherever the parents grow together and it is evidently the most frequent hybrid in the genus and perhaps the most frequent of any genus within Europe. *Rumex crispus* x *R. pulcher* has only recently been found in south-west Western Australia by John Moore and by myself. Occurring also at the same locality were *R. conglomeratus* x *R. crispus* and *R. conglomeratus* x *R. pulcher*.

*Rumex bidens* × *R. brownii* is described below as the first recorded hybrid between indigenous Australian species. Also for the first time, a hybrid between an indigenous Australian species (*R. brownii*) and an alien (*R. crispus*) is here described viz. *R. xjohannis-moorei*.

Two hybrids in which *R. dumosus* or one of its relatives is one of the parents originated among plants cultivated by Danser in the 1920's, viz. *R. xascendens* Danser (*R. dumosus* × *R. salicifolius*) and *R. xupsaliensis* Danser (*R. dumosus* × *R. sp.*). These hybrids were included in my 1935a treatment of Australian *Rumex* but are not dealt with in the present paper.

### The taxonomy of subgenus *Rumex*

As all the indigenous Australian species of *Rumex* occur in subgen. *Rumex* it is appropriate here to fit these into the classification which I first proposed in 1937 (for North American species) and extended in 1949 (to include Asiatic species) and 1953 (to include African species). The framework of this classification is presented below where it will be seen that three new subsections (*Acrancistrum*, *Amphibii* and *Australienses*) within sect. *Simplices* have been described in order to accommodate the Australian taxa. The basis of this classification is the combination of fruiting and growth characteristics, hopefully resulting in a more natural arrangement of species than has hitherto been proposed for this subgenus.

Meisner (1857) divided subgen. *Rumex* (his section *Lapathum*) into two groups, one containing species with entire fruiting valves and the other containing species with dentate valves. This arrangement is considered to be highly artificial.

In an earlier paper (Rechinger 1949b) I outlined certain evolutionary trends within subgen. *Rumex* (syn. subgen. *Lapathum*). The taxonomy of this subgenus is based on the transformation characteristics of the three inner perianth segments (valves) during the ripening process. The three main types of valve modification are:

1. The valves become more or less membranous and a network of nerves develop.
2. The midrib of one or all three valves more or less thickens and is transformed into a basal callosity.
3. The margins of the valves develop teeth of various number, shape, direction and length.

These modifications may occur separately or combined in various ways. They may be limited to a single species or to a group of species. In some cases all possible combinations occur within a single very polymorphic species, resulting in parallelism and convergence. These facts, together with the ability of many species to hybridize, cause some of the main problems for the taxonomist within this subgenus.

Growth characters are of primary importance in dividing subgen. *Rumex* into its component sections:

1. Section *Axillares*. Plants not developing basal leaves; producing regular, leafy, axillary shoots that tend to develop secondary inflorescences which often overtop the primary ones; the flowering and fruiting process is practically indeterminate.
2. Section *Simplices*. Plants developing basal leaves; stem solitary, unbranched and producing a terminal panicle with a limited flowering and fruiting period.

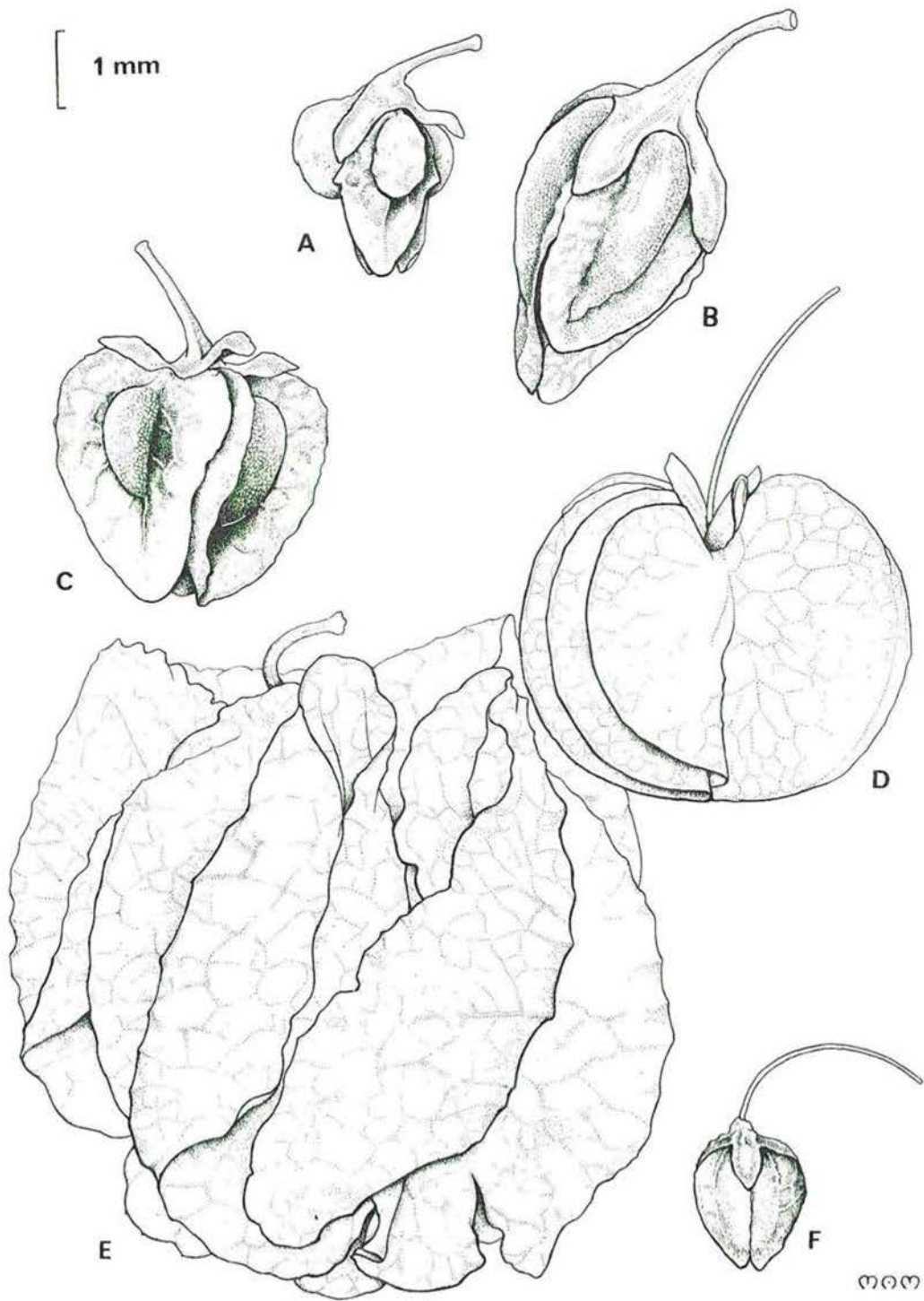


Figure 1. Fruits of *Rumex* species. A—*R. conglomeratus*. B—*R. frutescens*. C—*R. crispus*. D—*R. sagittatus*. E—*R. vesicarius*. F—*R. acetosella*.

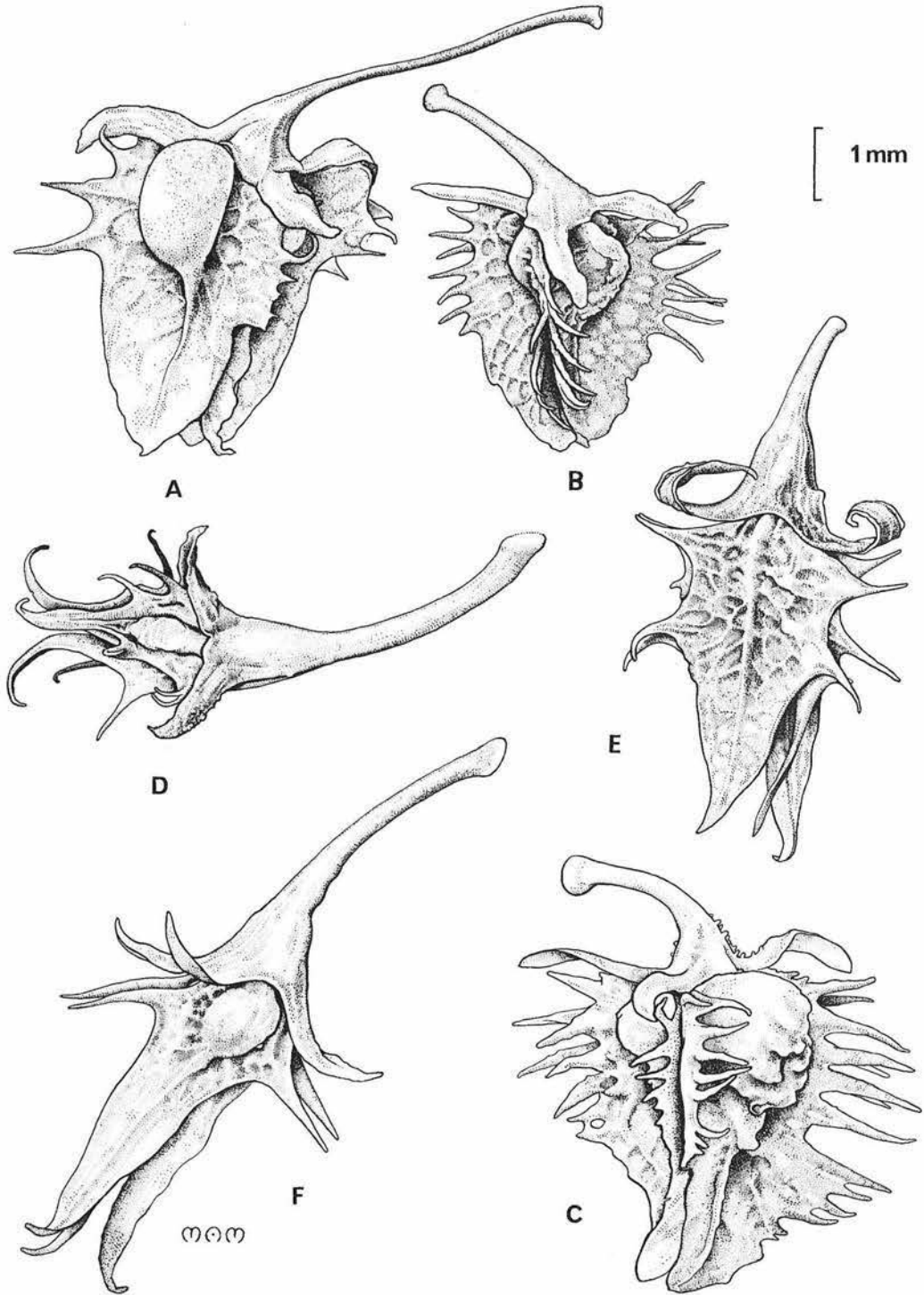


Figure 2. Fruits of *Rumex* species. A—*R. obtusifolius*. B—*R. pulcher* subsp. *pulcher*. C—*R. pulcher* subsp. *divaricatus*. D—*R. drummondii*. E—*R. dumosus*. F—*R. stenoglottis*.

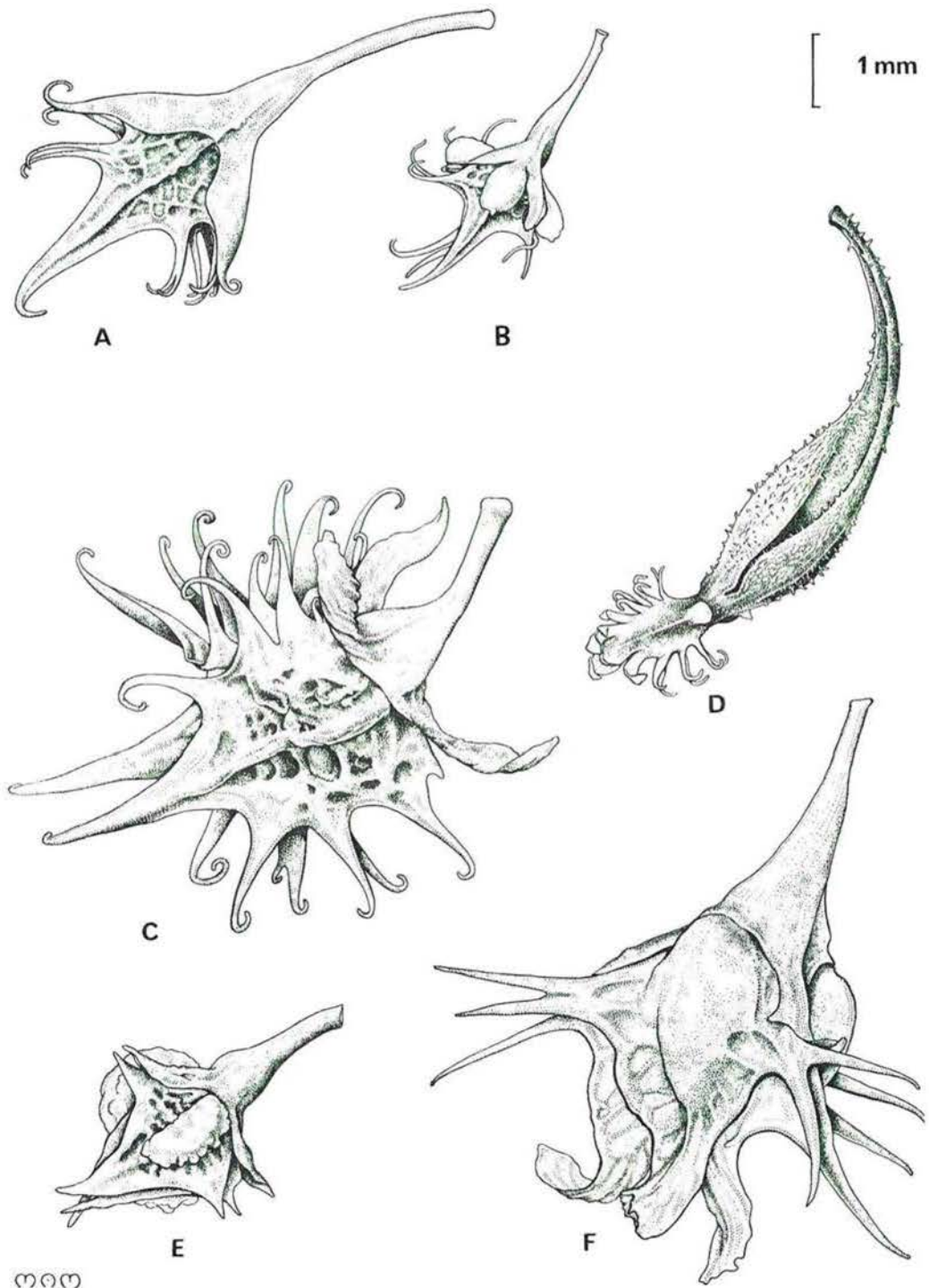


Figure 3. Fruits of *Rumex* species. A—*R. brownii*. B—*R. crystallinus*. C—*R. alcockii*. D—*R. bucephalophorus*. E—*R. tenax*. F—*R. bidens*.

Hybrids between species from these two sections are extremely rare.

Section *Axillares* has its centre of diversity in North America but there are several species in South America, four in Africa and two in East Asia. The section is represented in Australia by only the rare alien, *R. frutescens* (syn. *R. cuneifolius*). Hybrids between species of this section are known to occur.

Section *Simplices* has its centre of diversity in Europe and Asia and all the endemic and alien Australian species of subgen *Rumex*, except *R. frutescens*, belong to it. Hybrids are common between species of this section.

Despite a tendency for *R. alcockii* and *R. brownii* to occasionally develop axillary shoots these species have been included in sect. *Simplices*. These two species regularly develop basal leaves, which is a characteristic of this section.

### Taxonomic arrangement of the Australian species of *Rumex*

(Numerals refer to species numbers in the text, asterisks indicate alien species.)

#### Subgen. *Acetosella*

1. \**R. acetosella* L.

#### Subgen. *Acetosa*

##### Sect. *Sagittati*

2. \**R. sagittatus* Thunb.

##### Sect. *Vesicarii*

3. \**R. vesicarius* L.

#### Subgen. *Rumex*

##### Sect. *Axillares*

4. \**R. frutescens* Thouars

##### Sect. *Simplices*

###### Subsect. *Crispi*

5. \**R. crispus* L.

###### Subsect. *Conglomerati*

6. \**R. conglomeratus* Murr.

###### Subsect. *Amphibii*

7. *R. bidens* R.Br.

###### Subsect. *Obtusifolii*

8. \**R. obtusifolius* L.

9. \**R. pulcher* L.

###### Subsect. *Australienses*

10. *R. dumosus* A. Cunn. ex Meisn.

11. *R. drummondii* Meisn.

12. *R. stenoglottis* Rech.f.

13. *R. tenax* Rech.f.

###### Subsect. *Acrancistron*

14. *R. brownii* Campderá

15. *R. alcockii* Rech.f.

###### Subsect. *Maritimi*

16. *R. crystallinus* Lange

#### Subgen. *Platypodium*

17. \**R. bucephalophorus* L.

## Hybrids

18. *R. xcomaumensis* Rech.f. (*R. bidens* R.Br. x *R. brownii* Campdera)  
 19. *R. xjohannis-moorei* Rech.f. (*R. brownii* Campdera x *R. crispus* L.)  
 20. *R. xschulzei* Hausskn. (*R. conglomeratus* Murr. x *R. crispus* L.)  
 21. *R. xmuretii* Hausskn. (*R. conglomeratus* Murr. x *R. pulcher* L.)  
 22. *R. xpratensis* Mertens & Koch (*R. crispus* L. x *R. obtusifolius* L.)  
 23. *R. xpseudopulcher* Hausskn. (*R. crispus* L. x *R. pulcher* L.)

Key to *Rumex* species in Australia

(Including indigenous and alien species; excluding hybrids—see spp. nos. 18-23.)

- 1a. Leaves usually hastate or sagittate with acute lobes. Flowers dioecious, polygamous or hermaphrodite.....2  
 b. Leaves never hastate with acute lobes. Flowers hermaphrodite or polygamous.....4  
 2a. Valves very small, not longer than the nut, without a callosity, often adnate to the nut—subgen. *Acetosella*.....1. *R. acetosella* L.  
 b. Valves distinctly overtopping the nut—subgen. *Acetosa*.....3  
 3a. Vigorous erect annual. Valves 12-18(23) mm, often tinged purplish or pinkish.....3. *R. vesicarius* L.  
 b. Perennial climber with thick tuberous roots. Valves much smaller .....2. *R. sagittatus* Thunb.  
 4a. Valves entire.....5  
 b. Valves toothed.....7  
 5a. Panicle open with divaricate branches, flower whorls distant and nearly all subtended by a leaf. Valves small and with a thick callosity covering most of their surface .....6. *R. conglomeratus* Murr.  
 b. Panicle condensed, closed, whorls condensed, only the lowermost whorls or none subtended by a leaf. Callosity not covering most of valve surface .....6  
 6a. Stem procumbent, rhizome long and indurate and bearing a few short, erect or ascendent inflorescences. Leaves thick, leathery when dry, obovate, obtuse, flat.....4. *R. frutescens* Thouars  
 b. Stem strictly erect with appressed or rarely slightly patent inflorescence branches. Leaves lanceolate, tapering at both ends, acute, crispate (curled) .....5. *R. crispus* L.  
 7a. Annuals. Fruiting perigone very small, up to 2 mm long.....8  
 b. Perennials. Fruiting perigone above 2 mm long .....9  
 8a. Whorls few-flowered (normally 2-3 flowered). Basal leaves minute, 1-2 cm long, spatulate or ovate-lanceolate, flat. Fruiting pedicels often thickened and flattened. Outer perigone segments reflexed.....17. *R. bucephalophorus* L.  
 b. Whorls many-flowered. Leaves to 6 cm long, linear with obtuse lobate cordate base and strongly crispate margin. Fruiting pedicels filiform. Outer perigone segments appressed to the base of the inner ones .....16. *R. crystallinus* Lange  
 9a. Amphibious plant with long, creeping, often inflated rhizomes and relatively short, simple or little-branched inflorescences .....7. *R. bidens* R.Br.  
 b. Terrestrial, more or less erect plants, often with repeatedly-branched panicles .....10

- 10a. Valves with several hooked teeth on each side and with a hooked tip.....11  
 b. Valves with one or several straight or slightly arcuate teeth on each side .....12
- 11a. Basal and lower stem leaves oblong or lanceolate about 4-5 times longer than broad, thin. Pedicels, thin whorls with (5)6(8) flowers. Valves about (2.5)3(4) mm long .....14. *R. brownii* Campd.  
 b. Basal and lower stem leaves ovate or ovate oblong up to  $\pm$  3 times longer than broad, thick. Pedicels thicker, whorls with 8-15 flowers. Valves about 4.5-5 mm long .....15. *R. alcockii* Rech.f.
- 12a. Basal leaves oblong-ovate or elliptic and about twice as long as broad, with a distinctly cordate base.....13  
 b. Basal leaves lanceolate to linear or almost so, many times longer than broad, with variable base .....14
- 13a. Pedicels slender, at least twice as long as the fruiting perigone, articulate far below the middle.....8. *R. obtusifolius* L.  
 b. Pedicels rather thick, about as long as the fruiting perigone, articulate at the middle or slightly below .....9. *R. pulcher* L.
- 14a. Leaves very narrow, c. 5 mm broad, up to 20 times longer than broad, nearly grass-like, flat. Valves 2.5-3 mm long .....13. *R. tenax* Rech.f.  
 b. Leaves broader, usually  $\pm$  crispate. Valves (usually) longer .....15
- 15a. Valves triangular .....10. *R. dumosus* A. Cunn. ex Meisn.  
 b. Valves oblong, tongue-shaped with a prolonged apex.....16
- 16a. Valves very narrow (hardly 1.5 mm broad) with a single patent, marginal tooth near the base.....12. *R. stenoglottis* Rech.f.  
 b. Valves broader (1.5-2 mm) with 2(3) teeth on each side, the upper one pointing forward.....11. *R. drummondii* Meisn.

### Subgen. *Acetosella*

1. \**Rumex acetosella* L., Spec. Plant. 338 (1753). *Typus*: Herb. LINN sheet 464.38 (locality unknown).

*Perennial*, dioecious, extremely polymorphic. *Stems* 10-50 cm high, erect or ascending, flowering on upper half. *Leaves* very variable; *basal leaves* long-petiolate, *laminae* usually hastate with acute, simple or rarely dissected basal lobes, the upper leaf segment broadly or narrowly lanceolate, rarely linear; *stem leaves* similar but smaller and short-petiolate. *Inflorescences* repeatedly branched, leafless. *Flower whorls* usually 5-8-flowered. *Pedicels* about equalling the flowers. *Valves* neither broader nor longer than the nut, either free or more frequently adnate to the nut. *Nuts* 1-1.5 mm long. (Figure 1F).

*Distribution*. Probably originating from Europe and southwestern Asia; well established in North and South America, South Africa, Australia and New Zealand.

The species comprises several subspecies, these being indistinguishable when no fruiting material is available. Most of the fruiting specimens from Australia belong to the supsp. *angiocarpus* (Murbeck) Murbeck, a southwest Europe taxon in which the valves are adnate to the nut. Until recently it was assumed that chromosome numbers were correlated with morphological characters (Löve 1941). However, according to more recent studies by Den Nijs (1974, 1976) and Johnson and Briggs (1962) this is not true, the situation being much more complicated. As the taxonomic studies of Den Nijs have not yet been published, I must refrain from going into more detail and no material is cited here.

**Subgen. *Acetosa* sect. *Sagittati***

2. \**Rumex sagittatus* Thunb., Prodr. Fl. Capens. 67 (1794). *Typus* not indicated.

*Acetosa sagittata* (Thunb.) L. Johnson & B. Briggs, Contrib. New South Wales Nat. Herb. 3: 166 (1962).

*R. luxurians* L.f., Suppl. 212 (1781) non L., Mantissa 64 (1767). *R. burchellii* Campderá, Monogr. Rumex 135 (1819).

*Perennial*. Roots developing thick tubers. *Stems* usually very long, exceeding 1 m, climbing, flexuose. All leaves bright green, long-petiolate; *laminae* (4)8-10 x 3-5 cm, hastate, with very acute divergent basal lobes up to 2.5 cm long, apices acute. *Inflor-escences* wide, open, primary branches at right angles to the axis, repeatedly branched. *Flower whorls* few-flowered. *Flowers* dioecious. *Fruiting pedicels* thin, fili-form, articulate at about the lower third. *Outer perianth segments* reflexed. *Valves* in fruiting stage orbicular, 4-7 x 6-9 mm, with narrowly cordate bases, thin, mem-branous, finely reticulate, pale coloured and sometimes tinged purple. *Nuts* 3 x 1.3 mm, pale brown.  $2n = 18$  (Johnson & Briggs, loc. cit.). (Figure 1D).

*Distribution*. South Africa. Cultivated in places in tropical and subtropical regions. Established (?) in Australia.

*Selected specimens examined*. QUEENSLAND: Maleny, 18 January 1951, *R. Cole* s.n. (BRI).

NEW SOUTH WALES: La Perouse 33°59'S, 151°14'E, *R. Coveny* 6429 and *J. Powell* (NSW); 1 mile [1.6 km] S of Eurobodalla, NW of Narooma, *H. Salasoo* 5163 (NSW); North Sydney, *C. T. White* 10333 (BRI); c. 2 km S of Williamtown on Newcastle road, *K. L. Wilson* 2414 (NSW).

VICTORIA: Port Phillip Bay, Ricketts Point between Black Rock and Beaumaris, *Helen I. Aston* 932 (MEL).

TASMANIA: Sandy Bay, Long Beach 42°54'S, 147°18'E, 1 October 1968, *D. I. Morris* s.n. (HO); "Boobyalla" near Currie, King Island, Bass Strait, July 1972, *B. D. Smith* s.n. (MEL).

WESTERN AUSTRALIA: South Perth, *R. D. Royce* 6801 (PERTH); Claremont, February 1962, *J. Williams* s.n. (PERTH).

*Rumex sagittatus* is quite unlike any other Australian species in its tuberous roots—which are however, rarely collected or even observed—and its climbing habit. The valves are second in size only to *R. vesicarius*.

**Subgen. *Acetosa* sect. *Vesicarii***

3. \**Rumex vesicarius* L., Spec. Plant. ed 1: 336 (1753). *Type citation*: "Hab. in Africa."

*Acetosa vesicaria* (L.) A. Löve, Rit. Landbun. Atvinn. Hask. Reykyavik Ser. B, No. 3: 108 (1948).

*Rumex clementii* Domin, Bibl. Bot. 89: 614 (1921).

*Rumex roseus* auct. austral. nec aliorum.

Stout, succulent, pale green annuals. Basal and lower stem leaves with petioles longer than the laminae; laminae 5-10 x 4-8 cm, triangular with cordate or subtruncate bases (basal lobes  $\pm$  acute, acuminate or rarely  $\pm$  obtuse), flat, apices  $\pm$  broadly acuminate to  $\pm$  acute; upper stem leaves similar but smaller. Pedicels single per ocrea. Flowers at the apex of pedicels twin or triplet. Valves 12-18(23) x 15 mm, thin, finely reticulate, often tinged purplish or pinkish, inflated, those of the 2-3 flowers folded together, suborbicular or broadly elliptic, profoundly emarginate on both ends. Nuts 3.5-4.5 mm long, greyish brown.  $2n = 18$  (A. Löve loc. cit.). (Figure 1E).

*Selected specimens examined.* QUEENSLAND: 66 km from Bedourie on road to Boulia, R. W. Purdie 1402 (BRI).

NEW SOUTH WALES: Fowlers Gap, N of Broken Hill, S. Jacobs 1940 (NSW); 11 km E of Warratta Bore, 32 km E of Milparinka, K. L. Wilson 1642 and J. Pickard (NSW).

SOUTH AUSTRALIA: c. 3 km from Wirrealpa on road to Blinman, W. R. Barker 293 (MEL, dupl. ex AD); Aroona Valley, c. 25 km NW of Oraparinna Hst., E. N. S. Jackson 1733 (CANB, dupl. ex AD); Ediacara, c. 50 km W of Leigh Creek, T. R. N. Lothian 2400 (AD); Sacred Canyon, c. 19 km SE of Wilpena, 27 September 1981, Naomi Norris s.n. (MEL); Gawler Cemetery, D. E. Symon 12901 (ADW); Musgrave Park 26°09'S, 131°12'E, S. H. Yengoyan, V. G. Harper and A. A. Yengoyan 150 (NT).

NORTHERN TERRITORY: Mulga Park 25°51'S, 131°39'E, S. H. Yengoyan, V. G. Harper and A. A. Yengoyan 31 (NT); Billygoat Hill, Alice Springs, G. Chippendale 90 (NT).

WESTERN AUSTRALIA: 1 mile [1.6 km] W of Mileura Hst., NW of Meekatharra, R. A. Saffrey 1113 (PERTH); 3 miles [4.8 km] from Menzies towards Kalgoorlie, 7 September 1968, M. E. Phillips s.n. (MEL, dupl. ex CBG); 2.5 km SE of Yalgoo 28°22'S, 115°43'E, K. Pajmans 3903 (CANB).

*Distribution.* North Africa to Pakistan; north Arabia, southern Persia, Afghanistan, Pakistan, one locality in central Greece. This desert/semidesert species was introduced into Australia during the past 50-60 years and is now widespread and well established. In Western Australia I have observed the species to be well established at both Kalgoorlie (around the goldmines) and Kalbarri.

*Rumex vesicarius* cannot be mistaken for any other species on account of its annual growth, its juicy stem and leaves and the size of its valves. The fact that one pedicel usually bears two to three flowers, the valves of which are folded together, can easily escape observation.

4. \**Rumex frutescens* Thouars, Esquisse Fl. Tristan d'Acougne in Mèl. Bot. et Voy. 4: 38 (1811). *Typus*: Tristan da Cunha, Moseley, Challenger Exped. s.n. (E, BM).

*R. cuneifolius* Campderá, Monogr. Rumex 95 (1819).

Icon.: Rechinger f., Ark. Bot. 26A (3): 20, fig. 8, tab. 5 (1933).

*Perennial* by a long, indurate, creeping rhizome with thick nodes; flowering stems solitary or few, short, rarely elongating. Basal leaves not developed; stem leaves thick, fleshy when alive but leathery when dry; lower leaves of flowering stems with thick petioles less than half as long as the laminae, laminae up to 12 x 5 cm, obovate



Figure 4. *Rumex frutescens*. John Moore, 10 Dec. 1981 (PERTH).

with cuneate bases, flat but with finely crispate margin, apices obtuse; *upper stem leaves* few, shorter petiolate,  $\pm$  acute. *Inflorescences* nearly leafless or with very few small leaves in the lower part, compact in the fruiting stage. *Whorls* many-flowered. *Fruiting pedicels* usually shorter than or as long as the perigone, stout, articulate about the middle. *Fruiting valves* 4-5 (6) x 3 mm, leathery, entire, ovate-triangular in outline, all bearing a strong thick fusiform callosity. *Nuts* about 2.5 x 2 mm. (Figures 1B and 4).

*Distribution.* South America, Argentine, Chile, Peru, Bolivia, Uruguay, Tristan da Cunha, Gough Island. Rarely as an alien in Europe (well established on dunes in southern England) and in North America. Known from two localities in Australia.

*Specimens examined.* WESTERN AUSTRALIA: William Bay, 70 km West of Albany, growing in summer moist winter waterlogged swamps with *Juncus* sp. in sand over gravel, 12 Dec. 1981 John Moore s.n. (PERTH). (On a visit by John Moore and myself to this locality in December 1982, *R. frutescens* could not be found.)

VICTORIA: Coode Island, Oct. 1908, Dec. 1908 and 28 Mar. 1912, J. A. Tovey and C. French jnr. (all MEL). This locality is no longer in existence, it having been destroyed by harbour works at the mouth of the Yarra River, Melbourne; there is, however, still a Coode Road (N. G. Marchant pers. comm.).

The discovery of this species at two localities on the south coast of Australia is of major phytogeographic interest. Its main area is South America. It was described from Tristan da Cunha as *R. frutescens* Thouars (1811). In my monograph of *Rumex* in Africa (1954: 62) I erroneously stated that *R. frutescens* is a synonym of *R. cuneifolius* (1819). The area of this species seems to be a truly south Atlantic one: Tristan da Cunha, 37°06'S, 12°20'W; Gough Island 40°12'S, 4°45'W. The question is still open whether it has been spread with or without human intervention. On its occurrence in Britain see Lousley, Report. Bot. Exch. Club 1941-42: 579 (1942).

#### Subgen. *Rumex* sect. *Simplices* subsect. *Crispi*

5. \**Rumex crispus* L., Spec. Plant. 335 (1753). *Type citation*: "Hab. in Europae succulentis."

*Perennial.* *Stems* (30)50-100(150) cm high, strictly erect. *Basal and lower stem leaves* petiolate, petioles shorter than the laminae; *laminae* lanceolate, undulate, up to 30 cm x 60 mm, attenuate on both ends with cuneate rarely narrowly truncate bases, apices acute; *upper stem leaves* similar, but gradually becoming smaller and narrower. *Inflorescences* with erect rarely slightly patent branches, more or less compact in the fruiting stage, rarely the lower whorls separated by a few subtending leaves in the lower part of the inflorescence. *Whorls* many-flowered. *Fruiting pedicels* variable in length, thin, always longer than the valves. *Fruiting valves* varying in size (3.5)4-5(6) mm long and broad, orbicular-cordate, rarely subcordate-triangular, entire, usually all valves bearing a callosity, callosities equal or sometimes unequal; rarely only the anterior valve with a callosity and the others ecallose. *Nuts* (2)2.5-3(3.5) mm long, normally broadest below the middle. (Figure 1C).

*Selected specimens examined.* QUEENSLAND: Mary River c. 20 km S of Gympie 26°02'S, 152°04'E, 25 October 1974, S. L. Everist s.n. (BRI); Clifton, C. T. White 12670 (BRI).

NEW SOUTH WALES: 40 km NNW of Warren, K. Pajmans 1770 (CANB); Between Lyneham and Gungahlin, J. Pulley 1174 (CBG); Cave Creek, c. 0.5 mile [0.8 km] below Blue Waterhole, A. Rodd 68 (NSW).

VICTORIA: Wangaratta 36°22'S, 146°17'E, *Helen I. Aston* 2167 (BRI, dupl. ex MEL); Studley Park, Kew, *R. V. Smith* 77/28 (MEL).

TASMANIA: 13 miles [21 km] from Queenstown towards Hobart, *M. E. Phillips* 477 (CBG); Flinders Island near Whitemark, *John Whinray* 3 (MEL).

SOUTH AUSTRALIA: Southern Lofty Region 35°11'S, 138°37'E, *A. W. Bell* 106 (MEL dupl. ex AD); Bute Railway yard, c. 130 km NNW of Adelaide, *B. Copley* 812 (MEL dupl. ex AD)

NORTHERN TERRITORY: Todd River, Alice Springs 23°42'S, 133°52'E, 14 November 1979, *A. Thomas* s.n. (NT).

WESTERN AUSTRALIA: Woody Island, Recherche Archipelago, *Ian Abbott* 17 (MEL); Denmark 34°57'S, 117°21'E, *K. H. Rechinger* 60137 (PERTH, W).

*Distribution.* Probably originally spontaneous in Europe and southwestern Asia. Now well established in most extratropical parts of the world. *Rumex crispus* is the most common of the European species of subgen. *Rumex* in Australia.

*Rumex crispus*, in spite of a moderate range of morphological variability, can easily be distinguished from other species in Australia by its ± strict and rather dense panicles, its crispate leaves which are attenuate at both ends and by its broad, cordate-rounded, entire fruiting valves of which usually all, but rarely only the anterior one, bear a callosity.

#### Subgen. *Rumex* sect. *Simplices* subsect. *Conglomerati*

6. \**Rumex conglomeratus* Murr., Prodr. Stirp. Goetting. 52 (1770). *Typus*: Germania: Göttingen.

For Synonymy see Rechinger f. 1949a: 96.

*Perennial.* Stems usually 30-80 cm high, ± erect, often branching from below the middle; branches arcuate-divaricate and forming open panicles. *Basal* and *lowermost stem leaves* petiolate; *petioles* usually as long as the laminae; *laminae* flat, narrowly oblong-ovate with slightly cordate or truncate bases, up to 6 cm x 3 mm, small in comparison with the size of the plant, apices rotundate-obtuse; *upper stem leaves* becoming gradually smaller and with shorter petioles and more acute apices. *Flower whorls* many-flowered, all distant, all (except sometimes the uppermost) subtended by a small short petiolate leaf. *Fruiting pedicels* about the same length as the valves or only slightly longer, articulate at the middle or slightly below. *Fruiting valves* 2.5-3.2 x 1-1.7 mm, oblong ovate, entire, all bearing a large callosity which sometimes occupies nearly the whole surface of the valve. *Nuts* 1.3-1.7 mm long, dark brown. (Figure 1A).

*Selected specimens examined.* QUEENSLAND: Upper Peachester 26°51'S, 151°54'E, *L. S. Smith* s.n. (BRI).

NEW SOUTH WALES: Moseley Park, Lord Howe Is., *A. C. Beauglehole* 5514 (CANB); Graveyard Ck, Kunghur, c. 12 miles [19.3 km] SW of Murwillumbah, *E. F. Constable* 6583A (NSW); At edge of Lake Burley Griffin, *R. Pullen* 8762 (CANB); c. 1.5 km S of Wyong Ck and 0.5 km W of Pacific Coast Highway, *K. L. Wilson* 1991 (NSW); 6.5 km N of Bendemeer on Macdonald River road to Kingstown, *K. L. Wilson* 4357 (NSW).

VICTORIA: Junction of Emerald and Cockatoo roads 37°58'S, 145°27'E, *S. J. Forbes* 244 (MEL); Studley Park, Kew, *R. V. Smith* 77/29 (MEL); Brodribb River bridge on Princes Highway 37°42'S, 148°34'E, *K. L. Wilson* 2173 (NSW).

TASMANIA: Near George Town 41°10'S, 146°50'E, December 1955, W. M. Curtis s.n. (HO); Ross 42°02'S, 147°32'E, 7 July 1966, W. M. Curtis s.n. (HO).

SOUTH AUSTRALIA: Torrens Gorge, c. 17 km ENE of Adelaide, Hj. Eichler 14620 (AD); E of Callendale, c. 40 km SW of Naracoorte, D. Hunt 2324 (MEL, dupl. ex AD).

WESTERN AUSTRALIA: Robinson Estate, SW of Albany, K. H. Rechinger 60016 (PERTH, W); Ocean Beach, S of Denmark 35°03'S, 117°20'E, K. H. Rechinger 60142 (PERTH, W).

*Distribution.* Central and southern Europe, Mediterranean, southwest and central Asia. Introduced into most extratropical parts of the world where it has become well established.

*Rumex conglomeratus* is easily recognized by its divaricately branched panicles, its flower whorls each subtended by a leaf and by its small, narrow, entire fruiting valves which bear a prominent callosity covering a large part of the valve surface.

### Subgen. *Rumex* sect. *Simplices* subsect. *Amphibii*

**Subsect. *Amphibii*** Rech. f., subsect. nov.

Perennis, amphibius. Rhizomate procumbente elongato et inflato ad nodos radicante perennis. Caulis fructifer brevis, erectus, subsimplex. Folia basalia non evoluta; folia caulina lanceolato-lineararia, acuta. Pedicelli fructiferi perigonio 1.5-2-plo longiores, basin perigonii versus valde incrassati, in tertia vel quarta parte inferiore articulati. Valvae ovato-rhombicae, acutae, omnes calliferae, utrinque dentes 2 antrorsos ferentes.

*Typus:* *R. bidens* R.Br.—Sectio monotypica.

Amphibious. *Perennial* by an often elongated and inflated procumbent rhizome rooting at its nodes and ending in a short ascendent or erect flowering stem. *Basal leaves* not developed; *lower stem leaves* narrowly lanceolate-linear with truncate or cuneate bases and acute tips; *stem leaves* lanceolate-linear, acute. *Fruiting pedicels* one and a half times to twice as long as the valves, much thickened at the base of perigone, articulate at the lower third or quarter. *Valves* ovate-rhombic, acute, all with a callosity, with two marginal teeth on each side pointing forward.

7. *Rumex bidens* R. Br., Prodr. Fl. Nov. Holl. 116 (1810). *Typus:* "R. Brown, Iter Australiense 2308, 1802-05" (BM).

*R. muelleri* Meisn. in DC., Prodr. 14: 61 (1856).

*Amphibious perennials.* *Rhizomes* often elongate, creeping in the mud, often floating or partly submerged, rooting at the nodes, internodes often inflated, rhizomes ending in an ascendent or more or less erect, usually unbranched flowering stem which is 20-60 cm high. *Basal leaves* not developed; *lower stem leaves* 10-20 x 1.5-2.5 cm, narrowly linear-lanceolate with truncate or broadly cuneate bases, margins flat or very slightly crisped, apices acute; *upper stem leaves* similar. *Flower whorls* many-flowered, distant, all with subtending leaves, lower whorls predominantly female, upper ones male (according to Black in sched.). *Fruiting pedicels* one and a half to twice as long as the fruiting perigone, much thickened towards the base of the perigone, articulate at 1/3-1/4 of the lower part. *Outer perigone segments* 3-4 mm

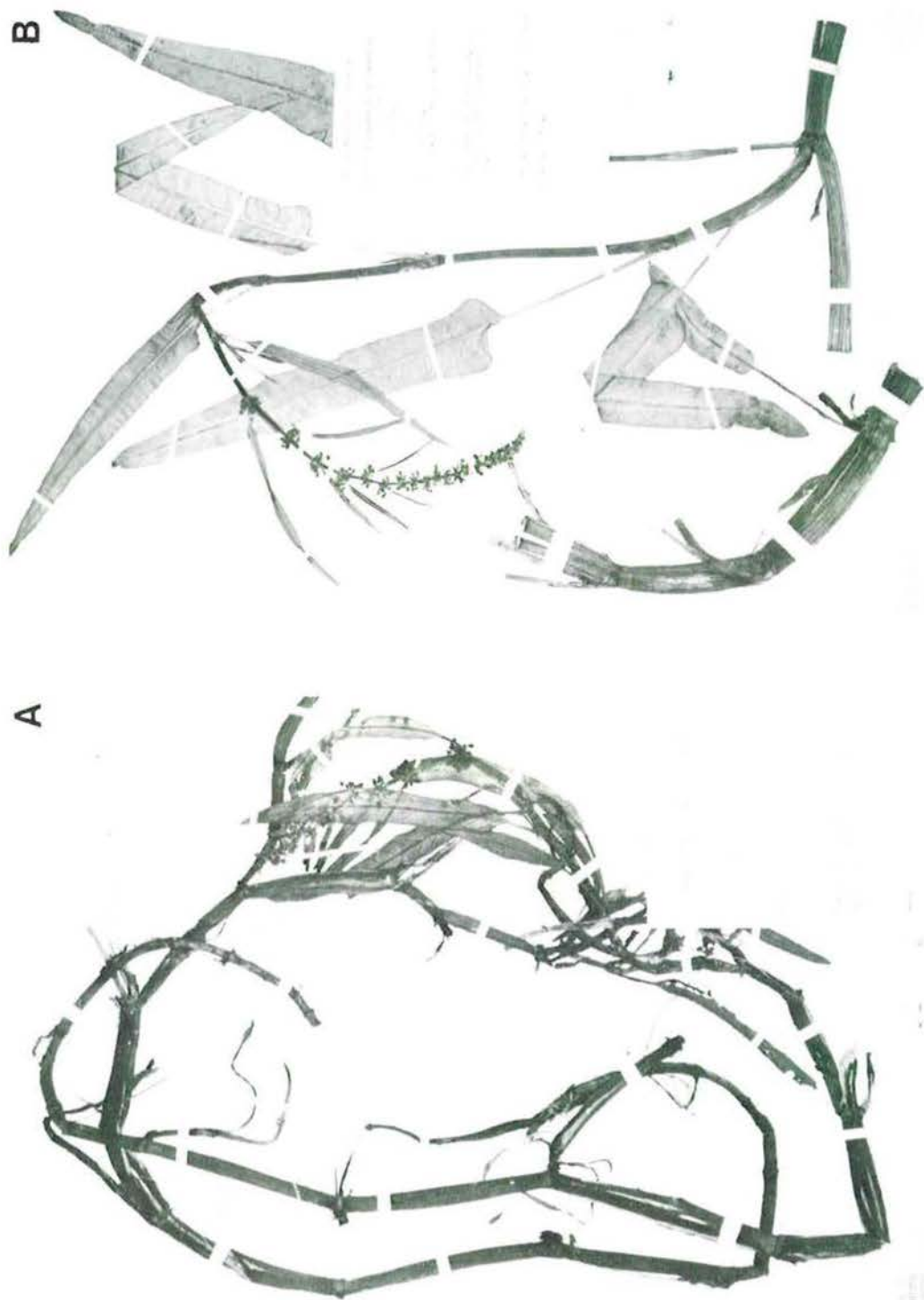


Figure 5. *Rumex bidens*. A—A. C. Beaglehole 30475 & A. E. Orchard (MEL). B—Helen I. Aston 1307 (MEL).

long, appressed to the margin of the interior ones and often hiding their lowest pair of teeth. *Fruiting valves* c. 5 x 3.5 mm, ovate-rhombic with a narrow tip bearing 2 antrorse teeth on either side; each valve with a callosity. *Nut* 3 mm long, dark brown. (Figures 3F and 5).

*Selected specimens examined.* NEW SOUTH WALES: Lake Whymoul near Barham, 28 November 1956, *R. A. Williamson* s.n. (NSW).

VICTORIA: Boggy Ck 0.5 miles [0.8 km] NW of Kyneton, *Helen I. Aston* 1240 (AD, MEL); Darlots Ck, Tyrendarra, Portland, *A. C. Beauglehole* 370 (MEL); c. 2 miles [3.2 km] W of Mt Abrupt Cairn, Grampians, 11 February 1969, *A. C. Beauglehole* and *A. E. Orchard* s.n. (MEL); Near Yarra River, October 1952, *F. Mueller* s.n. (MEL); Keilor Park, Maribyrnong Bridge near Calder Highway Bridge, *R. V. Smith* 69/54 (MEL); Geelong, December 1909, *H. B. Williamson* s.n. (CANB).

TASMANIA: Jordan River 42°44'S, 147°14'E, *L. Rodway* (HO); In drains about Launceston, *Ch. Stuart* 70 (MEL).

SOUTH AUSTRALIA: Mt Barker Ck, Mt Lofty Range, 4 December 1943, *J. B. Cleland* s.n. (AD); Mannum, River Murray, *C. M. Eardley* 2871 (ADW); SE Comaun, 20 km E of Penola, *D. Hunt* 1520 (AD); South Killanoola Swamp, c. 25 km SSW of Naracoorte, *D. Hunt* 2331 (AD, BRI, MEL); Wood's Point, c. 12 km downstream from Murray Bridge, 8 June 1962, *J. V. Mertin* s.n. (AD); SE of Marsh's Swamp, W of Lake Leake, 19 February 1966, *I. B. Wilson* s.n. (AD).

*Distribution* (Figure 11A). South-east mainland Australia and Tasmania.

*Rumex bidens*, an amphibious plant restricted to the south-east of Australia and to Tasmania, probably having no close relatives with the possible exception of *R. neglectus* T. Kirk, an endemic of New Zealand and the Auckland Islands.

#### Subgen. *Rumex* sect. *Simplices* subsect. *Obtusifolii*

8. \**Rumex obtusifolius* L., Spec. Plant. 335 (1753). *Type citation*: "Hab. in Germania, Helvetia, Gallia, Anglia."

*Perennial*. *Stems* 60-80(120) cm high, erect, branching from about the middle; *branches* arcuate patent and forming an open panicle. *Basal leaves* with petioles usually longer than the laminae; *laminae* oblong-ovate from a cordate base, up to about 20 x 10 cm, flat, apices obtuse or broadly acuminate; *stem leaves* shorter petiole, narrower and longer, usually tapering from a rather broad, non-cordate base. *Flower whorls* all (except the uppermost) distant, the lower ones only subtended by a small leaf. *Fruiting pedicels* slender, articulate at about 1/3 or 1/4 of their length, about 2.5 times as long as the valve. *Fruiting valves* of varying shape and size (according to subspecies, see discussion), usually linguiform towards the apex, usually with 2-3 teeth in their lower half. *Nuts* 2.5-3.2 mm, broadest above the base, brown. (Figure 2A).

*Selected specimens examined.* NEW SOUTH WALES: Near Robertson, *M. Gray* 5883 (CANB); Near Thredbo Village, Kosciusko State Park, *M. Gray* 6410 (CANB); Near Cabramurra, *C. W. E. Moore* and *M. Gray* 5413 (CANB); Balmain, *K. L. Wilson* 891 (NSW).

VICTORIA: Trentham, on roadside, *R. V. Smith* 66/49 (MEL); Terang, in railway yard, *R. V. Smith* 66/75 (MEL); North Brighton railway station, 16 February 1956, *J. H. Willis* s.n. (MEL).

TASMANIA: Near Linda 42°04'S, 145°36'E, January 1953, *W. M. Curtis* (HO).

SOUTH AUSTRALIA: Mt Lofty Range National Park, 11 December 1943, *J. B. Cleland* s.n. (AD); Banks of River Torrens, Adelaide, *T. J. Smith* 2073 (AD).

WESTERN AUSTRALIA: Robinson Estate, SW of Albany 35°02'S, 117°53'E, *K. H. Rechinger* 60015 (PERTH, W).

*Distribution.* Europe except the Arctic (in the Mediterranean the species is restricted to the mountains); South-west Asia eastwards into the central Elburz Range. Introduced into many extratropical parts of the world and more or less established in some places. In Australia much rarer than *R. crispus*, *R. pulcher* and *R. conglomeratus*.

*Rumex obtusifolius* is a polymorphic species which can be divided into four subspecies (see Rechinger 1932: 41-61). The most common one in Australia and elsewhere outside its natural area of occurrence, is subsp. *obtusifolius* (syn. subsp. *agrestis* (Fries) Danser); it has valves up to 6 mm long, all usually possessing three teeth which in length about equal the width of the valve, the anterior valve only bearing a callosity. Some Australian specimens tend towards subsp. *transiens* with slightly smaller valves, shorter teeth and usually all valves bearing a callosity of unequal size.

9. \**Rumex pulcher* L., Spec. Plant. 336 (1753). *Type citation*: "Hab. in Gallia, Italia, Veronae."

*Perennial*, variable in habit. *Stems* 20-60 cm high, ± stiff or angular-flexuose, variously branching often from below the middle (see subspecies). *Leaves* thickish, comparatively small, often papillose below, petiolate, petioles usually shorter but sometimes about as long as the laminae; *laminae* of basal leaves ovate-oblong from a cordate base, sometimes constricted below the middle (fiddle-shaped)—see subspecies; *stem leaves* few, shorter petiolate and more acute than the basal ones. *Flower whorls* many-flowered, all distant, all subtended by a small leaf which is not prominent in the uppermost whorls. *Fruiting pedicels* thickish, articulate near the middle or slightly below but not dehiscent, shorter than or sometimes equalling the valves. *Valves* thick, leathery, variable in shape (see subspecies), 4.5-6 × 2.5-4.5 mm, with a thick reticulate-foveolate reticulation, usually all bearing a callosity, of unequal sizes, margins variously and grossly dentate. *Nuts* 3-4 mm long, broadest below the middle. (Figures 2B and 2C).

*Distribution.* Mediterranean region and south-west Asia. Introduced into, and in places well established in, warmer places of the world. Common and locally well established in America and Australia.

Bentham (1870: 264) did not have a clear concept of *R. pulcher* as evidenced by the following passage from his description: "... radical and lower leaves oblong-lanceolate or almost linear. Pedicels shorter or longer than the perianth... Inner segments of the fruiting perianth lanceolate or triangular, 2-3 lines long with a rigid point..." These characters do not apply to *R. pulcher* but instead to *R. dumosus* or *R. drummondii*. Bentham confounded specimens of the Australian indigenous species, *R. dumosus* or *R. drummondii*, with the alien *R. pulcher*. This is apparent not only from his description but also from his listing as synonyms *R. oxyspalus* and *R. drummondii*. This error has persisted in some publications and herbaria up to the present.

*Rumex pulcher* is a polymorphic species (Rechinger 1932: 25-39) with five subspecies being recognized, two of which occur in Australia.

9a. subsp. **pulcher**

*Fruiting branches* horizontal or angularly reflexed and intricate. *Basal leaves* usually constricted below the middle. *Valves* narrowly ovate or oblong-triangular, with slightly ligulate apices and several well developed teeth near the base. (Figure 2B).

*Selected specimens examined.* NEW SOUTH WALES: Batemans Bay, L. A. S. Johnson and B. G. Briggs B3077 (NSW); Albury, 2 December 1975, H. J. Milvain s.n. (NSW).

VICTORIA: 4.7 miles [7.6 km] S of Terang, J. Anderson 331 (MEL); Yarra bank near Botanic Gardens, 13 December 1910, W. R. A. Baker s.n. (MEL).

TASMANIA: George Town 41°10'S, 146°50'E, December 1955, W. M. Curtis s.n. (HO); Hobart, April 1924, A. H. S. Lucas s.n. (NSW); Garland Grove, Cape Barren Is., J. S. Whinray 1455 (MEL).

SOUTH AUSTRALIA: Mt Drummond, C. R. Alcock 2591 (AD); Near Kalangadoo on Millicent road, D. Hunt 1966 (AD).

WESTERN AUSTRALIA: Denmark 34°57'S, 117°21'E, K. H. Rechinger 60138 (PERTH, W); 10 km W of Redmond 34°53'S, 117°42'E, K. H. Rechinger 60234 (PERTH, W); Narrikup 34°46'S, 117°42'E, K. H. Rechinger 60240 (PERTH, W); 5 km NE of Narrikup, K. H. Rechinger 60241 (PERTH, W); Red Gum Pass road near Kendenup 34°29'S, 117°38'E, K. H. Rechinger 60398 (PERTH, W).

*Distribution.* Mediterranean Basin and western Europe. Introduced and partly well established in warmer parts of most continents.

9b. subsp. **divaricatus** (L.) Murb., Beitr. z. Fl. Südbosniens und der Herzegovina in Fysiogr. Sällskap. Handl. 2: 45 (1891). *Typus*: "Hab. in Italia."

*R. divaricatus* L., Spec. Plant. ed. 2: 478 (1762).

*Fruiting branches* arcuate-divaricate. *Basal leaves* usually not constricted below the middle. *Fruiting valves* more or less broadly ovate or orbicular-triangular with broadly acuminate apices, with several short more or less irregular teeth on the margin. (Figure 2C).

*Selected specimens examined.* VICTORIA: Yarra bank, 13 December 1910, W. R. A. Baker s.n. (MEL).

TASMANIA: Sandy Bay, 15 July 1910, R. A. Black s.n. (MEL); Hogan Is., Eastern Bass Strait, January 1968, N. Scarlett s.n. (MEL).

SOUTH AUSTRALIA: Near Coomunga, Eyre Peninsula, C. R. Alcock 2586.

WESTERN AUSTRALIA: St. Fergus road, between Toodyay and Avon River, N. T. Burbidge 8013 (CANB); Northam, C. Dziekanowski 3971 and J. Roethke (PERTH); Capel, January 1925, H. G. Elliott s.n. (PERTH); South Perth, October 1944, R. D. Royce s.n. (PERTH); Moora, December 1968, E. B. J. Smith s.n. (PERTH).

*Distribution.* Mediterranean region, especially the southern part; south-west Asia. Introduced and in parts well established in warmer parts of America, Africa and Australia. The distinction between the two subspecies appears to be less clear in some cases in Australia than in the Mediterranean.

**Subgen. *Rumex* sect. *Simplicis* subsect. *Australienses***

**Subsect. *Australienses*** Rech. f., subsect. nov.

Perennes. Folia basalia elongata, latitudine (3)5-30(!)-plo longiora. Pedicelli fructiferi perigonium aequantes ad eo triplo longiores, in medio vel infra medium articulati. Valvae ecallosae, unica vel omnes calliferae, semper dentatae.

*Typus: Rumex dumosus* A. Cunn. ex Meisn.

The new subsection is closest to subsect. *Obtusifolii* which includes *R. obtusifolius* L. and *R. pulcher* L., both of European or Mediterranean origin and occurring as aliens in Australia (see spp. 8 and 9 above). The main distinctive characters of the new subsection are the extremely narrow leaves, the far greater reduction of valve surface and the usually longer teeth in proportion to the valve surface. As a matter of fact *R. tenax* Rech. f. has the longest and finest leaves in the whole genus, they look nearly grasslike. The only extra-Australian species belonging to subsect. *Australienses* is *R. flexuosus* Solander ex Sprengel from New Zealand.

10. ***Rumex dumosus*** A. Cunn. ex Meisn. in DC., Prodr. 14: 62 (1856). *Typus:* Liverpool plains, forms large, round bushes, A. Cunningham (holo: K; iso: MEL, NSW, NY).

*R. flexuosus* F. Muell., Syst. Cens. Austral. Plts. 31 (1882), p.p. quidem.

*Perennial* with vertical rootstock. *Stems* several, 20-50 cm high, flexuose, repeatedly dividing from near the base with numerous thin, flexuose branches forming an entangled mass breaking off near the base and dispersing as a tumbleweed. *Basal leaves* long-petiolate; *laminae* 10-20 x 0.8-2 cm, linear-lanceolate from a broadened truncate or broadly cuneate rarely subcordate base, sometimes constricted above the base, panduriform and/or obtusely lobed at the base, with coarsely erose crispate margins, apices acute; *stem leaves* numerous, similar to the basal ones, gradually becoming shorter petiolate and narrower and more acute. *Panicles* (see above). *Flower whorls* (2)3-4(5)-flowered, distant, loose, nearly all subtended by a narrow leaf. *Fruiting pedicels* of varying length within one whorl, rather thin, articulate below the middle. *Fruiting valves* c. 5 x 3 mm long (excluding teeth), triangular, attenuate, strongly reticulate; medium nerve not or only slightly thickened, (more or less incrassate), sometimes forming an elongate callosity (var. *dumosiformis*); usually two strong teeth present on the lower part of each side of the valve, the lower one more or less patent, the upper one antrorse, sometimes a shorter third one occurs near the middle. *Nuts* 2.5-3 mm long. (Figures 2E and 6).

*Rumex dumosus* is interpreted here in a broad sense as comprising a set of variants badly in need of further investigation. Both comparative morphology and cytological studies as well as cultivation experiments are required to elucidate the complex variation patterns observed on the basis of limited fruiting material.

The relationship of *R. dumosus* to the New Zealand endemic, *R. flexuosus* Solander ex Sprengel should be reconsidered. At present I have no N.Z. material at hand for comparison. However, according to my earlier treatment (Rechinger 1935a: 45) the two species are related by their characteristic panicles whose fine, repeatedly divided branches form an entangled mass which breaks-off at ground level and is dispersed as a tumbleweed. *Rumex flexuosus*, however, presumably has more flowers



Figure 6. *Rumex dumosus*. A—T. Smith 813 (AD). B—John Moore, 3 Sept. 1981 (PERTH).

per whorl, its articulation on the fruiting pedicel is closer to the base and the valves are smaller on average. There is much variation in these characters within the Australian material of *R. dumosus* examined.

*Rumex drummondii* is accepted here as a species (see sp. 11 below) but it is noted that very little material of this taxon has been seen. The status of *R. drummondii* and its relationship to *R. dumosus* is therefore in need of critical reappraisal.

In my earlier treatment of *Rumex* (Rechinger 1935a: 43) I distinguished *R. dumosiformis* from *R. dumosus* on the basis of three characters of the fruiting valves: the valves were smaller, possessed longer teeth and their central nerve was thickened into a callosity. It is now apparent that these characters are not correlated and that there is variation from specimens with valves lacking a callosity to ones where it is quite pronounced. *Rumex dumosiformis* should therefore be regarded as only a variety (see 10b below).

#### 10a. var. *dumosus*

Valves all ecallose.

Selected specimens examined. NEW SOUTH WALES: Jerrabomberra Avenue, Canberra, *E. M. Canning* 5033 (CBG); 15 miles [24 km] N of Deniliquin, *J. H. Leigh* S86 (NSW); Near Jerilderie, *E. McBarron* 20974 (NSW).

VICTORIA: c. 0.5 miles [0.8 km] N of Victoria Valley Hall on Grampians Road, *A. C. Beaglehole* ACB 30805 (MEL); Devils Pools, N of Wonga Hut, Wyperfeld National Park, *John Landy* and *A. C. Beaglehole* ACB 9594 (MEL); 8 km NNE of Strathmerton near site of Myee railway station 35°51'S, 145°30'E, *T. B. Muir* 6060 (MEL); Whipstick, near Neilborough, 10 November 1963, *W. Perry* s.n. (MEL).

TASMANIA: Conara to Ross, December 1955, *W. M. Curtis* s.n. (HO); Rokeby 42°53'S, 147°26'E, December 1899, *L. Rodway* s.n. (HO).

SOUTH AUSTRALIA: Hundred of Yaranyacka, c. 45 km NNE of Port Lincoln, *C. R. Alcock* C122 (AD); Wolseley, c. 80 km N of Naracoorte, *K. M. Alcock* 197 (AD); Iron Knob, c. 55 km NW of Whyalla, 7 November 1936, *J. B. Cleland* s.n. (AD); Beaumont hills, c. 6 km SE of Adelaide, 14 November 1943, *J. B. Cleland* s.n. (AD); Bool Lagoon, c. 25 km S of Naracoorte, *D. Hunt* 2203 (AD); Wilmington, c. 40 km SE of Port Augusta, 22 October 1928, *E. H. Ising* s.n. (AD).

WESTERN AUSTRALIA: (all PERTH). Swamp Road, Gairdner River, property of R. Hurst, *J. Moore* 5, 12 and 26; Devil Creek Road, Gairdner River, property of T. Parker, *J. Moore* 31.

*Distribution* (Figure 12B). South-east and south-west Australia. It is not known whether the Western Australian occurrences are natural or whether they are the result of human intervention. Rarely found in Europe as an alien on imported wool.

#### 10b. var. *dumosiformis* (Rech. f.) Rech. f., stat. nov.

*Rumex dumosiformis* Rech. f., Oesterr. Bot. Z. 84: 43 (1935). *Lectotypus* (here selected): Murray River, Victoria, *Wawra* (W).

At least *anterior* valves bearing a callosity.

*Other specimens examined.* QUEENSLAND: Darling Downs, Macalister, April 1916, *E. W. Bick* s.n. (BRI); Jimbour, 9 May 1956, *M. Conway* s.n. (BRI); 6 miles [9.7 km] S of Muckadilla on "Lorne" Station, 12 June 1968, *C. J. Paull* s.n. (ADW, BRI); Everton, Jimbour, 8 June 1937, *A. Tuppack* s.n. (BRI).

NEW SOUTH WALES: Wonganella 35°13'S, 144°49'E, December 1918, *E. Officer* s.n. (NSW).

VICTORIA: Boorhaman, 29 November 1939, *Raleigh A. Black* s.n. (MEL); 4 miles [6.4 km] by road S of Echuca, *E. F. Constable* 5218 (NSW).

TASMANIA: Township Lagoon, Tunbridge 42°08'S, 147°25'E, *D. I. Morris* 7855 (HO).

SOUTH AUSTRALIA: Spalding 33°30'S, 138°37'E, 8 November 1920, *J. M. Black* s.n. (AD); Kilkenny, (5 km NW Adelaide), 9 September 1948, *J. B. Cleland* s.n. (AD); Brighton, (c. 15 km SSW Adelaide), 21 December 1949, *J. B. Cleland* s.n. (AD); Jamestown, 23 November 1960, *D. E. Symon* s.n. (ADW).

*Distribution* (Figure 12B). Eastern Australia, of scattered occurrence.

11. *Rumex drummondii* Meisn. in DC., Prodr. 14: 61 (1856). *Typus*: Swan River, Drummond 207 (iso: MEL).

*R. pulcher* sens. Benth., Fl. Austral. 5: 264 (1870), p.p. quoad syn. *R. drummondii*.

*R. flexuosus* F. Muell., Syst. Census of Austral. Plts. 31 (1882); Second Census of Austral. Plts. 53 (1889), p.p., non Sol. ex Sprengel.

*R. flexuosiformis* Rech. f. Oesterr. Bot. Z. 84: 46 (1935), syn. nov.

*Perennial. Stems* erect, 60-90 cm high, usually branched in the upper half; branches divaricate, flexuose, forming an open panicle. *Basal leaves* petiolate, petioles about equalling the length of laminae; laminae oblong-lanceolate from a truncate or subcordate base, nearly flat, up to 10 x 2 cm, apices acute; upper stem leaves evidently shorter petiolate, narrower and more acute. *Flower whorls* usually 8-12-flowered, all distant, only the lowermost subtended by a small leaf. *Fruiting pedicels* about twice or sometimes even 3 times as long as the valve, articulate around the lower third, more or less thickened towards the base of the perianth. *Fruiting valves* (3.5)4-5 mm long, 1.5-2 mm broad (excluding teeth), prolonged into a long and narrow acute apex which as a whole is somewhat slightly recurved but not hooked as in *R. brownii*, central nerve of the valve bearing a callosity near the base and 2(3) acute, more or less divergent, sometimes slightly curved teeth. *Nuts* 2.5-3.5 mm long, broadest slightly below the middle. (Figures 2D and 7A).

*Other specimens examined.* WESTERN AUSTRALIA: Gingin, October 1938, *P. R. Gorrie* s.n. (PERTH); Kalgan River, 5 miles [8 km] E of Albany, *A. Oldfield* s.n. (MEL).

*Distribution* (Figure 12B). Western Australia. The only precise localities known for this species are those given above.

Having now examined further material of Drummond 207 and 703 (syntypes of *R. drummondii*) from herb. MEL I am of the opinion that *R. flexuosiformis* Rech. f. should be considered conspecific with *R. drummondii*. Previously (Rechinger 1935a: 46) I had subdivided Meisner's taxon into *R. flexuosiformis* (based on Drummond 703) and *R. drummondii* (lectotypified by Drummond 207).



Figure 7. A—*Rumex drummondii*. Isotype, *J. Drummond* 207 (MEL). B—*R. stenoglottis*. *J. de Nardi & L. A. S. Johnson* 376 (NSW).

*Rumex oxysepalus* Meisn. (1857), evidently based on an immature specimen (Herb. Preiss 1357), probably should be considered conspecific with *R. drummondii* as suggested by Meisner in the protologue.

The characters separating *R. drummondii* from *R. dumosus*, seem to hold true, viz. long pedicels articulate near the base and many-flowered whorls. Furthermore the valves of *R. drummondii* are longer and narrower with a more prolonged narrow tip having the tendency to be slightly reflexed when dry (but not hooked as in *R. brownii*).

Bentham (1870) regarded *R. drummondii* as a synonym of *R. pulcher* and this error has persisted in several herbaria and publications up to the present. *Rumex pulcher* can always be easily recognized by its short thick pedicels which are articulate at about their middle and by its much broader valves which never have a prolonged tip.

## 12. *Rumex stenoglottis* Rech. f., sp. nov. (Figures 2F and 7B).

Perennis. Caulis erectus,  $\pm$  angulato-flexuosus, (30)40(50) cm altus, plerumque fere a basi iteratim tenuiter ramosus; panícula ampla intricate ramosa. Folia basalia et caulina inferiora mox marcescentia petiolo 3-8 cm longo vel interdum longiore suffulta, linearia, margine crispata, prope basin  $\pm$  indistincte rotundato-dilatata, basi ipsa contracta vel  $\pm$  oblique sinuato-cuneata, supra basin interdum  $\pm$  indistincte contracta, apice acuta; folia caulina pauca, brevius petiolata, valde diminuta; folia verticillastri inferiora fulcrantia brevissime petiolata, lanceolata, e basi dilatata longe attenuata. Florum verticillastri (3)4-5-flori, omnes remoti. Pedicelli fructiferi prope basin articulati, validiusculi, perigonium versus sensim incrassati, perigonio plerumque paulo longiores. Perigonii fructiferi folia exteriora basi valvarum appressa, dentem plerumque subaequantem eumque interdum  $\pm$  occultantes. Valvae fructiferae  $\pm$  5 mm longae, dente excluso vix 1.5 mm latae, anguste lingulatae, in apicem acutum subulatum interdum subrecurvo-patulum excurrentes, utrinque basi dentem singulum rectangulariter patentem latitudine valvae longiorem ferentes, prope basin callo ovoideo-hemisphaerico in costam validam attenuato provisum, nervatura ad foveolas crasse marginatas paucissimas reducta. Nux  $\pm$  3 mm long. Differt a *R. dumoso* A. Cunn. ex Meisn. valvis longioribus angustissimis lingulatis acutissimis, basi utrinque dentem unicum rectangulariter patentem ferentibus.

*Typus*: 500 m W of road 12 km N of Rankins Springs towards Naradhan, 36°46'S, 146°20'E, 290 m alt., New South Wales, Western Plains. 19 Nov. 1975. *M. D. Crisp* 1630 (holo: CBG).

*Perennial*. Stems erect, more or less angular-flexuose, 30-50 cm high, usually divided nearly from the base into a broad panicle composed of repeatedly divided fine branches which finally form a more or less entangled mass. *Basal* and *lower stem leaves* soon withering, slightly broadening at the base, often somewhat constricted above the base with wavy margin and acute apex; *stem leaves* few, smaller, with shorter petioles; *leaves subtending lower flower whorls* long, tapering from a slightly broader base. *Whorls* with (3)4(5) flowers, all distant. *Fruiting pedicels* articulate near the base, slightly thickened towards the perigone, usually slightly longer than the fruiting perigone. *Fruiting valves* c. 5 mm long (excluding the teeth), hardly 1.5 mm broad, narrowly tongue-shaped, gradually tapering into the sharp tip which is sometimes slightly patent-recurved (but never hooked), with a single, patent marginal tooth at the base; central nerve expanded into a callosity near its base. *Nuts*  $\pm$  3 mm long.

Related to *R. dumosus* A. Cunn. ex Meisn. from which it is distinguished by its very narrow valves tapering to a sharp apex and bearing a single, patent tooth near the valve base.

*Other specimens examined.* QUEENSLAND: Darling Downs, Dalby, April 1916, C. T. White s.n. (BRI).

NEW SOUTH WALES: Ingleburn, J. Bacon & J. McBarron 16204 (NSW); Aberdeen, 19 December 1912, E. Breakwell s.n. (NSW); Yanco Experimental Farm, November 1913, E. Breakwell s.n. (NSW); 1 km W Wee Waa in floodplain of Namoi River 30°13'S, 149°25'E, B. G. Briggs 4318 (NSW); Mitchell Highway, 6 miles [9.7 km] SSE of Dubbo towards Wellington, R. Coveny 2508 (NSW); 20 km S of Nevertire on Tottenham Rd, G. M. Cunningham 3978 & P. L. Milthorpe (NSW); Backyamma State Forest, 15 miles [24 km] ENE Forbes, F. K. Curtin 317 (NSW); Garah, July 1963, F. W. Cutting s.n. (NSW); 25 km W Rankin Springs 33°53'S, 146°04'E, J. C. De Nardi 943 (NSW); The Meglo, Coonamble Experimental Station, J. C. De Nardi & L. A. S. Johnson 376 (NSW); Sydney Botanic Gardens, 2 January 1941, C. Fry s.n. (NSW); Gundy, January 1954, R. E. Herrington s.n. (NSW); Aberdeen, 3 December 1954, L. A. S. Johnson s.n. (NSW); Weemelah, E. McBarron 15768 (NSW); Boggabilla, October 1952, H. K. Paterson s.n. (NSW); Rice Research Station, Leeton 254/38, October 1938, s. coll. (NSW); Paradise Experimental Area, B. Semple 606 (NSW); "Iolanthe" 26 km W Garah 29°08'S, 149°28'E, K. L. Solling 552 (NSW); Parkes 33°08'S, 148°11'E, 1965, B. Stuckey s.n. (NSW); "Burrigillo" N of Merrywinebone edge of watercourse, 12 November 1956, J. T. Waterhouse s.n. (NSW); Yanco, February 1913, H. Wenzholz s.n. (NSW); Grong Grong, G. H. Wright 12 (NSW).

VICTORIA: Wyperfeld National Park, 7 miles [11.3 km] S of NE corner of the Hump, N boundary of park, A. C. Beauglehole and E. W. Finck ACB 29469 (MEL); St. Albans, R. H. Groves 524 (MEL); Pyrenees (central-west region), February 1840, George A. Robinson s.n. (MEL).

*Distribution* (Figure 12A). South eastern Australia.

In *Rumex stenoglottis* the valves are about 5 mm long (excluding the teeth), rarely 1.5 mm broad near their base and prolonged into a long thin very acute reflexed tip; there is only a single tooth at the base of the valve on each side. The collector of the type specimen has named his plant *R. crystallinus* Lange; E. M. Canning has tentatively renamed it as *R. tenax*. By the few fruits per whorl as well as by the pedicels longer than the valve, the plant, however, is definitely different from both these species; from *R. crystallinus* it is furthermore distinguished by its perennial growth habit. Several other sheets of *R. stenoglottis* which I have examined had been named *R. dumosus*. The latter is evidently the closest relative of the new species. Both have in common the repeatedly divided panicle with the branches forming an entangled mass. *Rumex stenoglottis*, however, differs from *R. dumosus* by the very narrow, lingulate valves bearing a single tooth at the base on each side.

*Etymology.* The specific epithet is derived from the Greek words *stenos* (narrow) and *glossa* (tongue), referring to the shape of the tip of the valves.

13. *Rumex tenax* Rech. f., Oesterr. Bot. Z. 84: 40 (1935). *Lectotype* (here selected): Narrabri, J. H. Maiden, November 1899, ex herb. Sydney (W).

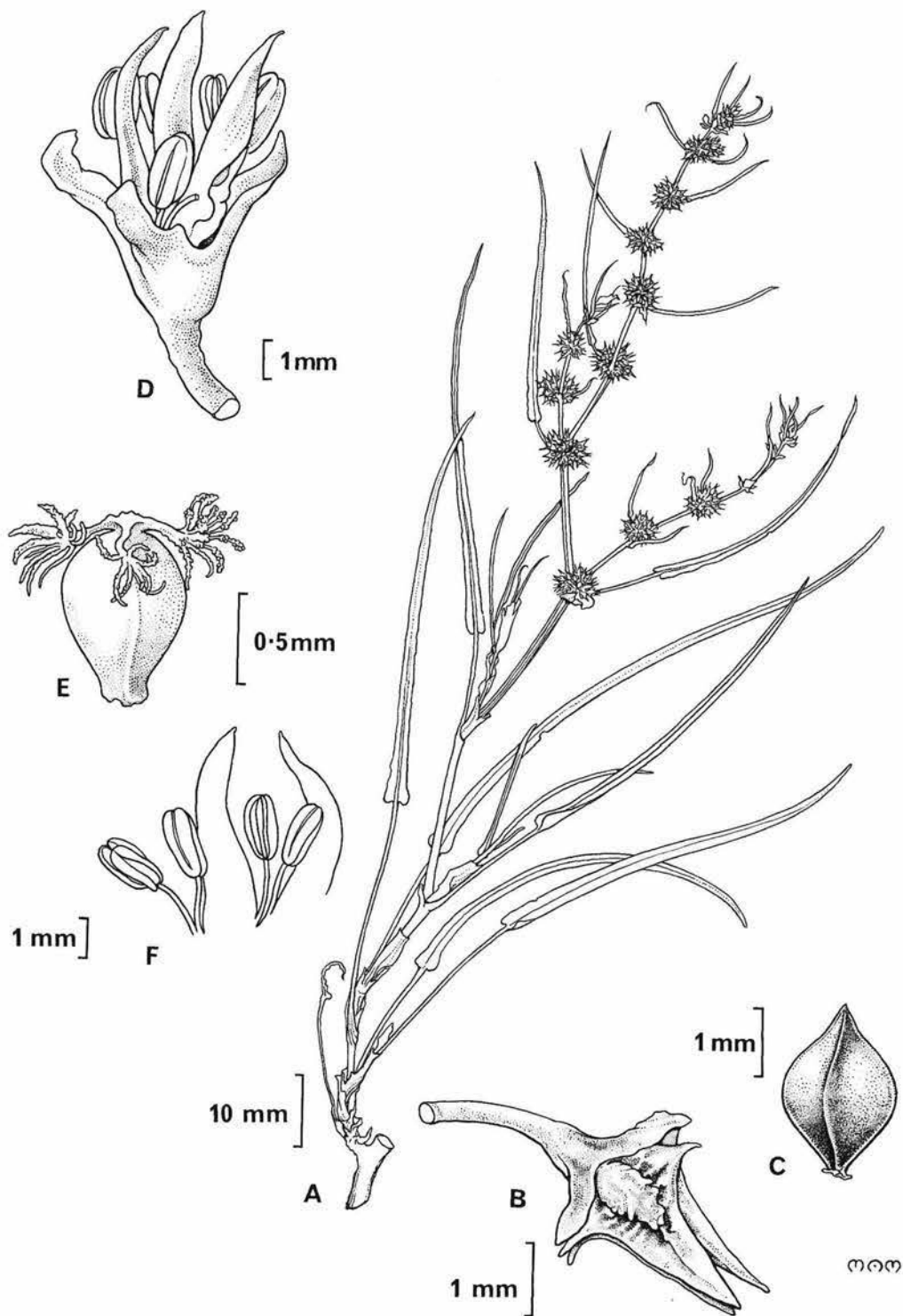


Figure 8. *Rumex tenax*. A—Habit. B—Fruit. C—Nut. D—Flower. E—Gynoeceium. F—Detail of anthers. Helen I. Aston 2184 (MEL).

Deep rooted *perennial*. Plants glabrous, smooth. *Stems* erect, wiry, 15-50 cm high, divaricately branched. *Basal leaves* with long and rigid petioles, narrowly linear, 90-160 x c. 5 mm, more or less indistinctly broadened at the base which is slightly obliquely truncate or more often broadly cuneate, apices very acute; *petioles* long, rigid; *stem leaves* up to 10 x 0.3-0.4 cm, very narrowly linear, 20-30 times as long as broad, flat or minutely crisped at the margin, base as on the basal leaves, *petiole* short; *upper stem leaves* diminishing in size, becoming still narrower. *Flower whorls* many flowered, dense, all distant, all with a narrow subtending leaf many times longer than the whorl. *Fruiting pedicels* articulate near the base, somewhat or up to 1.5 times longer than the fruiting perigone. Outer perigone segments c. 1.5 mm long. *Fruiting valves* 2.5-3 mm long, c. 1.5 mm broad near the base (excluding the teeth) apices straight and mucronate, surface of valve minutely pitted and with a single strong tooth on each side, all valves with a callosity. *Nuts* c. 2 x 2.25 mm. (Figures 3E and 8).

*Selected specimens examined.* QUEENSLAND: About 3 miles [4.8 km] SW Taroom (25°39'S, 149°48'E), R. W. Johnson 773 (BRI); Woodlands, about 40 miles [64 km] N Bungunya (28°26'S, 149°39'E), R. W. Johnson 1241 (BRI); 1 mile [1.6 km] W of Yelarbon 28°34'S, 150°45'E, L. A. S. Johnson & E. F. Constable s.n. (BRI); Roma, Maranoa district 26°35'S, 148°47'E, C. T. White 9545, (BRI, CANB); Cunnamulla, Warrego District, C. T. White 12020 (BRI).

NEW SOUTH WALES: Forbes 33°23'S, 148°01'E, September 1933, A. B. Cashmore s.n. (ADW); Lyneham Oval, Canberra, M. Gray 6280 (BRI); SW Tapiodam, Henshall 887 (NT); 29 miles [46.7 km] N of Stelman's Tank between Cobar and Bourke, C. W. E. Moore 4335 (CANB); 40 miles from Hay towards Balranald, 15 September 1965, M. E. Phillips s.n. (CBG); Kennedys Tank, 20 km N Broken Hill 31°34'S, 141°35'E, D. Symon 6735 (ADW, CANB).

VICTORIA: Northam Yarrowonga, in the railway yards 36°01'S, 146°00'E, Helen I. Aston 2184 (MEL); Wyperfeld Nat. Park within 3 miles [4.6 km] of Wonga Hut, A. C. Beaglehole 9537 (MEL); Johnson's Bend, Murray River near Mildura (20°29'S, 147°53'E), L. A. Craven 1582 (CANB, MEL); Charlton (158 miles NW Melbourne), 24 May 1964, R. V. Smith s.n. (MEL); c. 19 km SE Horsham 36°43'S, 142°12'E, D. E. Symon 9793 (ADW, CANB).

SOUTH AUSTRALIA: Lyrup, Southern Murray Region 34°16'S, 140°39'E, August 1922, H. W. Andrew s.n. (AD); Paringa near Renmark, 12 January 1884, M. Murray s.n. (AD); Mutooroo, just west of S.A. and N.S.W. border, c. 60 km WSW of Broken Hill, 1 May 1930, T. B. Paltridge s.n. (AD, CANB); Upper Murray River near 379 mile peg opposite Little Hunchee Island, D. E. Symon 11582 (ADW, CANB).

WESTERN AUSTRALIA: Merredin Research Station, March 1944, E. Langfield s.n. (PERTH).

*Distribution* (Figure 11B). *Rumex tenax* has an eastern Australian distribution roughly between 25°30' and 37°45'S and 139°30' and 152°30'E. Most localities are situated west of the Great Dividing Range.

As there appears to be considerable confusion between *R. tenax* and *R. crystallinus* the distinguishing features between these two species are given in the table below. Although the name *R. tenax* was correctly applied by both Beadle, Evans and Carolin (1972) and Burbidge and Gray (1970), Willis (1973) confused it with *R. crystallinus*. Many Australian herbarium specimens referable to these taxa have until now been wrongly named.

<i>R. crystallinus</i>	<i>R. tenax</i>
Annual	Perennial
Stem short, flexuose, ascendent, branching from the base or nearly so	Stem rather tall, somewhat wiry, erect, branches stiff, forming an open panicle
Colour of dry plant tending towards orange	Colour of dry plant never orange
Leaves broadly linear, all roughly crispate and long petiolate	Leaves very narrow, the narrowest of the whole genus, nearly grasslike, lower 3-4 (5) mm broad, upper 1-2 mm broad, flat, utmost border finely crispate
At least the upper whorls confluent	All whorls distant
Fruiting valves c. 2 mm long, barely 1 mm wide (excluding teeth) measured near the base, usually with 1(2) teeth of varying length on each side	Fruiting valves 2.5-3 mm long, c. 1.5 mm wide (excluding teeth) measured near the base, with a single strong tooth on each side

*Rumex tenax* evidently has no close relative but it can be regarded as a most remote representative of sect. *Australienses*. When describing *Rumex tenax* (1935a) I was in doubt about its duration. Judging from numerous sheets showing the basal, and in some cases even subterranean parts, it is now evident that it is a long lived perennial.

#### Subgen. *Rumex* sect. *Simplices* subsect. *Acrancistron*

**Subsect. *Acrancistron*** Rech.f., subsect. nov.

Perennis. Folia inferiora longitudine 2.5-4-plo longiora, basi cordata vel sinuato-truncata vel late cuneata, supra basin saepe  $\pm$  constricta. Pedicelli fructiferi valvis aequilongi vel eis ad duplo longiores, infra medium vel in tertia parte interiore articulati. Valvae nervo mediano incrassato provisae rarius subindistincte calliferae, utrinque hamato-pluridentatae, apice valvae quoque in dentem hamatum excurrente.—Typus subsectionis: *R. brownii* Campd.

*Perennials*. Lower leaves 2.5-4 times longer than broad, often slightly constricted above the base. *Fruiting pedicels* equalling the valves in length or up to twice as long, articulate below the middle or on the lower third; *central nerve of the valves* more or less thickened and sometimes with a more or less indistinct callosity, with several hooked marginal teeth and the apex ending equally in a hooked tooth.

14. ***Rumex brownii*** Campd., Monogr. *Rumex* 64, 81 (1819). *Typus*: "Ad portum Jackson", *R. Brown* (BM).

*R. fimbriatus* R. Brown, Prodr. Fl. Nov. Holl. 116 (1810) nec Poir.

*R. brownianus* Schult.f., Syst. Veg. VII, 2: 1395 (1830).

*Perennial. Stems* slender, 50-80(100) cm, ascendent, usually with few, elongate, leafless branches. *Basal leaves* variable in shape and size, oblong or lanceolate, base more or less cordate or sometimes truncate or broadly cuneate, usually panduriform, constricted above the base, up to 10(17) x 3(5) cm, slightly crispate at the margin, rarely flat, apices acute or subobtuse; *stem leaves* few and confined to the lower 1/3 of the plant, gradually becoming smaller and narrower and more acute. *Panicles* loose with very few, usually simple, elongate branches. *Whorls* few-flowered, with (5) 6(8) flowers, distant, without subtending leaves. *Fruiting pedicels* thin, as long as the valves or somewhat longer, rarely up to twice as long, articulate about 1/3 of their length. *Fruiting valves* (2.5)3(4) x c. 2 mm, triangular, strongly reticulate-nervose, dentate, teeth 3-5 on each side, all teeth as well as the apex hooked. *Nuts* c. 2 x 1.25 mm, broadest somewhat below the middle.  $2n = 20$  (tetraploid)—B. Briggs in sched., NSW 60878. (Figures 3A and 9A).

*Selected specimens examined.* QUEENSLAND: Outside Tennyson Powerhouse, Brisbane, 23 September 1968, A. A. Dowling s.n. (BRI); Indooroopilly 27°30'S, 152°00'E, L. Durrington 00149 (BRI); Between Holland Park and Mt Gravatt, near Brisbane, C. E. Hubbard 2730 (BRI); 28 miles [44.8 km] S of Roma on road to Surat, L. A. S. Johnson and D. F. Blaxell 1001 (NSW); Warrego River crossing, 1 km E of "Nombardie" 27°27'S, 145°53'E, R. W. Purdie 664D (BRI); Kingaroy, L. S. Smith 3091 (CANB); Mackay 21°10'S, 149°10'E, T. Stanley 78253 and E. Ross (BRI); Wallumbilla, May 1916, C. T. White s.n. (NSW).

NEW SOUTH WALES: 1 km W of Wee Waa in floodplain of Namoi River 30°13'S, 149°25'E, B. G. Briggs 4318a (NSW); 8 miles [12.9 km] NE of Dubbo on road to Mendooran, R. Coveny 2471 (NSW); Near Cobbitty trig, 5.5 km N of Cobbitty 33°59'S, 150°42'E, R. Coveny 7447, D. Benson and H. Bryant (NSW); Eremeran turn-off on Gilgunnia road, G. M. Cunningham and P. L. Milthorpe 1466 (NSW); 37 miles [59.5 km] N of Cobar on Louth road 31°07'S, 145°27'E, S. Jacobs 205 (NSW); Cookardina, E. J. McBarron 465 (NSW); 62 miles [99.7 km] E of Cobar on Barrier Highway, C. W. E. Moore 3919 (CANB); Floodplain of Darling River c. 15 km SW of Wilcannia 31°45'S, 143°15'E, K. Pajmans 3222 (CANB); Lake Eucumbene, 27 January 1965, M. E. Phillips s.n. (CBG); N end of Little Slope, Lord Howe Island, J. Pickard 2752 (NSW); CSIRO grounds, lower E slope of Black Mountain, R. Pullen 8646 (CANB); Tuross River Catchment area 36°11'S, 149°40'E A. and C. Tyrrel 48 (CBG); 10.5 km SE of Mungindi on Moree road 29°02'S, 149°05'E, K. L. Wilson 1882 (NSW); Royal Botanic Gardens, Sydney, K. L. Wilson 657 and J. Seur (NSW).

VICTORIA: Brisbane Ranges, 2-3 miles [3.2-4.8 km] NE of Durdidwarrah, J. Anderson 315 (AD); Valencia Creek, c. 18 km N of Maffra, H. I. Aston 2016 (MEL); Wyperfeld National Park, 3.5 miles [5.6 km] SW of Wonga Hut, A. C. Beaglehole ACB 28446 (MEL); 4 miles [6.4 km] NE of Hattah Lake, Kulkyne Forest, A. C. Beaglehole ACB 39221 and J. H. Willis (MEL); Between Halls Gap and Stawell, 12 November 1959, D. E. Symon s.n. (ADW); Hawkesdale, December 1901, H. B. Williamson s.n. (NSW); Geelong, January 1910, H. B. Williamson s.n. (CANB); Port Phillip Bay, McCrae foreshore, 24 February 1963, J. H. Willis s.n. (MEL).

TASMANIA: Devonport 41°09'S, 146°23'E, October 1943, W. M. Curtis s.n. (HO); Brown's River near Hobart 42°58'S, 147°20'E, 23 December 1944, W. M. Curtis s.n. (HO); George Town 41°10'S, 146°50'E, December 1955, W. M. Curtis s.n. (HO); Gordon Point, Channel Highway, R. Melville 2434, J. Willis and W. Curtis (MEL); Buckland 42°37'S, 147°43'E, 14 December 1978, B. Robinson s.n. (HO); River Jordan 42°44'S, 147°14'E, January 1893, L. Rodway s.n. (HO); Roden Island, Furneaux Group, J. S. Whinray 1320 (MEL); Deal Island, Kents Group, J. S. Whinray 1927 (MEL).

SOUTH AUSTRALIA: Big Heath National Park, c. 25 km SW of Naracoorte, *C. R. Alcock* 3062, 3083 (AD); SE slope to Boat Harbour Creek, between Cape Jervis and Victor Harbour, *Hj. Eichler* 14441 (AD); Kangaroo Island at mouth of Western River, *Hj. Eichler* 15361 (AD); c. 5 km SSE of Bascombe Well Homestead (c. 25 km WSW of Lock), *Hj. Eichler* 19285 (AD, MEL); Torrens Gorge, Mt Lofty Range, *A. G. Spooner* 262 (AD); River front at Overland Corner, *D. E. Symon* 3874 (ADW); S of Pitlockry, Lower Coorong 36°25'S, 139°46'E, *D. E. Symon* 10551 (ADW); NE of Kondoolka Homestead, Gawler Range, *J. Z. Weber* 3086 (AD); Mambray Creek, c. 40 km SSE of Port Augusta 32°50'S, 138°04'E, *D. J. E. Whibley* 4380 (AD); c. 35 km SSE of Yunta near Manunda, *P. G. Wilson* 2228 (AD).

NORTHERN TERRITORY: CSIRO paddock 23°48'S, 133°54'E, 19 July 1977, *D. J. Nelson* s.n. (NT)

WESTERN AUSTRALIA: Helena Bridge, June 1902, *C. Andrews* s.n. (PERTH); *C. Milton's* property, 3 km S of Mt Barker 34°38'S, 117°40'E, *K. F. Kenneally* 6494 (PERTH); *R. & D. Hurst's* property, Swamp Road, 60 km S of Jerramungup, *K. H. Rechinger* 60059 (PERTH, W); *M. Buxton's* property, 10 km W of Redmond (34°53'S, 117°42'E), *K. H. Rechinger* 60235 (PERTH, W); Margaret River, 13 January 1945, *R. D. Royce* s.n. (PERTH); *Buxton's Farm*, Hay River District 34°53'S, 117°34'E, 29 April 1981, *J. K. Scott* s.n. (PERTH).

*Distribution.* Australia (Figure 13A), New Zealand, Timor, New Guinea and Java. It is not known whether the Western Australia occurrences are natural or whether they are the result of human intervention. Rarely found as an alien in Europe.

The most outstanding character of *R. brownii* and the closely related *R. alcockii* are the hooked teeth on their valves. There is a group of African and Asiatic species, namely *R. nepalensis* Spreng. (see map 4, Rechinger 1932), *R. bequaertii* De Wildeman (Central and South Africa and Madagascar) and *R. steudelii* Hochst. (Central and South Africa) which share this character. However, these species differ from *R. alcockii* and *R. brownii* in having the tips of the valves pointed and straight, not pointed and hooked. It is open to question whether the character of hooked teeth is an expression of close relationship or whether it might have evolved convergently in Australia and in Africa and Asia.

There is a considerable range of morphological variation in *R. brownii* even after the removal of *R. alcockii* (see sp. 15 below). This variation involves the width and shape of the leaves and the size of the fruiting perigones.

A peculiar ecotype or geographical race occurs on the Yorke Peninsula and Kangaroo Island in South Australia and extends east to the Furneaux Group in Bass Strait. The plants are of low habit, 5-20 cm high, the flowering stems are unbranched and possess few stem leaves, the basal leaves are thickish, small, linear-oblongate or obovate, often constructed below the middle, and have a cordate base. The fruit on most specimens seen are not quite ripe but they seemingly hardly differ from typical *R. brownii*. Future visitors to this area should try to establish whether it is an ecotype or a geographical race. Pending further observations I refrain from assigning a formal rank to this interesting variant. The following specimens referable to this variant have been seen.

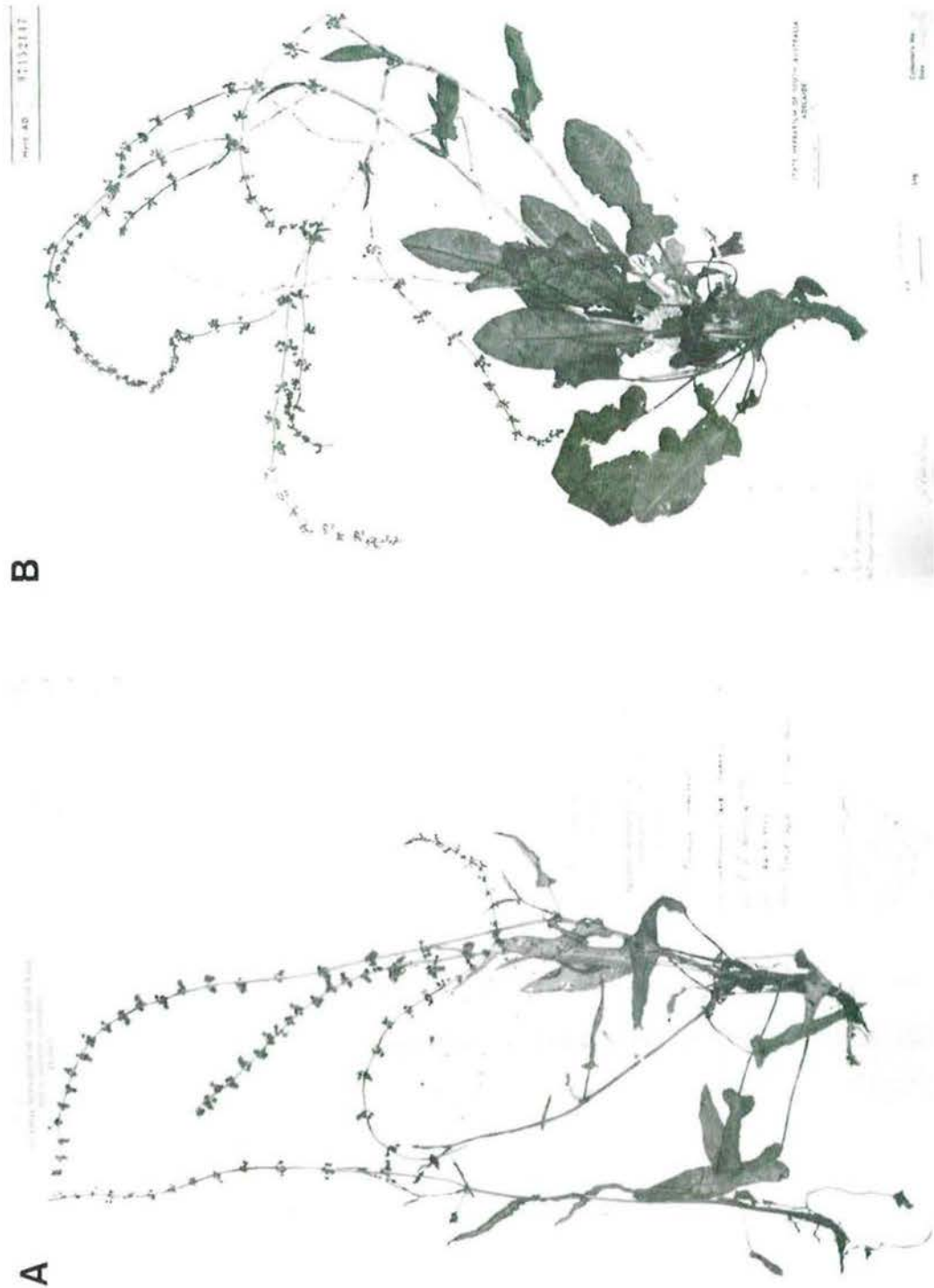


Figure 9. A—*Rumex brownii*. K. L. Solling 580 (NSW). B—*R. alcockii*. C. R. Alcock 3583 (AD).

VICTORIA: Lady Julia Percy Island, A. C. *Beaglehole* ACB 6650 (MEL)

TASMANIA: East Sister Island, Furneaux Group 39°40'S, 148°00'E, J. S. *Whinray* 9 (HO); Mount Chappell Island, Furneaux Group, J. S. *Whinray* 586 (HO).

SOUTH AUSTRALIA: Ardrossan, c. 90 km NW of Adelaide 34°26'S, 137°55'E, *Anon.* 341 (AD 97923135); Rocky River, Kangaroo Island, 19 November 1924, J. B. *Cleland* s.n. (AD); Stokes Bay, Kangaroo Island, A. B. G. *Trainee* 91 (AD); Rocky River, Kangaroo Island, J. R. *Wheeler* 1183 (AD).

15. *Rumex alcockii* Rech. f., sp. nov. (Figures 3C and 9B).

Perennis, 30-60 cm altus, ascendens vel  $\pm$  erectus, robustus, pauciramosus; rami elongati, subflexuosi, simplices. Planta exiccando bruneo-rufescens. Folia crassiuscula, in vivo evidenter subcarnosa, in sicco subcoriacea, oblonga vel oblongo-lanceolata; folia basalia petiolo quam lamina plerumque subaequante vel paulo tantum brevior suffulta, oblonga vel late oblongo-lanceolata, latitudine plerumque (2.5)3(3.5)-plo longiora, basi cordata vel sinuato-truncata, supra basin panduriformi-contracta, plana sed extremo margine leviter crenata vel subcrispata, apice obtusiuscula vel subacuta; folia caulina non numerosa, saepe in dimidia vel in tertia parte inferiore caulis sita, sensim brevius petiolata, minora, proportione angustiora et acutiora. Verticillastri multiflori, inferiores floribus 8-15, infimis folio diminuto exceptis omnia foliis fulcrantibus carentes. Pedicelli crassiuiculi, perigonium  $\pm$  aequantes vel paulo longiorus. Perigonii folia exteriora marginibus interiorum appressa,  $\pm$  2 mm longa. Valvae 4-4.5 mm longae crasse coriaceae, grosse reticulato-foveolatae; nervus medianus ceteris multo validior, in parte inferiore saepe in callum  $\pm$  distinctum fusiformem incrassatus; nervus in apicem valvae longe sensim attenuatum apice manifeste hamato-incurvum excurrens; dentes utrinque 3-4, apice manifeste hamati. Nux 2.8-3 mm longa.

*Typus*: S.A. Eyre Peninsula-Gawler Ranges, c. 32 km N Minnipa, P. G. *Wilson* 526 16.10.1958 (holo: AD).

*Perennial*. Plant turning reddish brown upon drying. *Stems* 30-60 cm high, ascendent or erect, robust, with few branches. *Leaves* thickish, *petioles*  $\pm$  equalling laminae in length; *laminae* of basal leaves oblong or broadly oblong-lanceolate, (2.5)3(3.5) times longer than broad, base cordate or sinuate-truncate, usually with a slight contraction above the base, mainly flat but minutely or slightly crenate or crispate at the extreme margin; *stem leaves* not numerous, usually situated in the lower half or third of the stem, smaller and proportionally narrower and more acute than the basal leaves. *Lower whorls* with 8-15 flowers, only the lowermost subtended by a leaf, the majority completely leafless. *Valves* 4.5-5 mm long, somewhat leathery, grooved, the central nerve thicker than the remainder and often with a distinct callosity near its base, prolonged at the apex into a distinct hook, 3-4 marginal teeth present and all equally hooked at the tip. *Nuts* 2.8-3 mm long.

*Selected specimens examined*. SOUTH AUSTRALIA: South of Bascombe Well, c. 115 km NNW of Port Lincoln, C. R. *Alcock* 1540 (AD); Coultla, South Eyre Peninsula, C. R. *Alcock* 2309 (ADW); Little Swamp, c. 10 km NW of Port Lincoln, Eyre Peninsula, C. R. *Alcock* 2524 (AD, ADW); Near Coomunga, c. 15 km NW of Port Lincoln, C. R. *Alcock* 2585, 2588 (AD, ADW); Hundred of Wangary, c. 30 km NW of Port Lincoln, C. R. *Alcock* 2748 (AD, ADW); Hundred of Warrow, c. 45 km NW of Port Lincoln, C. R. *Alcock* 2776 (AD); South Artaming Dam, Yardea Homestead, c. 210 km W of Port Augusta, C. R. *Alcock* 4179 (AD); Pondalowie, Innes National Park, 33°15'S, 136°55'E, C. R. *Alcock* 4921 (AD); c. 2 km W of Hiltaba Homestead,

c. 105 km NE of Streaky Bay Township, *B. J. Blaylock* 1976 (AD); Blinman, c. 80 km SE of Leigh Creek, 24 September 1956, *J. B. Cleland* s.n. (AD); Corunna, c. 5 km N of Iron Knob, c. 55 km NW of Whyalla, *W. L. Cleland* s.n. (AD); Yararoo Station, Kulpara, c. 110 km NW Adelaide, *B. Copley* 1627 (AD); Siccus River, Johnson's Pdk, Koonamore Station, c. 400 km NNE Adelaide, *M. Crisp* 696 (AD); Mt Remarkable Nat. Park, Mambray Creek 32°50'S, 138°04'E, *N. N. Donner* 4921 (AD); Mambray Creek, c. 45 km SE of Port Augusta, *Hj. Eichler* 17643 (AD); Southern face of Mt Yardea, c. 65 km NE Minnipa, *L. Haegi* 826 (AD, ADW); Oraparinna Nat. Park, c. 160 km NNE of Port Augusta, *E. N. S. Jackson* 1712, 1756 (AD); W of Arkarool Sanctuary Headquarters, c. 95 km ENE of Leigh Creek, *R. H. Kuchel* 2948 (AD); South side of Mt Serle which is c. 45 km E of Leigh Creek, *T. R. N. Lothian* 3117 (AD); Oratunga Station near Blinman, Flinders Range, *J. Ogden* ANU 18127 (CANB); c. 8 km WNW Mount Remarkable, *A. E. Orchard* 3265 (AD); Thurlga Station, c. 25 km W of Lake Gairdner south, *K. D. Rohrlach* 903 (AD); Hiltaba homestead, c. 105 km NE of Streaky Bay Township, *A. G. Spooner* 2327 (AD); Mambray Creek, *D. E. Symon* 755 (ADW); Balcanoona Station, *D. E. Symon* 3017 (ADW); Oraparinna National Park, *D. E. Symon* 7447 (ADW); ± 40 km SW of Yardea H. S. on road to Minnipa, *D. E. Symon* 8118 (CANB); Gourambulla Cave, Hawker, c. 90 km north east of Pt Augusta, *G. J. Telfer* 59 (AD); Oraparinna Nat. Park, c. 160 km NNE of Port Augusta, *J. Z. Weber* 2484 (AD); Melrose, on lower slopes of Mt Remarkable 32°49'S, 138°11'E, *P. G. Wilson* 2779 (AD).

*Distribution* (Figure 13B). The new species is restricted to the Eyre Peninsula-Flinders Range area of South Australia. It occurs at the western end of the range of *R. brownii* in that State.

*Rumex alcockii* is closely related to *R. brownii* Campd. in that the teeth on the margin as well as at the tip of the fruiting valves all end in a hook and by the lowermost floral whorls only being subtended by a leaf. *Rumex alcockii* is distinguished from *R. brownii* by a number of correlated characters, viz. its vigorous growth, its thick, short leaves, the lower ones on average being only 2.5-3 times as long as broad, its more numerous flowers per whorl (8-15 in *R. alcockii*, (5)6(8) in *R. brownii*) and its larger fruiting valves (4.5-5 mm long in *R. alcockii*, (2.5)3(4) mm in *R. brownii*).

*Etymology*. The species is named in honour of C. R. Alcock, Pest Plants Commission, South Australian Department of Agriculture. The segregation of this new species from *R. brownii* was made possible through an instructive set of specimens gathered by Alcock, viz. nos. 1540, 2309, 2524, 2585, 2588, 2748 and 4179 (all AD).

#### Subgen. *Rumex* sect. *Simplices* subsect. *Maritimi*

16. *Rumex crystallinus* Lange, Index Sem. Hort. Haun. 28(1861). *Typus*: A specimen cultivated in Copenhagen Bot. Garden (holo: C).

*R. halophilus* F. Muell., *Fragm. Phytogeogr. Austral.* 4: 48(1863).

*Annual*, 6-40 cm high, becoming orange-reddish when dry. *Stems* usually low, flexuose, ascendent, often bearing flowers from the base; habit variable according to humidity, rarely luxuriant. *Basal and lower stem leaves* up to 6 x 0.8 cm, ± papillose below, all long petiolate, linear with obtuse basal lobe, margins strongly crisped, apices acute. *Flower whorls* many flowered, all distant and subtended by linear, erose leaves, sometimes the upper ones close together. *Fruiting pedicels* equalling the fruiting perianth or up to 1.5(2) times longer, filiform, articulate near the base.

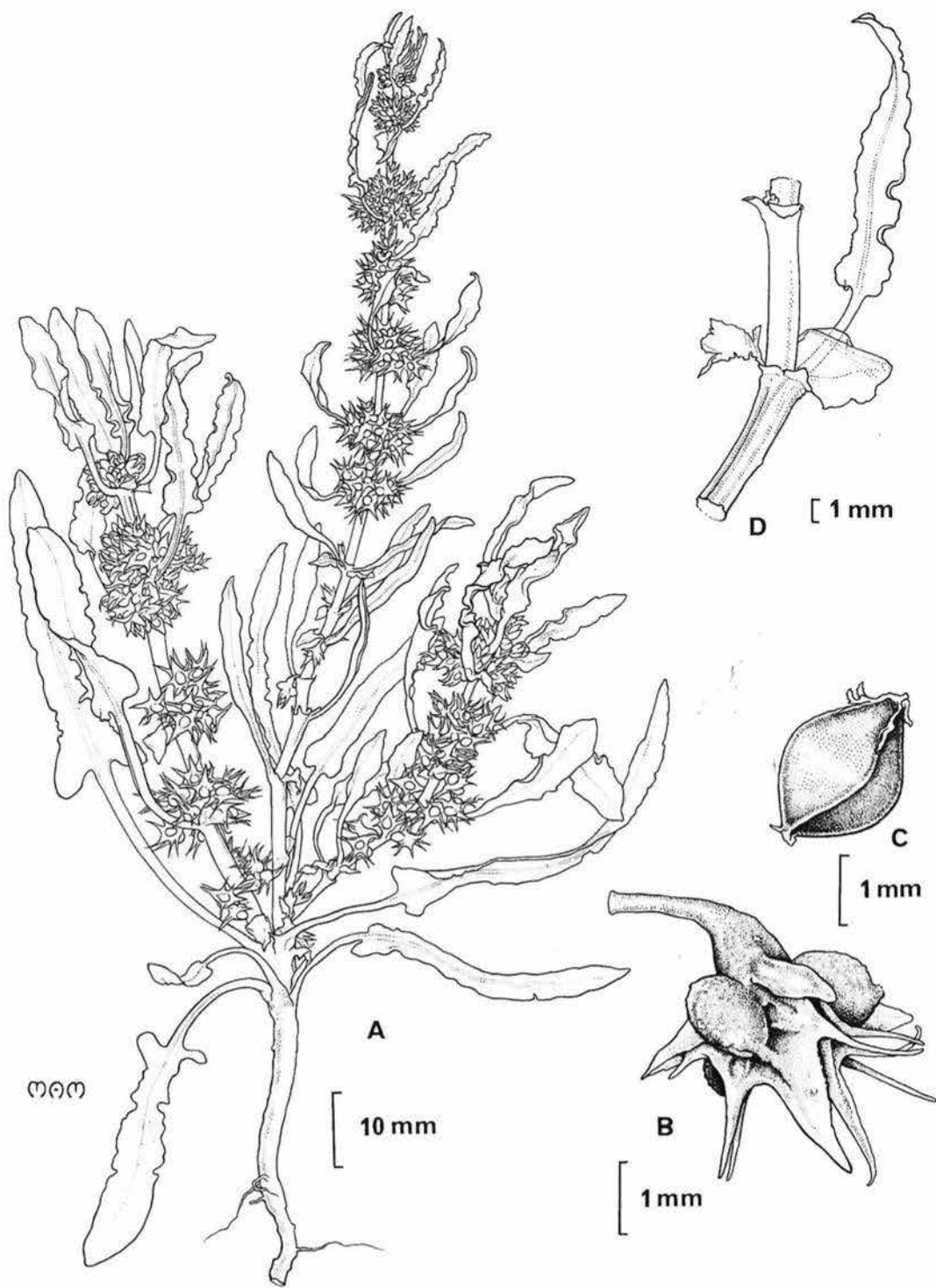


Figure 10. *Rumex crystallinus*. A—Habit. B—Fruit. C—Nut. D—Stem segment and leaf. T. R. N. Lothian & D. E. Francis 480 (AD).

*Fruiting valves* c. 2 mm long, barely 1 mm broad (excluding the teeth) at the base, each valve with a callosity and with 1(2) teeth of varying length on either side, apices narrow and acute. *Nuts* c. 1 x 0.5 mm. (Figures 3B and 10).

*Selected specimens.* QUEENSLAND: Nive Tank about 30 miles N of Augathella, May 1939, *S. L. Everist* s.n. (BRI); Diamantina River, 1.5 miles [2.4 km] west of Roseberth Homestead c. 20 km N South Australian border, *R. Filson* 3348 (AD); Campsite at Diamantina River north bank, just north of Queensland/South Australian border, *T. R. N. Lothian* and *D. E. Francis* 516 (AD).

NEW SOUTH WALES: Willow Point Station, Darling River 33°20'S, 141°46'E, 18 March 1959, *L. A. S. Johnson* and *E. F. Constable* s.n. (NT); Mount Mulyah, about 60 miles NW of Louth, *C. W. E. Moore* 6348, 6352 (CANB); NE side of Fort Grey Basin, Sturt National Park 29°06'S, 141°14'E, *K. L. Wilson* 652 (BRI).

VICTORIA: Hattah Lakes National Park, Hattah Lake, *A. C. Beauglehole* 968 (MEL).

SOUTH AUSTRALIA: Yardea Station c. 210 km W of Port Augusta, 6 October 1972, *C. R. Alcock* s.n. (AD); Murbko Flat, 15 km S Morgan 34°08'S, 139°39'E, 21 February 1973, *R. J. Chinnock* s.n. (AD); Dolabarinna crossing on Warburton River 27°45'S, 138°13'E, *E. N. S. Jackson* 2661 (AD); 2 miles [3.2 km] S of Queensland/South Australian border, *T. R. N. Lothian* and *D. E. Francis* 479, 480 (AD); Bookaloo Dam c. 75 km NW Port Augusta, 6 April 1930, *B. J. Murray* s.n. (AD); Lake Paddock, Koonamore c. 60 km north of Yunta, 1 March 1930, *T. B. Paltridge* s.n. (AD); Near Tinga Tingana on the Strezelecki Creek, *D. E. Symon* 5671 (ADW, CANB); The Diamantina c. 40 km S of Birdsville 26°21'S, 139°31'E, 25 August 1975, *J. Z. Weber* s.n. (AD); c. 50 km NW Andamooka 30°05'S, 136°55'E, *J. Z. Weber* 5870 (AD).

NORTHERN TERRITORY: Curlew Waterhole, Lander R., 70 km NW Willowra H.S. 20°33'S, 132°07'E, *G. Chippendale* 4803 (AD, MEL, NT); Mayfield Swamp, Andado Station 25°48'S, 135°16'E, *T. S. Henshall* 1483 (AD, CANB).

WESTERN AUSTRALIA: Lyndon River about 16 miles inland 23°32'S, 114°50'E, 1885, *H. S. Carey* s.n. (MEL).

*Distribution* (Figure 14). All mainland States in arid/semiarid areas.

*Rumex crystallinus*, the only annual Australian *Rumex*, undoubtedly belongs to subsect. *Maritimi* Rech. f. (1937). This subsection is characterized by annual growth, small valves usually with long teeth and all bearing a callosity. The distribution of the subsection is world wide. Each continent has one or several endemic species. Ecologically all *Maritimi* grow on temporarily flooded depressions or along riversides. None are weeds.

*Rumex crystallinus* has up till recently been confused with *R. tenax* which from my standpoint is neither similar nor related. The distinctive characters have been pointed out in detail under *R. tenax* (sp. 13 above).

#### Subgen. *Platypodium*

17. \**Rumex bucephalophorus* L., Spec. Plant. 336 (1753). *Typus*: "Hab. in Italia".

For Synonymy see Rechinger 1939.

*Annual* (ours). *Stems* 5-20 cm high, single or several, thin, ± branching. *Basal leaves* small, up to 2 cm long, petiolate, ovate or spatulate, flat. *Flower whorls* few flowered, (1)2-3(4). *Flowers* mostly dimorphic or at least in part supported by

normal thin pedicels, in part by elongate broadened and flattened pedicels broader than the fruit. *Valves* minute, dentate, bearing a small reflexed callosity. *Nuts* 1.3-2.3 mm long. (Figure 3D).

*Selected specimens examined.* WESTERN AUSTRALIA: Yallingup, 5 November 1963, *R. Bettenay* s.n. (PERTH).

*Distribution.* Mediterranean area (see Rechinger 1939). Rarely as an alien elsewhere.

*Rumex bucephalophorus* is a highly polymorphic species which has been divided into seven subspecies (Rechinger 1939) which are confined to various parts of the Mediterranean and Macaronesia. The Australian specimen(s) are not complete enough to be assigned to a certain subspecies but they probably belong to subsp. *hispanicus* (Steinh.) Rech.f.

### Hybrids

18. *Rumex xcomaumensis* Rech.f., hybr. nov. (= *R. bidens* R.Br. x *R. brownii* Campderá).

Perennis. Caulis decumbens vel ascendens, irregulariter pauciramosus, nodis inferioribus radicanibus, internodiis inferioribus fistulosis; rami elongati, flexuosi. Folia longe petiolata, inferiora 8-10 x 2-3 cm, oblongo-linearata, basi late oblique cuneata, interdum subdilatata, margine plana, apice acuta; folia superiora brevius petiolata, anguste lineari-lanceolata, 8-15 x 0.8-1 cm, apicem versus longissime sensim attenuata. Florum verticillastri infimi et medii foliis angustissime linearibus suffulti, 6-10-flori. Pedicelli fructiferi tenues, irregulares, perigonium aequantes usque eo sesqui, vel exceptione usque duplo, longiores. Valvae fructiferae irregulariter evolutae, ad summum 5 x 3 mm (dentibus lateralibus exclusis) coriaceae irregulariter crasse calliferae, paucifoveolato-reticulatae, ambitu subrhombico-triangularis, utrinque dentes plerumque 2-3, validos divergentes latitudinem valvae subaequantis proferentes; dentes et apex valvae apice pro parte quidem subhamati. Nux plerumque non vel incomplete evoluta.

*Typus:* Comaum area, c. 20 km N Penola, South Australia, comm. *Miss Hunt* No. 4 (holo: AD).

*Other specimens examined.* SOUTH AUSTRALIA: On way from Wolseley to Comaum (Wolseley is c. 95 km N Comaum which is 65 km N of Mount Gambier), *K. M. Alcock* 196 (AD); South Australia, South East, *K. M. Alcock* 37 "grows near swamps and looks like a hybrid between *R. bidens* and *R. brownii*" (AD).

*Rumex xcomaumensis* seems to be a hybrid, its parents are probably *R. bidens* R. Brown and *R. brownii* Campd. Fertility is evidently much reduced. The habit, a creeping radican stem with erect rather short inflorescences and also to a certain extent the leaves, are reminiscent of *R. bidens*. The slender pedicels and the more numerous, often slightly hooked teeth suggest *R. brownii* as the other probable parent.

The two Alcock specimens listed above are similar in most respects but they differ slightly from the type in that their lowermost whorls are subtended by a leaf and the tubercles on their valves are somewhat less pronounced.

This is the first recorded hybrid between two indigenous Australian species of *Rumex*.

19. ***Rumex xjohannis-moorei*** Rech. f., hybr. nov. (= *R. brownii* Campderá x *R. crispus* L.)

Perennis. Caulis erectus, in parte superiore pauciramosus. Folia emarcida. Florum verticillastri multiflori. Pedicelli fructiferi tenuiter filiformes, inaequilongi, in quarta circiter parte inferiore articulati, quam valvae duplo usque fere quadruplo longiores. Valvae ambitu et magnitudine variables, cordato-triangulares, valde inaequaliter calliferae, apice partim quidem  $\pm$  productae, longitudine interdum latiores, margine irregulariter denticulatae. Nux saepe saepius incomplete evoluta.

*Typus*: 60 km S of Jerramungup, Swamp Road, property of R. D. Hurst, on field borders, 8.12.1982, *Rechinger f.* 60063 (holo: PERTH; iso: W).

*Rumex xjohannis-moorei* was recognized by John Moore as a hybrid. It was found in association with *Rumex crispus* while *R. brownii* grew nearby. It is intermediate in habit, is of more vigorous growth and is more profusely branched than *R. brownii*, but the branches are more patent, more elongate and more flexuose than in *R. crispus*. The pedicels are of very unequal length but in proportion to the valves on average are longer than in *R. crispus*. The valves are in general appearance more similar to *R. crispus* but smaller and of very unequal size and shape and  $\pm$  irregularly denticulate near the base; the callosities are very irregularly developed. The degree of sterility seems to be rather high, a considerable number of flowers have set no fruits at all, in some of them the nuts have reached their full size but usually they can be compressed and seem to be not viable.

*R. brownii* x *R. crispus* is the first recorded spontaneous hybrid between an indigenous and an alien species. It is named after its discoverer, Mr John Moore of the W.A. Department of Agriculture (Albany branch), who has undertaken a special study of *Rumex* in the Albany region. John guided my wife and myself on several excursions in the Albany region in December 1982.

20. ***Rumex xschulzei*** Hausskn. (= *R. conglomeratus* Murr. x *R. crispus* L.) Mitt. Geogr. Ges. (Thüringen) Jena 3: 68 (1885). *Typus*: Several syntypes from Germany: Thüringen, *Haussknecht* (JE).

In habit closer to *R. crispus* but panicle less strict, flower whorls more distant and at least in the lower half of branches subtended by a leaf. Valves entire, much smaller and especially narrower than in *R. crispus*.

Known from only one locality, viz. Western Australia, 5 km N of Brennan's Ford along Scott River Road NE of Augusta, *K. H. Rechinger* 59864 (PERTH, W).

21. ***Rumex xmuretii*** Hausskn. (= *R. conglomeratus* Murr. x *R. pulcher* L.), Mitt. Geogr. Ges. (Thüringen) Jena 3: 73 (1885). *Typus*: Switzerland, Lausanne, *Haussknecht* (JE).

Not easily recognized because both parents have divaricate branching panicles and distant floral whorls which are mostly subtended by a leaf. Valves smaller than *R. pulcher* with less pronounced teeth.

Recorded from the following Western Australian localities: 5 km N of Brennan's Ford along Scott River Road, NE Augusta 34°13'S, 115°16'E, K. H. Rechinger 59864, 59866 (PERTH, W); 5 km NE of Narrikup on Yellanup Road to Porongurup Range, K. H. Rechinger 60242 (PERTH, W).

22. ***Rumex xpratensis*** Mertens & Koch, (= *R. crispus* L. x *R. obtusifolius* L.), *Deutschl. Flora* 2: 609 (1826). *Syntypi*: Thüringen, Wallroth; Heidelberg, Dierbach; Darmstadt, Borkhausen; Westfalen, Bönninghausen (location of specimens unknown).

Intermediate in habit between the parents or sometimes more similar to *R. crispus*. Compared with *R. crispus* the leaves are less crispate or only slightly undulate, they are broader and truncate or the lower ones slightly cordate. The valves are more or less intermediate in shape between the parents, they are always much broader than in *R. obtusifolius* and with shorter teeth; the tips of valves are slightly triangular to tongue-shaped.

*Specimens examined*. QUEENSLAND: Outside Tennyson Powerhouse, Brisbane, 23 September 1968, A. A. Dowling s.n. (BRI)

NEW SOUTH WALES: Orange, 15 January 1951, R. C. Madsen s.n. (NSW); Bulga Service Station on the Windsor-Singleton Road, R. Coveny 6531 and J. Powell (NSW)

VICTORIA: Orbost, in garden, c. 1937, F. Robbins s.n. (MEL).

SOUTH AUSTRALIA: Shores of Brown Lake, Mt Gambier, D. E. Symon 1188 (ADW); Mt Lofty Botanic Garden, J. R. Wheeler 328 (AD).

WESTERN AUSTRALIA: Robinson Estate, SW of Albany, K. H. Rechinger 60017 (PERTH, W).

This is the most frequent hybrid of *Rumex* and it can be found nearly everywhere where the parents grow together.

23. ***Rumex xpseudopulcher*** Hausskn. (*R. crispus* x *R. pulcher* L.), *Mitt. Bot. Ver. (Thüringen)* Jena 11: 60 (1897). *Typus*: Greece, Thessalia: Orman Magula, Haussknecht (JE).

Usually more similar to *R. crispus* in habit, but pedicels shorter, nervation of valves more pronounced and the margin dentate. Leaves truncate or subcordate at the base, less crispate than in *R. crispus*.

Valves similar to those of *R. crispus* x *R. obtusifolius* but with shorter pedicels, stronger reticulation and the valve tip usually less, or not at all, protracted.

*Specimens examined*. WESTERN AUSTRALIA: 5 km N of Brennan's Ford along Scott River Road, NE Augusta 34°13'S, 115°16'E, K. H. Rechinger 59865 (PERTH, W); Denmark, along road to Agricultural Experimental Station 34°57'S, 117°21'E, K. H. Rechinger 60139 (PERTH, W); Narrikup, 30 km N of Albany to Mt Barker 34°46'S, 117°42'E, K. H. Rechinger 60239 (PERTH, W).

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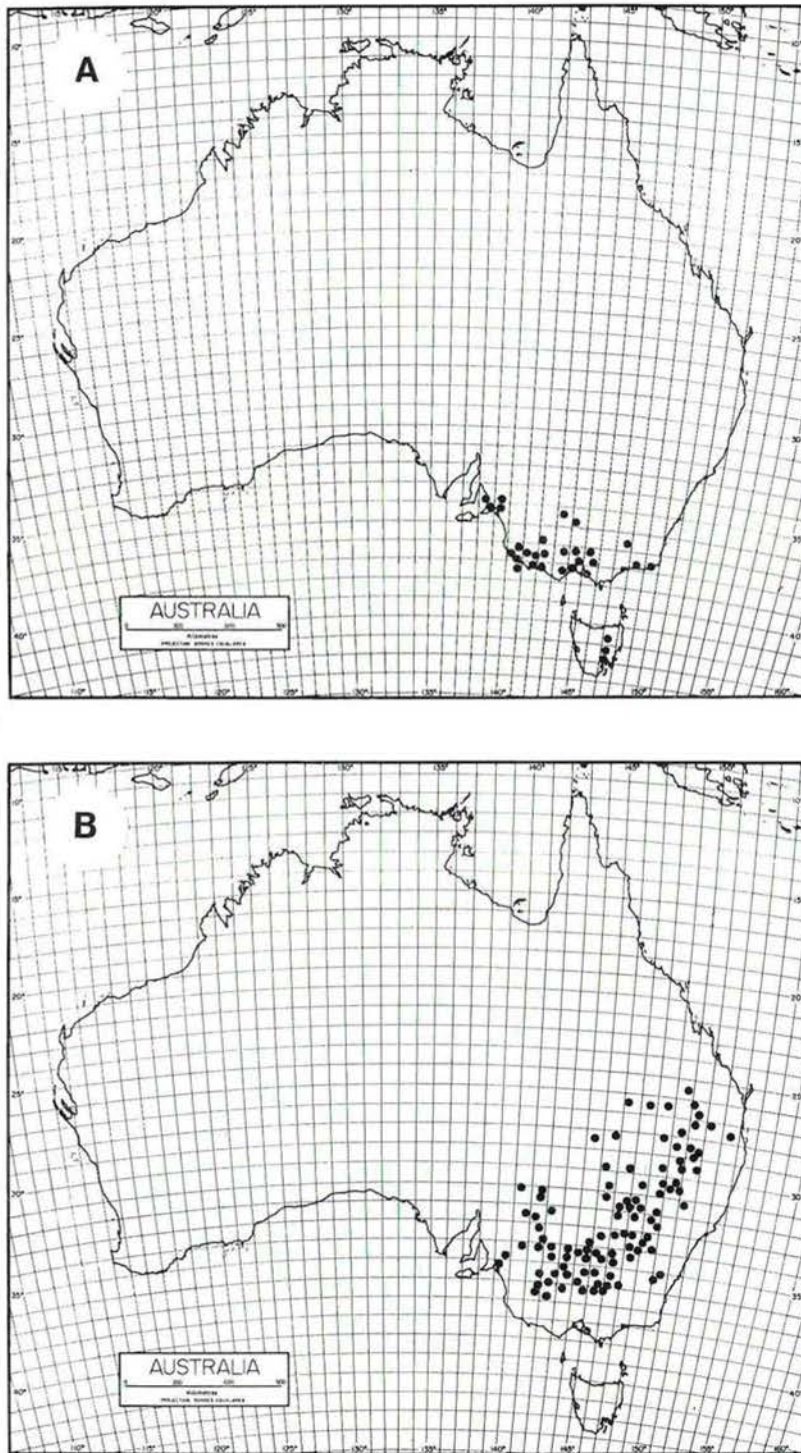


Figure 11. A—Distribution of *Rumex bidens*. B—Distribution of *R. tenax*.

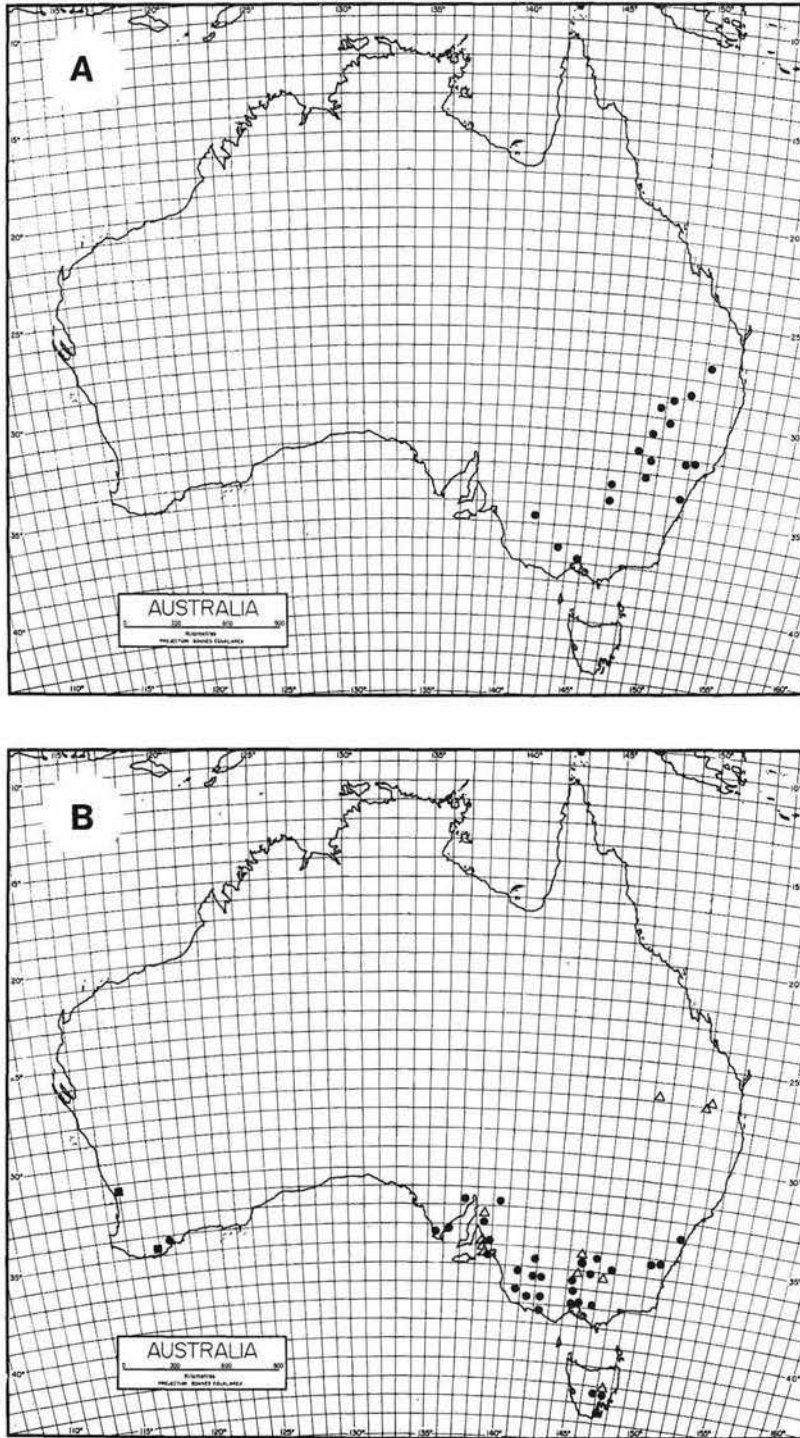


Figure 12. A—Distribution of *Rumex stenoglottis*. B—Distribution of *R. dumosus* var. *dumosus* (●), *R. dumosus* var. *dumosiformis* (△) and *R. drummondii* (■).

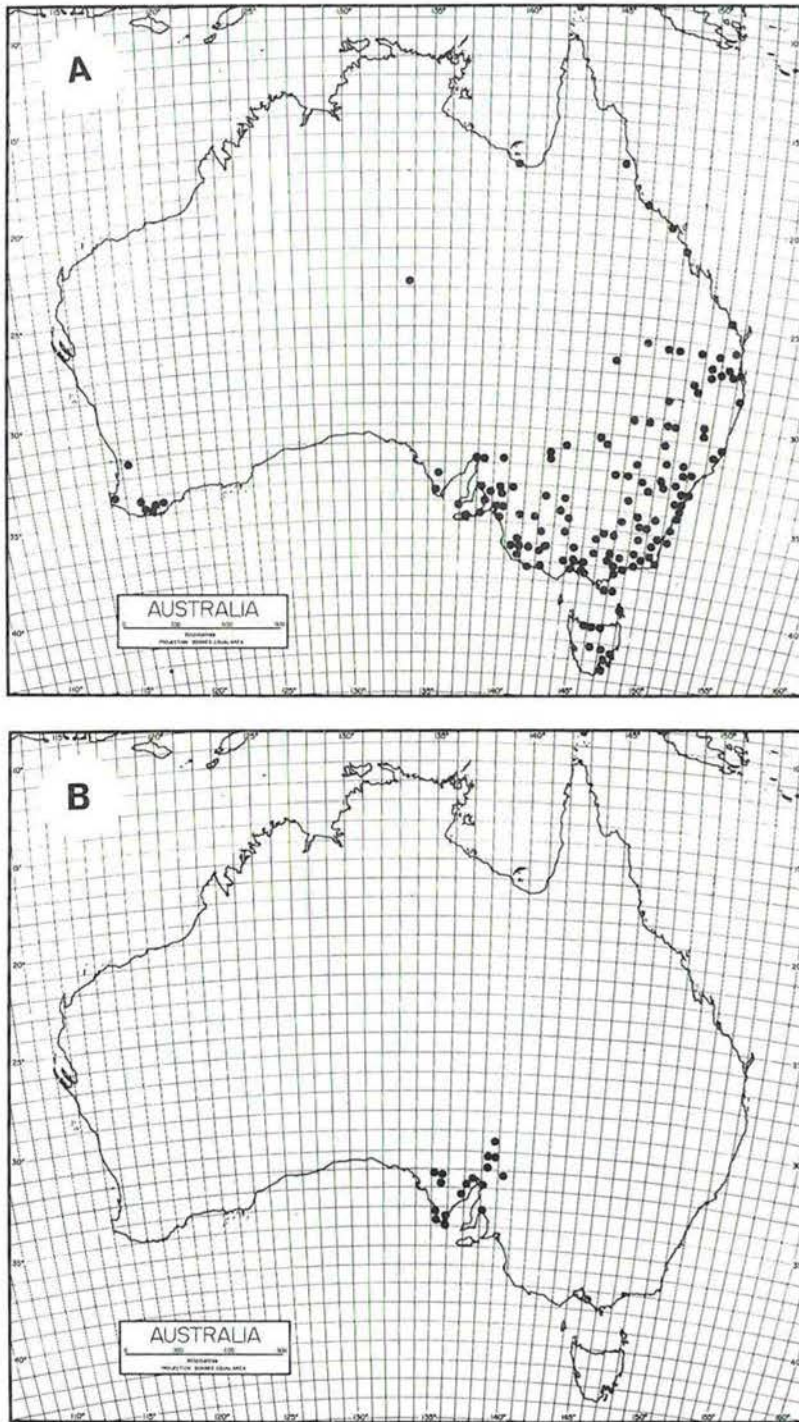
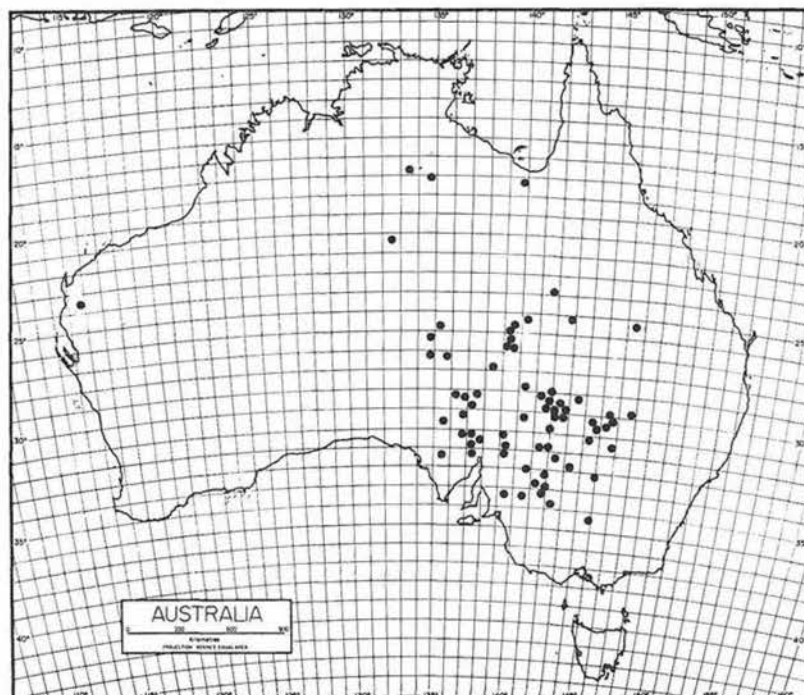


Figure 13. A—Distribution in Australia of *Rumex brownii*. B—Distribution of *R. alcockii*.

Figure 14. Distribution of *Rumex crystallinus*.

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