

***Brachysola* (Lamiaceae: Prostantheroideae), a new
Western Australian genus**

B.L. Rye

Western Australian Herbarium, Department of Conservation and Land Management,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983

Abstract

Rye, B.L. *Brachysola* (Lamiaceae: Prostantheroideae), a new Western Australian genus. *Nuytsia* 13(2):331–338(2000). *Brachysola* Rye is described as a new genus, based on *Chloanthes* sect. *Brachysolenia* F. Muell. but with a simplified name. It belongs in Lamiaceae subfamily Prostantheroideae, resembling the genera of tribe Westringieae in its fruit but appearing more similar to tribe Chloantheae in its inflorescence, and is unique in having stellate hairs. *Brachysola* comprises two species and occurs in the south-west of Western Australia. A lectotype is chosen for the type species, *Brachysola halganiacea* (F. Muell.) Rye, which is known from only three collections and has been placed on the Priority Flora List. The other species, reinstated here with the new combination *Brachysola coerulea* (F. Muell. & Tate) Rye, is known from many specimens over a much wider area.

Introduction

The new genus described here was first recognized as a distinct entity by Mueller (1876), who named it *Chloanthes* sect. *Brachysolenia*, distinguishing its only known member, *Chloanthes halganiacea*, from typical *Chloanthes* species by its different corolla shape. Diels & Pritzel (1904) transferred the section to *Pityrodia* R. Br. and recognized two species. Munir (1979) recognized only one species and did not maintain the section. However, he noted several further unique features of this group in comparison with other species placed in *Pityrodia*, these being the absence of hairs on the ovary and inside of the corolla tube, the lack of basal appendages on the anthers and anther dehiscence occurring “sooner after the flowers open than in other species” Munir (1979: 38).

Recent work has shown that this plant group is very distinct and needs to be removed from *Pityrodia*. A cladistic study based on morphological characters (Cantino 1992) has indicated that *Pityrodia*, as traditionally accepted, is polyphyletic, with *Pityrodia halganiacea sens. lat.* (i.e. section *Brachysolenia*) forming a sister group to all other members of tribe Chloantheae and being closer than they are to tribe Westringieae. This has been strongly supported by a cladistic study based on DNA sequences (Olmstead *et al.* 1999), which has provided a more objective indication of relationships. Even after removal of sect. *Brachysolenia*, *Pityrodia* appears to be polyphyletic, the cladistic studies suggesting that *Pityrodia*, or at least part of it, needs to be united with *Chloanthes* R. Br. and *Hemiphora* (F. Muell.) F. Muell.

Section *Brachysolenia* is raised here to the generic level and its name shortened to make it easier to pronounce. The new genus belongs in Lamiaceae subfamily Prostantheroideae (often previously referred to by its synonym Chloanthoideae) and appears to be somewhat intermediate in morphology between the two tribes Chloantheae and Westringieae. However the molecular data (Olmstead *et al.* 1999) clearly place the genus in tribe Choantheae.

Taxonomy

Brachysola Rye, *nom. et stat. nov.*

Chloanthes sect. *Brachysolenia* F. Muell. (Mueller 1876: 14–15). – *Pityrodia* sect. *Brachysolenia* (F. Muell.) E. Pritz. (Diels & Pritzel 1904: 515). *Type: Chloanthes halganiacea* F. Muell. [= *Brachysola halganiacea* (F. Muell.) Rye].

Shrubs with non-glandular stellate hairs on the stems and leaves, and with a mixture of non-glandular stellate hairs and simple glandular hairs on vegetative parts of the inflorescence and on the outside of the flowers; stellate hairs with the branches spreading and usually longer than the patent stalk; glandular hairs patent, the stalk comprised of a number of large cells, the terminal gland forming a capitate apex. *Young stems* terete, densely hairy. *Leaves* opposite or in near-whorls, sessile, densely hairy on undersurface. *Inflorescence* a terminal panicle of 1–7-flowered cymes. *Calyx* 5-lobed, with a similar indumentum to that of the pedicels outside and distally inside (on the upper part of the lobes), glabrous inside the tube and base of the lobes, persistent in fruit but scarcely enlarged; lobes more or less triangular, about as long as or longer than the tube, acute. *Corolla* 5-lobed, broader than long when fully opened, largely bluish purple with the base more deeply coloured surrounding a yellow viscid centre; tube shorter than the lobes, with a narrow tubular base and a broad spreading upper portion, glabrous inside; lobes spreading, the lowest (abaxial) one largest, the other two pairs of lobes about equal, variable in shape, commonly broadly ovate to broadly obovate, obtuse. *Stamens* 4, somewhat didynamous, the lower pair usually with a slightly longer filament than the upper pair, inserted almost at the base of the corolla within the narrow basal portion of the tube, glabrous, yellow; filament somewhat thickened above the middle but otherwise filiform; anther of two broad parallel lobes, dorsifixed near the base, lacking appendages, each lobe longitudinally dehiscent. *Ovary* 4-celled, with 1 ovule in each cell, glabrous, with scattered sessile glands on the summit, dark purple. *Style* terminal, arising at summit of ovary but its insertion point becoming exceeded by the 4 fruitlets surrounding it at maturity, long-exserted, filiform, 2-lobed at apex, glabrous, purplish; lobes closely adherent at first, separating at maturity, each with a terminal stigma. *Fruit* a schizocarp, distinctly 4-lobed, separating into four 1-seeded fruitlets (mericarps), enclosed in the calyx; mericarps indehiscent, hard, the outer surface reticulate-patterned and brown turning to black, with a paler hard compartment on the inside enclosing soft tissue; seeds somewhat flattened and strongly incurved around the inner compartment, soft, white.

Size and distribution. A genus of two species, restricted to the south-west of Western Australia. It occurs in the central-eastern part of the South West Botanical Province and in the western part of the South-western Interzone, its northernmost known extent not far south of the Eremean Botanical Province. Figure 1 shows the distributions of both species.

Etymology. From the Greek words *brachys* – short and *solen* – pipe or channel, referring to the short tubular basal portion of the floral tube. To make it less cumbersome, this name has been shortened by removal of two syllables from *Brachysolenia* to *Brachysola*.

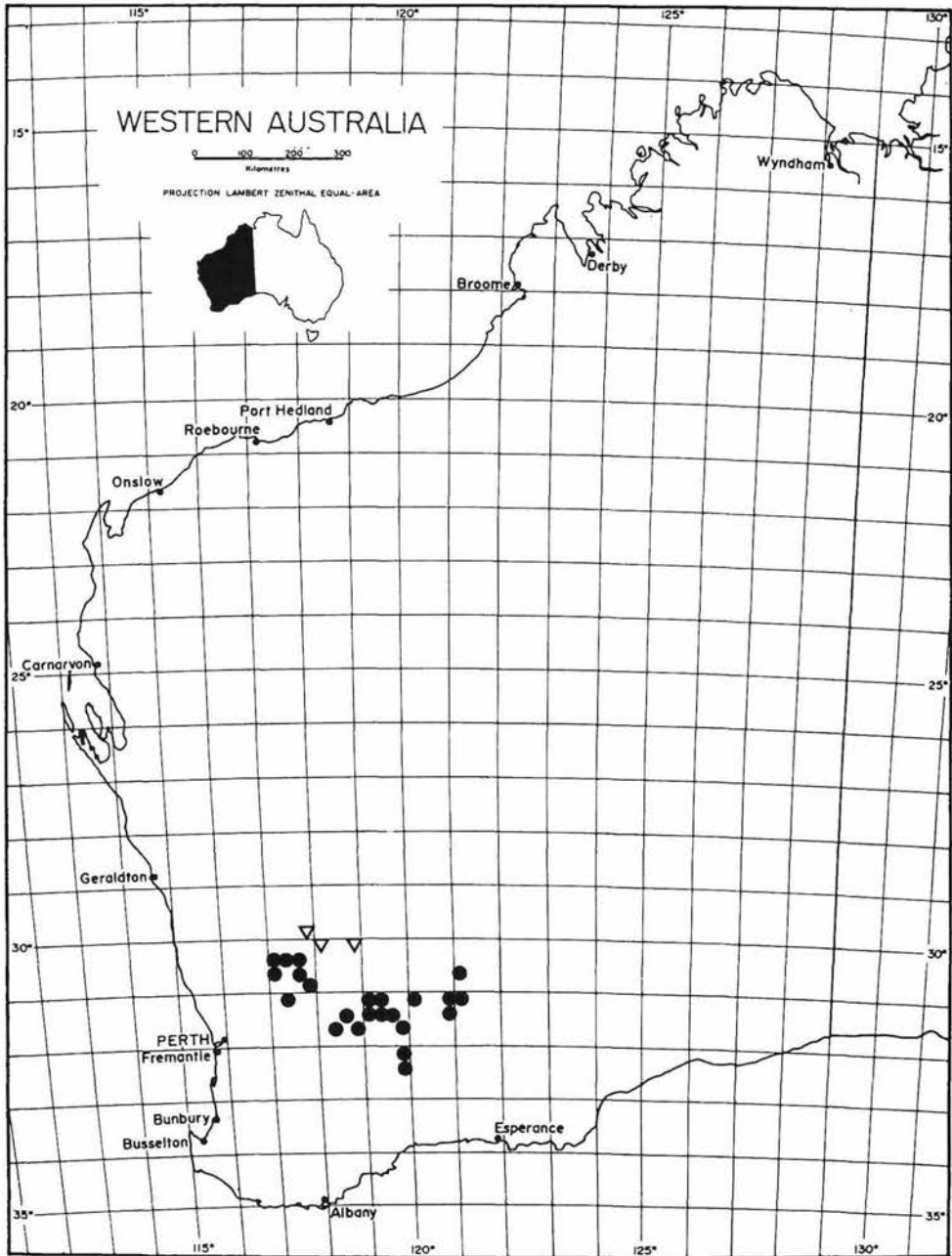


Figure 1. Distribution of *Brachysola coerulea* ● and *Brachysola halganiacea* ▽ .

Notes. *Chloanthes* sect. *Brachysolenia* F. Muell. is not a *nom. inval.* as indicated by Chapman (1991: 703), but the brief description of the new section is readily overlooked as it is given in a note that happens to appear alone on the next page following the description of the type species.

Since *Brachysola* has previously been placed in *Chloanthes* and *Pityrodia*, a list of the main morphological differences between *Brachysola* and the *Pityrodia* group is given in Table 1 to emphasize how inappropriate that placement was. In view of the great morphological variability in the *Pityrodia* group, the number of clear-cut differences in the table is surprisingly large and leaves no doubt as to the distinctiveness of *Brachysola*.

Table 1. Morphological differences between *Brachysola* and the *Pityrodia* group (including *Chloanthes* and *Hemiphora*).

Character	<i>Brachysola</i>	<i>Pityrodia</i> group
branched hairs	stellate	dendritic
corolla		
shape	widely spreading	more tubular
indumentum inside	absent	present
stamen insertion	very near base	towards centre of tube
anthers		
attachment	near base	almost central
basal appendage	absent	present
ovary	glabrous	hairy
fruit		
number of fruitlets	4	2 (or fruit indehiscent)
style insertion	in central depression	at summit
fruitlet core	with a compartment	simple

Although *Brachysola* is placed in tribe Chloantheae, it is somewhat intermediate in its morphology between this tribe and tribe Westringieae. It matches tribe Westringieae in its fruit, with the style inserted in a depression between 4 fruitlets, whereas members of tribe Chloantheae have a fruit that is either indehiscent or separating into 2 fruitlets, which are united at first fully or almost to the summit, with the style arising at the summit. Several genera including *Hemigenia* R. Br. have fruitlets specialized for myrmecocorous dispersal. They have a hard compartment attached to the inside-base of each fruitlet containing readily accessible fleshy tissue attractive to ants, this elaiosome-like structure being separated by a hard wall from the soft white seed, which is hidden and protected inside the fruitlet. In these genera of tribe Westringieae the elaiosome-like structure is derived from the receptacle, one of several organs that have been known to develop this function in Australian plant groups (Berg 1975). *Brachysola* appears to have the remnants of a similar adaptation but with the fleshy tissue reduced and fully encased so that it is no longer accessible to ants. Its compartment is located centrally on the inner surface of the fruitlets, not near the base as in *Hemigenia*, so could have a somewhat different origin.

In its inflorescence *Brachysola* is closer to genera of tribe Chloantheae, which commonly have cymes in a variety of arrangements, than to tribe Westringieae with its mostly racemose inflorescences. *Cyanostegia* Turcz. of the former tribe has the same type of inflorescence as *Brachysola* but looser, and also shows the closest approach to *Brachysola* in its stamens, with the anther similar but more elongate. *Cyanostegia* is readily distinguished by its persistent enlarged calyx of fused sepals, which bears a superficial resemblance to the *Brachysola* corolla in its shape, size and colour. The *Pityrodia* group (including *Chloanthes* and *Hemiphora*) differs from *Brachysola* in having the anthers more centrally

dorsifixed, the free lower portions of the lobes often divergent, and with a minute to large basal appendage on the anther lobes. They also have a more tubular corolla tube, with a transverse circle of hairs at or below the base of the stamen filaments, which are inserted higher on the corolla tube than in *Brachysola*, and a hairy ovary. *Brachysola* has the base of the floral tube narrow and the upper part very widely spreading, and is glabrous on the inside of the corolla tube and on the ovary.

One characteristic of *Brachysola* not found in either tribe of subfamily Prostantheroideae is its stellate indumentum. The presence of branched hairs is taken to be the primary character separating the Chloantheae from the Westringieae in the morphological cladogram (Cantino 1992) but no distinction is made between stellate and dendritic hairs. Dendritic hairs are very uncommon in the Westringieae but are known in a few species such as *Hemigenia macrantha* F. Muell. In the Chloantheae, dendritic hairs are common in all genera except *Brachysola*.

It would be interesting to determine the origin of the stellate hairs in *Brachysola*. Perhaps they were derived either from dendritic hairs by contraction of the axis above the first branching point, or from simple hairs by terminal branching. *Dicrastylis micrantha* Munir is the only other species in subfamily Prostantheroideae known to have a hair with multiple branches radiating from a single point (Rye & Trudgen 1999: Figure 3B), but in this case the axis continues as a long simple extension, with a terminal gland; this specialised hair may have been derived from a simple multicellular glandular hair. In *Brachysola* the stellate hairs have many branches, typically 8 or 9, radiating at varied angles to the stalk, whereas in *D. micrantha* there are fewer branches in a single whorl.

Key to species of *Brachysola*

1. Leaves and cymes mostly or partially in near-whorls of 4; leaves linear or \pm very narrowly oblong, 0.7–3 mm wide **B. coerulea**
1. Leaves and cymes opposite; leaves narrowly ovate to obovate, 5–7 mm wide **B. halganiacea**

Brachysola coerulea (F. Muell. & Tate) Rye, *comb. nov.*

Chloanthes coerulea F. Muell. & Tate (Mueller & Tate 1893: 317). – *Pityrodia coerulea* (F. Muell. & Tate) E. Pritz. (Diels & Pritzel 1904: 516). *Type*: near Gnarlbine, Western Australia, 12 November 1891, R. Helms (*lecto*: PERTH 03738086, here chosen; *isolecto*: AD, G n.v., K n.v., MEL 69304 & 69305, NSW n.v., PERTH (ex AD) 03738108); Parker Range, Western Australia, 1892, E. Merrill (*excluded syn*: MEL 69302).

Illustrations. Blackall & Grieve (1965: 568 [as *Pityrodia caerulea*]); Munir (1979: Figure 10 [as *Pityrodia halganiacea*]).

Shrub 0.2–0.7(0.9) m high, often broader than high; stellate hairs up to 1.3 (but usually less than 1) mm long on the inflorescence, mostly shorter elsewhere; glandular hairs with 4–6 large cells, 0.4–1.4 mm long. *Leaves* usually all or mostly in near-whorls of 4 (one pair of leaves slightly or distinctly higher than the other pair), sometimes rather irregularly arranged but always at least some leaves ‘whorled’, the ‘whorls’ alternating with those of adjacent nodes, linear or very narrowly ovate to very narrowly obovate, 14–32 x 0.7–3 mm, the margins strongly recurved to revolute, usually almost meeting at midvein at least for part of their length and largely hiding the undersurface but occasionally well separated, densely stellate-hairy on undersurface, less densely so on upper surface at first and

usually becoming glabrous or partially glabrous, usually with scattered sessile glands and occasionally with a few short glandular hairs on upper surface or on midvein of undersurface; stellate hairs very fine, sometimes of distinct sizes, with branches horizontal or slightly reflexed, shorter than the stem hairs but sometimes broader. *Panicle* (50)80–160 mm long, 30–85 mm wide at the base, the cymes mostly or at least some of them arranged in near-whorls of 4 similar to the arrangement of the leaves, densely stellate-hairy and with scattered to fairly numerous glandular hairs on the main axis, branches and pedicels; bracteoles 2–3 mm long, shorter than the bracts at the summit of the cyme peduncles, which in turn are shorter than the leaf-like bracts subtending the peduncles. *Pedicels* up to 5 mm long. *Calyx* 3.5–4.5 mm long in flower and 4–5 mm long in fruit, tending to be pinkish; lobes more or less triangular or narrowly so, usually somewhat longer than the tube, up to 3.5 mm long, 1.5–2 mm wide at the base. *Corolla* with similar hairs but less densely hairy outside than the calyx, sometimes with a few stellate hairs inside on the lobes; tube with the narrow yellow base 1–1.5 mm long, the widely spreading upper part extending 2–3 mm from the centre to the base of the largest lobe; largest lobe 6–10 mm long, stellate-hairy at the centre and base but with a broad glabrous margin; other lobes 4–6 mm long, uniformly hairy outside. *Androecium*: lower filaments 4.5–7 mm long; anthers 0.8–1.3 mm long. *Style* 5–8 mm long. *Fruit* 2–2.3 mm long, 2.5–2.8 mm wide, 2–2.3 mm deep; seeds 2–2.3 x 1–1.3 mm.

Selected specimens examined. WESTERN AUSTRALIA (all PERTH): Bounty Camp, 32°06'S, 119°47'E, 22 Aug. 1995, G. Barrett; between Coolgardie and Victoria Rock, Nov. 1964, C. Davies; 3 miles [5 km] WSW of Kulja, 13 Nov. 1971, A.S. George 11174; 4.5 km W of Bencubbin on road to Mukinbudin, 8 Sep. 1996, B.J. Lepschi 2933 & T.R. Lally; 12 miles [19 km] from Southern Cross towards Bullfinch, 18 Sep. 1962, M.E. Phillips (ex CBG 057400); Mt Day road, 23.5 miles [38 km] SE of Marvel Loch, 6 Nov. 1984, B.H. Smith 523 (ex MEL).

Distribution and habitat. Extends from Kulja (between Dalwallinu and Koorda) south-east to near Forrestania (east of Hyden) and east to near Coolgardie, its known range about 370 km long. It occurs mainly in sandy soils, often with laterite, in shrublands or open woodlands, the associated vegetation often including mallee (*Eucalyptus*), *Acacia* and *Grevillea* species.

Phenology. Flowers mainly September to early December, also recorded March and August. Mature fruits recorded from early November to late December.

Conservation status. A relatively widespread and common species, not considered to be at risk.

Notes. Mueller & Tate's description of this species was distributed as a galley proof in 1893 and was published in *Botanisches Centralblatt* (Mueller & Tate 1893) on 30 August 1893 (Chapman 1991: 704). It was republished a few years later (Mueller & Tate 1896) with the specific epithet spelt *caerulea*. This later spelling of the epithet has commonly been used, but the earlier spelling, i.e. *coerulea*, has priority.

Munir (1979) reduced the species to a synonym of the taxon now known as *Brachysola halganiacea*, but probably had seen no material of true *halganiacea* apart from the fragmentary type specimen. Certainly there was no material of the species available at PERTH until recently, when the two specimens cited below were incorporated. *Brachysola coerulea* is here reinstated as a distinct species, readily distinguished from *B. halganiacea* as indicated in the key. Further differences are apparent in the indumentum. In *B. coerulea* the stems tend to have larger glandular hairs with more cells than in *B. halganiacea*, and the upper surface of the leaf tends to be less densely hairy and to have finer stellate hairs. No clear differences have been found in the flowers of the two species, however, although *B. halganiacea* does tend to have a less hairy corolla than *B. coerulea*.

Both Diels & Pritzel (1904) and Blackall & Grieve (1965) distinguished the two *Brachysola* species partly by inflorescence size in their keys. *B. halganiacea* does tend to have smaller panicles than *B. coerulea* but there is too much overlap in this character for it to be really useful in a key.

Brachysola halganiacea (F. Muell.) Rye, *comb. nov.*

Chloanthes halganiacea F. Muell. (Mueller 1876: 14). – *Pityrodia halganiacea* (F. Muell.) E. Pritz. (Diels & Pritzel 1904: 516). *Type*: near Mt Churchman, Western Australia, J. Young (*holo*: MEL 885).

Illustration. Blackall & Grieve (1965: 568) [as *Pityrodia halganiacea*].

Shrub up to 0.5 m high and 0.75 m wide; stellate hairs up to 0.7 (but usually less than 0.5) mm long on the inflorescence, mostly shorter elsewhere; glandular hairs with 3 or 4 large cells, 0.3–0.7 mm long. *Leaves* opposite, decussate, narrowly ovate to obovate, 12–28 x 5–7 mm, the margins recurved, usually well separated, closely and densely stellate-hairy on both surfaces at first, sometimes becoming sparsely hairy on upper surface, with scattered short glandular hairs on undersurface especially on or near the midvein and less frequent on upper surface, sometimes also with sessile glands; stellate hairs rather uniform, with branches horizontal or slightly reflexed, smaller than the stem hairs. *Panicle* with few to many cymes in an opposite-decussate arrangement, 40–90 mm long, 25–45 mm wide at the base, densely stellate-hairy and with scattered to fairly numerous glandular hairs on the various axes and bracts; bracteoles 2–3 mm long, shorter than the bracts at the summit of the cyme peduncles, which in turn are shorter than the leaf-like bracts subtending the peduncles. *Pedicels* up to 3 mm long. *Calyx* 3–4 mm long in flower and 4–5 mm long in fruit, colour not recorded; lobes ovate to broadly triangular, about as long as the tube, 1.4–2.3 mm wide at the base. *Corolla* with similar hairs but less densely hairy outside than the calyx, glabrous inside; tube with the narrow tubular base *c.* 1.5 mm long, the very spreading upper part extending *c.* 2.5 mm from the centre to the base of the largest lobe; largest lobe *c.* 6 mm long, largely glabrous outside but with a central basal area hairy; other lobes *c.* 4 mm long, more uniformly hairy outside but the apex of the lower pair sometimes glabrous. *Androecium*: lower filaments *c.* 4 mm long; anthers *c.* 1 mm long. *Style* *c.* 7 mm long. *Fruit* *c.* 2.4 mm long, *c.* 3 mm wide, not seen at full maturity.

Specimens examined. WESTERN AUSTRALIA: Karroun Hill Reserve (East), 47 km NNE of Beacon, date unknown [probably *c.* 1994], H. King 179 (PERTH); 4 km W of Yache Yachine Dam [Mt Jackson Station], *c.* 70 km NNW of Bullfinch, 3 Oct. 1981, K.R. Newbey 9285 (PERTH).

Distribution and habitat. Extends from near Mt Churchman east to Mt Jackson Station, a distance of about 110 km. Habitat data are available only for the easternmost locality, where *B. halganiacea* was recorded in deep yellow sand on a flat with "Acacia high shrubland".

Phenology. Flowers and young fruits recorded in early October.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority Two. Known from three localities, with only one plant recorded in the population on Mt Jackson Station. This poorly known species needs to be surveyed to determine its conservation status and other aspects of its biology more accurately. It occurs in a relatively inaccessible region that has not been well surveyed botanically, which would partially explain the poor representation of this species in the herbarium.

Notes. One of the flowers examined had only the upper pair of stamens fertile and with a longer filament (*c.* 4 mm long) than the staminodes below. This appeared to be an abnormality as other flowers examined

on the same specimen had four fertile stamens with the lower two filaments slightly larger (c. 4 mm long) than the upper two (c. 3 mm long).

Brachysola halganiacea appears to have a distinct geographical range, with all its known localities occurring to the north of the known range of *B. coerulea* (Figure 1).

Acknowledgements

I am grateful to Paul Wilson for nomenclatural advice, and to Richard Olmstead and Brendan Lepschi for early access to, and discussion of, their cladistic data.

References

- Berg, R.Y. (1975). Myrmecochorous plants in Australia and their dispersal by ants. *Australian Journal of Botany* 23: 475–508.
- Blackall, W.E. & Grieve, B.J. (1965). "How to know Western Australian Wildflowers." Part 3. (University of Western Australia Press.)
- Cantino, P.D. (1992). Evidence for a polyphyletic origin of the Labiatae. *Annals of the Missouri Botanical Garden* 79: 361–379.
- Chapman, A.D. (1991). "Australian Plant Name Index." (Australian Government Publishing Service: Canberra.)
- Diels, L. & Pritzel, E. (1904). Verbenaceae. In: *Fragmenta phytographiae Australiae occidentalis. Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 35: 493–524.
- Mueller, F. (1876). Verbenaceae. In: "Fragmenta Phytographiae Australiae." Vol. 10, pp. 13–16. (J. Ferres: Melbourne.)
- Mueller, F. & Tate, R. (1893). Elder ex diagnoses of new plants. *Botanisches Centralblatt* 55: 316–318.
- Mueller, F. & Tate, R. (1896). Phanerogams and vascular plants. *Transactions of the Royal Society of South Australia* 16: 333–383.
- Muir, T.B. (1979). An index to the new taxa, new combinations and new names published by Ferdinand J.H. Mueller. *Muelleria* 4: 123–168.
- Munir, A.A. (1979). A taxonomic revision of the genus *Pityrodia* (Chloanthaceae). *Journal of the Adelaide Botanic Gardens* 2: 1–138.
- Olmstead, R.G., Reeves, P.A. & Lepschi, B.J. (1999). Confirmation of a monophyletic Chloanthoideae (Lamiaceae) comprising tribes Chloanthae and Prostanthereae. *Lamiales Newsletter* 6: 7–10.
- Rye, B.L. & Trudgen, M.E. (1999). A taxonomic revision of *Dicrastylis* sect. *Dicrastylis* (Lamiaceae subfamily Chloanthoideae). *Nuytsia* 12: 207–228.