

Drosera bulbosa subsp. *coronata* (Droseraceae) from the northern goldfields region of Western Australia

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Abstract

Drosera bulbosa Hook.f. subsp. *coronata* R.P.Gibson from Western Australia is here described as new. It differs from *D. bulbosa* subsp. *bulbosa* and *D. bulbosa* subsp. *major* (Diels) N.G.Marchant primarily by having yellow pollen, and styles that form an annulus (crown) around the exposed apex of the ovary. It is currently known from two locations; however it is not considered to be under imminent threat of extinction.

Introduction

Analysis of variation in *Drosera bulbosa* across its distributional range revealed an unusual variant in the northern Wheatbelt of south Western Australia that is readily distinguishable, when in flower, from other known subspecies of this species. This subspecies is a flat-rosetted tuberous *Drosera* (*Drosera* subgenus *Erythrorhiza*), with leaves that are obovate to rectangular with a conspicuously raised mid-rib on the adaxial surface; flowers borne on individual pedicels arising directly from the centre of the rosette; and styles capitate similar to those of *D. bulbosa* (Fig. 1). However, the flower structure and pollen colour suggest that it is a new subspecies of *D. bulbosa*.

Taxonomy

Drosera bulbosa subsp. *coronata* R.P.Gibson, *subsp. nov.*

Holotype: *R.J. Cranfield* 5075, 18 Jun 1986, 63 km NE of Mullewa on Wanina Station, Western Australia (PERTH642746)

A tuberous perennial flat-rosetted carnivorous herb to 8 cm diameter. Mature rosettes comprises 10–16 leaves, olive-green; petiole red, up to 10 mm long; lamina oblong to slightly obovate, up to 4 cm long, c. 12 mm wide, apex obtuse; midrib red, raised for c. 90% of lamina length on adaxial surface, secondary veins also raised on abaxial surface; glands on adaxial surface of lamina red, stalked. Inflorescence usually 12–20-flowered; flowers with pedicels red, erect, 25–30 mm long at anthesis (that lengthen to 40 mm and become recurved in fruit). Sepals, 5, red, elliptic, 4 mm long, 1.2 mm wide, apex acute, apical margin often dentate, glabrous, recurved at anthesis. Petals, 5, white (sometimes light pink in bud), 9 mm long, 6 mm wide, faintly nectar-scented; apex obtuse, often weakly emarginate to dentate. Stamens 5, erect, up to 2 mm long; filaments white (or pale pink), linear; anthers pale red; pollen yellow. Ovary ellipsoid, weakly 3-locular, green, 1 mm long, up to 1 mm diam. Styles 3, up to 0.6 mm long, white to pale pink, multiply divided from base into 20–30 style segments;

capitate. Style segments arranged in an annulus below the apex of the ovary. Seeds black, ovoid, 0.7–0.8 mm diam. Figs 2 & 3.

Other specimen examined: *R.P.Gibson 319*, 17 Aug 2011, cultivated plants ex Mingenew Hill, Western Australia (NSW).

Distribution: This subspecies is only known from two locations in Western Australia, one near Pinegrove (27°47'13"S, 115°40'15"E) and the other near Mingenew (29°11'38"S, 115°26'28"E); about 130 km apart (Fig. 4). It is likely that this subspecies occurs in suitable habitat elsewhere in this region, in soils that are reliably moist each winter, such as the headwaters of streams in open shrublands and woodlands.

Habitat: Plants from Pinegrove are reported to grow in red clay-loam in *Acacia* woodland (*Cranfield 5075*). Plants that I have observed at Mingenew grew on the footslopes of a steep slope in an open *Acacia* shrubland growing with annual daisies and *Drosera macrantha* Endl. subsp. *macrantha*.

Flowering Period. Based on *Cranfield 5075* and observations of plants in cultivation, this species flowers in May and June. Flowers open for only a few hours during a single day and petals have a moderately strong nectar-sweet scent during anthesis. Plants appear to be self-incompatible and rely of cross-pollination for fertilization. Ripe seed is produced in July.

Conservation Status: This subspecies is currently known from two records 130 km apart; Mingenew Nature Reserve, and the other on a grazing property where the population does not appear to be under imminent threat. Thus this subspecies appears to meet the 'Priority three' conservation code for Western Australian Flora (Chapman 2013); that is, poorly known taxa that are known from a few locations, some of which may be at risk of threatening processes (the risk of land clearing at the Pinegrove site). Further survey for this subspecies is recommended, which would need to be conducted in May or June when plants are flowering in order to differentiate it from the other subspecies of *D. bulbosa*.

Etymology: The subspecific epithet ('coronata') is based on the annular, or crown-like arrangement of style segments around the apex of the ovary.

Affinities: Based on leaf shape, leaves with a prominent raised midrib, flowers held singularly on their own pedicles and capitate stigmas, and preliminary molecular data this taxon is most closely allied to *Drosera bulbosa* subsp. *bulbosa* and *D. bulbosa* subsp. *major*. It is intermediate in size between these two subspecies and due to its pollen colour and the absence of style segments from the apex of the ovary it is hereby considered to be another subspecies of *D. bulbosa*. Subspecific rank appears appropriate due to the similar leaf morphology of the three subspecies, all with their prominent raised midrib on the adaxial surface, and also the similarity of molecular sequences (unpublished data, not present here). Characteristic features of these subspecies are provided in Table 1 below. The type collection for *D. bulbosa* subsp. *major* was made near the town of Mingenew



Fig. 1. Open flowers of **a**, *D. bulbosa* subsp. *bulbosa* and **b**, *D. bulbosa* subsp. *major* that show the flowers have white pollen and capitate styles that form a hemispherical dome around the apex of the ovary. Scale bar: a & b = 5mm. Photographs by R. Gibson.

(Diels 1906: p. 126). A digital scan of this collection (Röpert 2013) was examined and found to match the taxon concept of *D. bulbosa* subsp. *major* (e.g. Lowrie 1987) and thereby confirm that *D. bulbosa* subsp. *coronata* is distinct from the former subspecies.

The recognition of this taxon provides an opportunity to update the key to species and subspecies of *Drosera* in the 'Flora of Australia' (Marchant *et al.* 1982). Suggested changes from couplet 53 (Marchant *et al.* 1982) to accommodate the 20 taxa of rosette tuberous *Drosera* here recognized are provided below. The tuberous rosetted sundew in Marchant *et al.* (1982, fig. 3) labeled as *D. bulbosa* is instead *D. rosulata* Lehm. based on its yellow pollen and leaves with a depressed midrib.

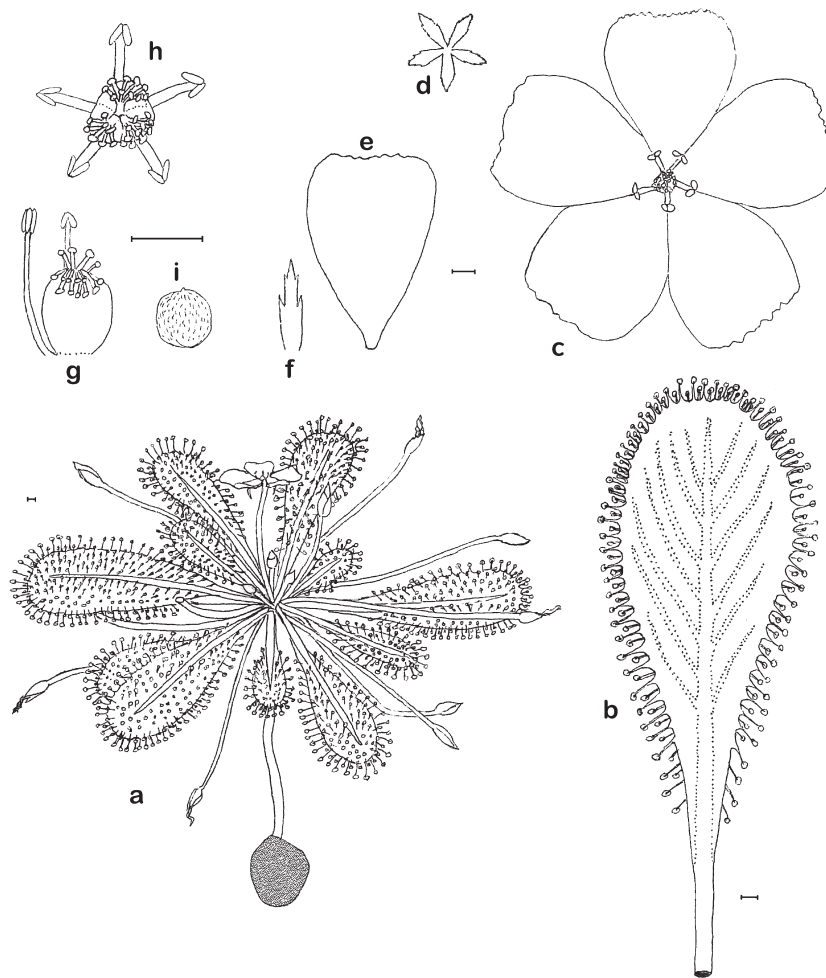


Fig. 2. Illustration of *Drosera bulbosa* subsp. *coronata*: **a**, whole plant in flower, **b**, mature leaf, abaxial surface; **c**, open flower; **d**, calyx; **e**, petal; **f**, sepal; **g**, gynoecium with two stamens from side; **h**, gynoecium and all stamens, from above; and **i**, ripe seed. Scale bar = 1 mm.



Fig. 3. *Drosera bulbosa* subsp. *coronata*: **a**, sterile rosette of leaves in situ; **b**, flowering plant (in cultivation); **c**, details of two flowers; **d**, details of stamens and ovary angled ventral view, showing naked apex of ovary above the annulus of styles and stamens with yellow pollen; **e**, details of centre of flower, ventral view; **f**, mature seeds (grid lines are 2 mm apart). Scale bar: **a**, **b** = 5 mm; **c** = 5 mm; **d**, **e**, & **f** = 1 mm. Photographs by R. Gibson

- 53 Inflorescence cymose, 2–many-flowered
 - 54 Rosettes of up to 12 leaves; leaves obovate
 - 55 Plants with one scape per rosette
 - 56 Leaves broadly obovate to 30 mm long 3–5 leaves per rosette; strongly stoloniferous *D. erythrorhiza* subsp. *erythrorhiza*
 - 56 Leaves broadly obovate to 60 mm long, 4–6 leaves per rosette; weakly stoloniferous *D. erythrorhiza* subsp. *magna*
 - 57 Leaves narrow obovate to 60 mm long, at least 8 leaves per rosette *D. erythrorhiza* subsp. *collina*
 - 57 Leaves obovate to 30 mm long; conspicuously variegated *D. erythrorhiza* subsp. *squamosa*
 - 55 Plants with several scapes per rosette
 - 58 Scapes 1–4, prostrate in scape *D. prostratoscaposa*
 - 58 Scapes up to 40, erect in fruit *D. macrophylla* subsp. *macrophylla*
 - 54 Rosettes of up to 30 leaves; leaves flabellate *D. zonaria*
- 53 Flowers on individual scapes
 - 59 Plants hysteranthous; tubers white *D. praefolia*
 - 59 Scapes produced after leaves; tubers orange or red
 - 60 Leaves with a prominently raised midrib on the adaxial surface
 - 61 Scapes erect in fruit
 - 62 Scapes 1–20; leaves to 18 mm long, shortly petiolate; petals pink ± white on adaxial surface *D. browniana*
 - 62 Scapes 20–50 (occasionally 2-flowered), leaves to 40 mm long, sessile; petals white, rarely pale pink *D. macrophylla* subsp. *monantha*
 - 61 Scapes prostrate in fruit
 - 63 Pollen white
 - 64 Leaves to 30 mm long, sepal margins entire *D. bulbosa* subsp. *bulbosa*
 - 64 Leaves to 55 mm long; sepal margins serrate *D. bulbosa* subsp. *major*
 - 63 Pollen yellow
 - 65 Style segments arranged in a hemisphere on the ovary apex; styles tubaeiform *D. tubaestylis*
 - 65 Style segments capitate; arranged in an annulus around apex of ovary *D. bulbosa* subsp. *coronata*
 - 60 Leaves without a prominently raised midrib on the adaxial surface
 - 66 Style segments erect with a recurved base
 - 67 Leaves obovate; shortly petiolate *D. rosulata*
 - 67 Leaves orbicular; distinctly petiolate *D. orbiculata*
 - 66 Style segments radiating from style apex
 - 68 Inflorescence of up to 7 flowers
 - 69 Plants stoloniferous; leaves obovate with a broad flat petiole; all leaves appressed to ground *D. aberrans*
 - 69 Plants not stoloniferous, whorled cauline leaves present; leaves spatulate with a linear, canaliculated petiole..... *D. schmutzii*
 - 68 Inflorescence up to 20 flowers; leaves obovate
 - 70 Petiole linear, to 10 mm long; multiple leaf rosettes produced per growing season *D. lowriei*
 - 70 Petiole obovate, to 15 mm long; single leaf rosette produced per plant per season *D. whittakeri*

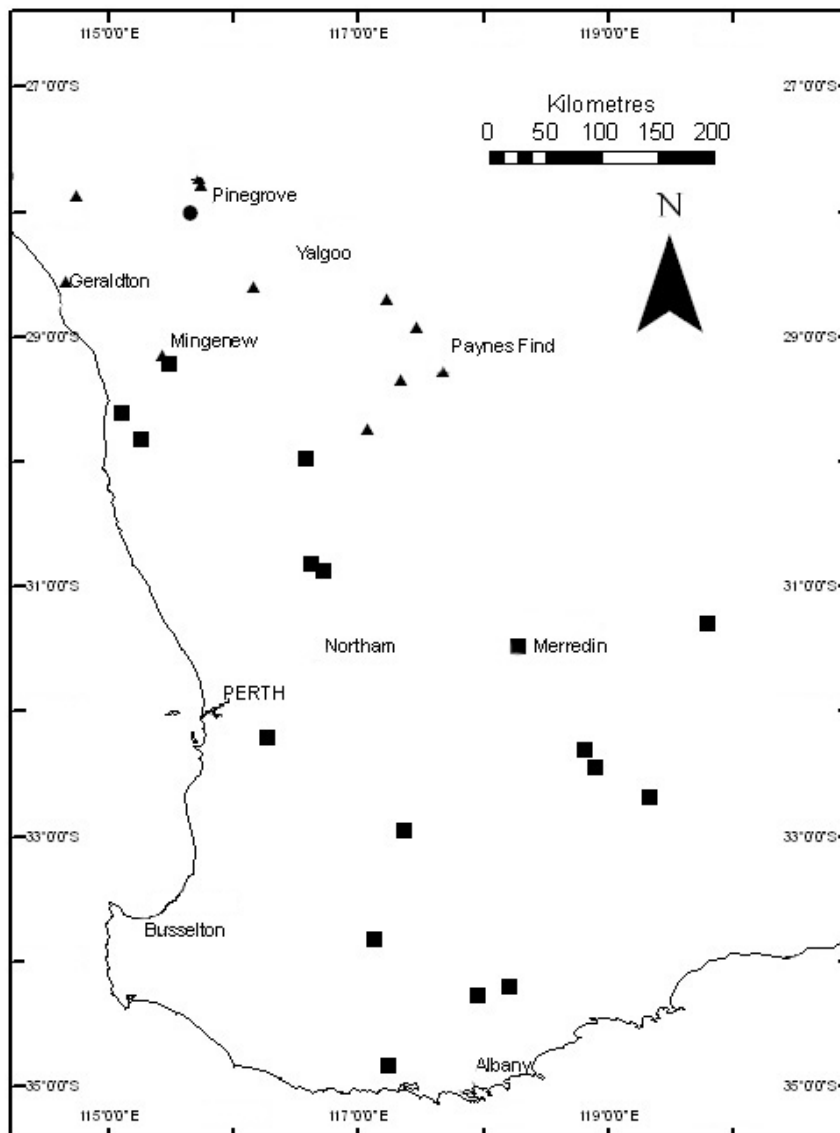


Fig. 4. Distribution map of *D. bulbosa* subsp. *coronata* (●), *D. bulbosa* subsp. *bulbosa* (■) and *D. bulbosa* subsp. *major* (▲) based on records at PERTH and the author's observations.

Table 1. Key morphological characters that distinguish *D. bulbosa* subsp. *coronata* from *D. bulbosa* subsp. *bulbosa* and *D. bulbosa* subsp. *major*.

Character:	<i>D. bulbosa</i> subsp. <i>coronata</i>	<i>D. bulbosa</i> subsp. <i>major</i>	<i>D. bulbosa</i> subsp. <i>bulbosa</i>
Pollen colour	yellow	white	white
Anther colour	pale red	white	white
Style length (mm)	3	1.5	1.5
Style segment arrangement	annulus around apex of ovary	hemispherical dome around apex of ovary	hemispherical dome around apex of ovary
Typical leaf size (mm)	40 × 12	55 × 25	25 × 10
Leaf colour	olive-green with red pigment on petiole and midrib	yellow-green	variably yellow green to olive green to partially to fully red
Leaf shape	oblong to weakly obovate	obovate	oblong to obovate

Conclusions

Drosera bulbosa subsp. *coronata* a new species based on leaf morphology and molecular sequences. It is part of the *Drosera bulbosa* complex, however this subspecies is differentiated from other taxa by its yellow pollen and the unique crown-like arrangement of its styles.

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