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State Herbarium of South Australia  
PO Box 2732  
Kent Town SA 5071  
Australia



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## AN ANOMALOUS SOUTH AUSTRALIAN *HALORAGIS* (HALORAGACEAE)

A.E. Orchard

Tasmanian Herbarium,  
GPO Box 252c, Hobart, Tasmania 7001

### Abstract

Plants from South Australia formerly referred to *Haloragis digyna* are now considered to constitute a distinct species, *H. eyreana* Orchard, sp. nov. This species has a number of features unusual in the genus, amongst which are its single style and unilocular ovary. Flowers on all collections made so far are male sterile, and reproduction appears to be entirely vegetative. With removal of the South Australian populations, *H. digyna* is now considered to be endemic to southern Western Australia.

In a previous treatment of the genus *Haloragis* (Orchard, 1975), *H. digyna* Labill. was considered to extend in isolated populations from near Busselton in Western Australia to southern Eyre Peninsula in South Australia. More recently (Orchard, 1977) *H. digyna* was re-examined in relation to *H. hamata* Orchard, and the suggestion was made then that the South Australian plants of *H. digyna* were distinct in some respects from true *H. digyna* from Western Australia. More material of the South Australian plants is now available, and this, plus re-examination of other collections, shows that "*H. digyna*" of South Australia is distinct from Western Australian plants of the same name, and I propose the name *H. eyreana* for this species, which differs from other *Haloragis* taxa in a number of unusual characteristics.

### *Haloragis eyreana* Orchard, sp. nov.

*Herbae* perennes 10-30cm alti, caudex stolonibus, *Caules* ascendentes arcuate, ramosi copiose, scabri sparsim trichomatibus  $\pm$  conicis 0.05-0.1mm longis. *Folia* alterna linearia 0.5-2.0cm longa, 0.1-0.2cm lata, margines integri vel foliis infimis minime 1-2-dentatis, scabra. *Inflorescentia* spicata indeterminata, dichasiis florum 3-5 in axillas bractearum foliiformium primariarum. *Flores* 3-meri insidens pedicellis 0.1-0.2mm longis. *Sepala* 3, deltata, 0.7-0.8mm longa, 0.6mm lata, scabra. *Petala* 3, cucullata, carinata, 2.0mm longa, 0.7mm lata (carinis ad marginem), unguiculata, scabra. *Stamina* 6; filamenta 0.2mm longa; antherae anguste oblongae, 1.1-1.5mm longae, 0.2-0.3mm latae, indehiscentes. *Stylus* 1, conicus, 0.7mm longus; stigma alba, fimbriata. *Ovarium* obconicum, 0.5mm longum, 0.5mm latum, dense scabrum, 1-loculatum ovulo uno pendulo. *Fructus*, ubi praesens, irregulariter obpyriformis, 1.3-1.5mm longus (sepala exclusa), 0.8-1.0mm latus; semina 0.

Typus: *C. Ray Alcock* 2553, South Australia, Eyre Peninsula, road between Sections 13 & 16, Hundred of Cummins, 12.xi.1968. Holotypus: AD96930327. Isotypus: ADW (Fig. 1).

Perennial *herbs* 10-30cm tall; rootstock stoloniferous. *Stems* arcuate ascending, freely branched,  $\pm$  woody only at extreme base, smooth below, weakly ribbed in upper parts, sparsely scabrous with conical or upward-curving unicellular hairs 0.05-0.1mm long. *Leaves* alternate, linear, 5-20mm long, 1-2mm wide, margins entire, or some of the lowermost leaves very shortly 1-2-toothed, apex acute, veins indistinct, lamina sparsely scabrous, mainly on margins, with hairs as for the stems. *Inflorescence* spicate, indeterminate, with dichasia of up to 5 flowers in the axils of the primary bracts, but all except 1-3 flowers in each dichasium abort at an early stage. Primary bracts green, alternate, indistinguishable from the upper leaves. Secondary bracts straw-coloured, linear, 1.2-1.4mm long, 0.2mm wide, acute, scabrous on margins, deciduous. Tertiary and higher order bracts as for secondary bracts, but progressively smaller. *Flowers* predominantly 3-merous, on pedicels 0.1-0.2mm long. *Sepals* 3 green, deltoid, 0.7-0.8mm long, 0.6mm wide, scabrous. *Petals* 3, greenish-yellow tipped red, hooded, keeled, 2.0mm long, 0.7mm wide (keel to margin), unguiculate, scabrous on keel. *Stamens* 6; filaments 0.2mm long; anthers yellow, linear-oblong, 1.1-1.5mm long, 0.2-0.3mm wide,

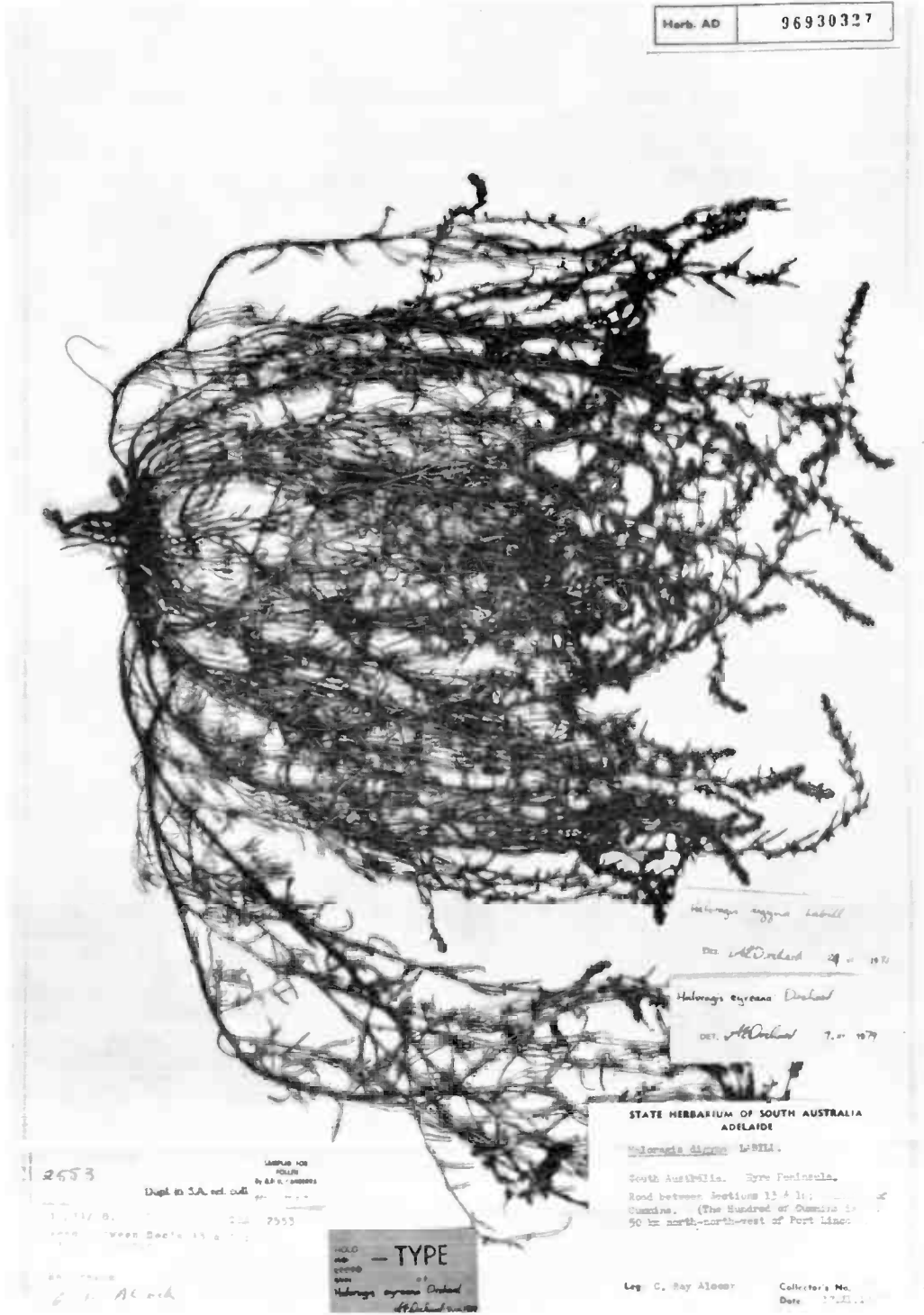


Fig. 1. Holotype of *Haloragis eyreana*. (Alcock 2553, AD).

antisepalous anthers ca 0.4mm longer than antipetalous ones, non-apiculate, apparently all indehiscent. *Style* 1, conical, 0.7mm long; stigma white, fimbriate, occupying upper  $\frac{1}{2}$  of style. *Ovary* obconical, 0.5mm long, 0.5mm diameter, densely scabrous; 1-locular with a single pendulous ovule. *Fruits* usually not formed, but if present somewhat irregular in shape, usually  $\pm$  obpyriform, 1.3-1.5mm long (excluding the persistent sepals), 0.8-1.0mm diameter; seeds 0. (Fig. 2.)

#### *Distribution*

*H. eyreana* is endemic to South Australia, and is confined to an area of a few square kilometres in the southern part of Eyre Peninsula between Cummins and Butler Tanks.

#### *Ecology*

All collections are from somewhat disturbed areas (roadside banks, railway culverts) usually on heavy clay-loam soils, in association with grasses. All of the plants collected so far are male sterile. The anthers develop fully but do not dehisce. Pollen from the type collection (*Alcock* 2553) was mounted during a pollen survey conducted by the Research School of Pacific Studies, Australian National University in 1972. A duplicate slide held at AD has been examined on my behalf by Dr J.P. Jessop, who reported that the grains measured 16-26 $\mu$ m and most appeared as if they had contained cytoplasm. This size is smaller than the range for most *Haloragis* species, but well within the range of *Gonocarpus* species. Style and stigma development appears to be normal, and an apparently functional ovule is formed in the ovary. In most plants there is no expansion of the ovary after anthesis, but in some an occasional flower will give rise to a pseudo-fruit. The ovary increases in size to form an apparently normal (if somewhat irregular) fruit, but these "fruits" contain no seed, only the shrivelled remains of the unfertilised ovule. Reproduction in this plant is therefore apparently entirely vegetative by means of its deep stoloniferous rootstock. Flowering and "fruiting" occur from October to January.

#### *Specimens examined*

SOUTH AUSTRALIA: *Alcock* C174, SAR culvert, Cockaleechie Rd, ca 8km from Cummins, 30.x.1964 (AD). - *Alcock* 2553, road between Sections 13 & 16, Hundred of Cummins, 12.xi.1968 (AD). - *Copley* 2459, ca 6km west of Butler Tanks, 25.i.1969 (AD). - *Copley* 2978, 16 miles east of Yeelanna, 1.i.1970 (AD). - *Orchard* 2993, ca 13km west of Ungarra on road to Yeelanna, 30.xii.1970 (AD, AK).

#### *Comments*

A minor change is necessary to the key to *Haloragis* in Orchard (1975) to accommodate this species. On page 67, the result of the second lead number 29 should be changed from "24. *H. digyna*" to "22a. *H. eyreana*". The second occurrence of *H. digyna* in the key (lead 30) remains unchanged. Figure 157 (Orchard, 1975) is *H. eyreana*, Figure 158 is *H. digyna*.

This is an unusual plant for several reasons. Whilst its unilocular ovary might suggest that it should be referred to *Gonocarpus*, the dichasia of up to 5 flowers, the lack of a columella in the ovary, and the increase in size of the ovary in the formation of the "fruit", all point to the fact that this is a *Haloragis* species with a very reduced flower. The stoloniferous rootstock and relatively thick ovary wall support this conclusion.

The apparently complete male sterility in this species has not been found in any other *Haloragis* species. In *Gonocarpus* several species have occasional male sterile plants in populations of otherwise normal hermaphrodite-flowered plants (Orchard, 1975) but none are known in which all plants have non-functional anthers.

Most flowers in this species are basically 3-merous, as described above. However, in *Orchard* 2993 some flowers are 4-merous, but here the functional arrangement of the flowers has broken down even further. All flowers, both 3- and 4-merous, lack styles, and

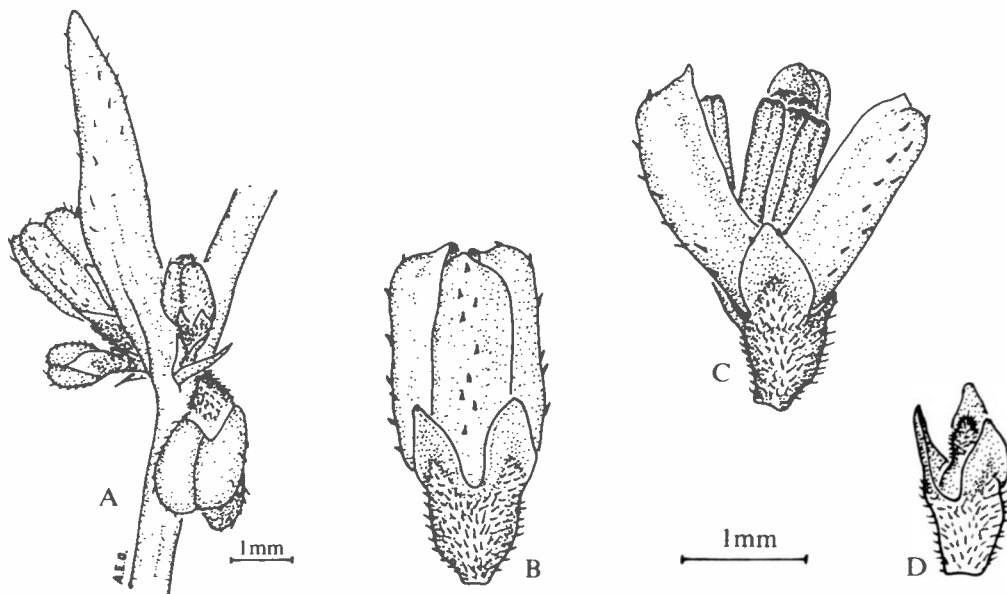


Fig. 2. *Haloragis eyreana*. A, portion of inflorescence, showing flowers in the axil of a primary bract; B, flower just before anthesis; C, flower at anthesis showing fully developed but indehiscent anthers; D, the same with petals and stamens removed to show the single style. (All from Alcock 2553).

the anthers are indehiscent. In the 4-merous flowers some of the anthers are vestigial while others grow to more or less normal size, and in some flowers the subtending bracts are fused to the ovary. The filaments on many of the anthers are short and deformed or twisted.

The relationships of this species seem to lie with the *H. aspera* complex, and in habit, leaf form, rootstock and "fruit" shape, *H. eyreana* comes closest to *H. heterophylla* Brongn., but is distinct in indumentum and flower structure. Despite the similarity in the reduction of the flower, the relationship between *H. eyreana* and *H. digyna* is probably not close. The nearest populations of *H. heterophylla* to *H. eyreana* are in the Mt Lofty Ranges, and it is conceivable that *H. eyreana* represents an isolated outlier of *H. heterophylla* which has evolved in isolation over a long period along the path to vegetative reproduction because of a breakdown in meiotic organisation.

The conservation status of this species must be assessed as endangered. No populations are known to occur inside National Parks, and all recorded collections come from areas subject to disturbance. The absence of sexual reproduction precludes the long distance dispersal and establishment of the species in safer localities, except via human agency.

With the description of the South Australian plants of *H. digyna* (*sensu* Orchard, 1975) as *H. eyreana*, the former species (*s.str.*) is now considered to be endemic to southern Western Australia.

#### Acknowledgements

I acknowledge with thanks the assistance of Dr J.P. Jessop who kindly examined the pollen slide of Alcock 2553 on my behalf, and also made available to me on loan the AD collections cited in the text. The photograph of the holotype was made by the Photograph Section, University of Tasmania.

### References

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