Calandrinia halophila Albr. & J.G.West (Montiaceae), a new species from estuarine environments in northern Australia

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Summary

Albrecht, D.E. & West, J.G. (2023). *Calandrinia halophila* Albr. & J.G.West (Montiaceae), a new species from estuarine environments in northern Australia. ***Austrobaileya* 13: 34–40**. *Calandrinia halophila* Albr. & J.G.West sp. nov. is described and illustrated, and differences between it and similar species of *Calandrinia* discussed. Notes on distribution, habitat and conservation status are also provided.

Key Words: Montiaceae; Portulacaceae; *Calandrinia*; *Calandrinia halophila*; *Parakeelya*; *Rumicastrum*; flora of Australia; flora of Western Australia; flora of Northern Territory; flora of Queensland; taxonomy; new species

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Introduction

In the early 1970s, initial collections of a small rosette-forming species of *Calandrinia* Kunth were made from a few estuarine sites in northern Australia. Since that time an additional 20 or so collections of the same taxon have been made from similar sites scattered across northern Australia. The species has been independently recognised as distinct by botanists, and assigned the phrase names *Calandrinia* sp. Berry Springs (M.O.Parker 855) and *Calandrinia* sp. Olive River (J.R.Clarkson+ 10012) at the Northern Territory Herbarium (DNA) and Queensland Herbarium (BRI) respectively. We here formally describe this entity as the new species *Calandrinia halophila* Albr. & J.G.West, acknowledging that the generic name is likely to change in the near future once the proposal to conserve the name *Parakeelya* Hershk. against *Rumicastrum* Ulbr. is voted on at the International Botanical Congress scheduled for 2024 (Thiele *et al*. 2018; West & Albrecht 2022).

Methods and materials

The species description is based on pressed herbarium specimens and spirit material housed at BRI, CANB, DNA and NSW. Representative flowers and fruits on dried specimens were rehydrated prior to assessment.

Measurements of plant parts are inclusive (e.g. 4.0–6.7 is given as 4–6.7). Following West & Albrecht (2022) the flower–bearing shoots were measured in two parts. The proximal portion was measured from the base to the closest bract/pedicel junction above. The distal flowering portion (i.e. inflorescence axis *sensu* Obbens 2011) was measured as the distance from the lowermost bract/pedicel junction to the apex of the distal-most bud or flower. Where inflorescences were reduced to a single flower the distal flowering portion equalled the combined length of pedicel and flower. Pedicel length was measured as the distance from its apex (at the junction with the sepals) to the insertion point of the closest bract below. For the purposes of consistency with descriptions of recently

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described species we here treat the two structures below the petals as sepals although it is acknowledged that they are considered to correspond to bracteoles or involucral bracts by some authors (see Nyffeler & Eggli 2010 for discussion). These structures were detached and flattened to measure. Fruit measurements are based on unflattened mature fruits prior to dehiscence.

Taxonomy

Calandrinia halophila Albr. & J.G.West, **sp. nov.**

Distinguished from other species of *Calandrinia* by the combination of the following characters: annual herb with leaves narrow and dorsi-ventrally compressed, strictly in a basal rosette; flower-bearing shoots not or only slightly exceeding the length of the longest leaves; bracts alternate; sepals non-persistent; petals (5–)6–7(–8), pale pink or rarely white; stamens 5–10; stigmata 5–7; capsules 2–3.2 mm long with an obtuse to subacute apex and splitting into 5–7 non-persistent valves; and shiny seeds mostly *c*. 0.35 mm long and 0.25 mm wide, with a very indistinct colliculate surface pattern. **Type:** Northern Territory. Berry Springs, 18 May 1977, *M.O. Parker 855* (holo: CANB 366252; iso: DNA [D0011526]).

Calandrinia sp. Berry Springs (M.O.Parker 855) Dixon, R.A.Kerrigan & Cowie: CHAH (2006); Kerrigan & Albrecht (2007); Short *et al*. (2011); Cowie *et al*. (2017); Parker & Percy-Bower (2022: 2).

Calandrinia sp. (Olive River J.R.Clarkson+ 10012): Thomas (2007, 2010, 2013, 2016); Brown (2021).

***Illustrations*:** Northern Territory Herbarium (2015) as *Calandrinia* sp. Berry Springs (M.O.Parker 855) Dixon, R.A.Kerrigan & Cowie.

Glabrous annual **herb** to *c*. 7.5 cm high with lateral roots arising from a non- or scarcely thickened taproot. **Leaves** all basal, mostly spreading, sometimes ascending or flat on substrate surface, succulent, narrowly oblanceolate, 3–60 mm long (the longer outermost leaves rarely < 15 mm long), 0.7–3 mm wide, dorsi-ventrally compressed to oval in cross-section, dull green or tinged red/pink, orange or brown; base attenuate and lacking clearly differentiated petiole; margins rounded in cross-section for most of leaf length but becoming more angular proximally; apex narrowly rounded to subacute. **Flower-bearing shoots** arising from leaf axils, spreading or prostrate on substrate surface, equal to or slightly shorter or slightly longer than the longest leaves; proximal leafless portion (1.5–)4–38 mm long; distal flowering portion (2.5–)6–37 mm long, flowers arranged in 1–3(–4)-flowered monochasial cymes or rarely dichasial cymes with monochasial branches, pedicels (2.5–)4–28 mm long, broader distally, fine, becoming somewhat wiry with age, narrowly longitudinally winged in dried specimens, persistent long after fruit abscission, not obviously elongating in fruit; bracts alternate, mostly appressed or ascending, triangular-ovate to elliptic, deeply concave, 1–2.5(–3) mm long, with a herbaceous midvein and broad hyaline margins, or rarely almost entirely hyaline, sub-acute to acuminate, tip sometimes recurved. **Flowers** 5–8 mm diameter. **Sepals** ovate, broadly ovate or broadly elliptic, 2–4 mm long and 2–3 mm wide in flower, enlarging to 2.5–5 mm long and 2.5–4 mm wide in fruit, at least one shedding before or with the capsule valves, free to base, venation not evident; margins narrow hyaline to *c*. 0.4 mm wide; apex broadly acute to obtuse. **Petals** (5–)6–7(–8), oblong-elliptic to narrowly obovate, (2–)2.4–3.5(–4) mm long, 0.6–1.6 mm wide, free or virtually so, pale pink or rarely white, apex obtuse. **Stamens** 5–10; filaments linear, appearing free, 1.3–2.2 mm long, pale pink to white, smooth; anthers versatile, 2-celled, each cell oblong in outline, 0.3–0.7 mm long, 0.15–0.25 mm wide, latrorse, dehiscing longitudinally, violet pre-dehiscence. **Ovary** ovoid to broadly ellipsoid or almost spherical, 1.2–2.2 mm long, 0.8–1.5 mm diameter, reddish-pink to orangish-pink. **Stigmata** 5–7, linear, 0.4–0.8 mm long, free to the base, pale pink to white. **Capsule** ovoid to broadly ellipsoid, 2–3.2 mm long, 1.3–2.5 mm wide, not exceeding the sepals, pale brown, apex obtuse to broadly acute, initially

the distal third separating into valves and sometimes the proximal third also splitting longitudinally, finally some or all valves separating for the whole length; **valves** 5–7, the tips sometimes recurved, not persisting and thus exposing placentas and funicles, thin-textured, when dry the external surface with numerous close minutely roughened striations. **Seeds** numerous, obovoid, (0.3–)0.35(–0.4) mm long, (0.2–)0.25(–0.3) mm wide, mid brown, evenly shiny, appearing smooth at ×10 magnification but very weakly colliculate, with a rudimentary strophiole. **Fig. 1**.

***Additional specimens examined*: Western Australia.** Mary Island, Vansittart Bay, Kimberley Region, Jun 2010, *Keighery KIBS1190* (PERTH); Northern bay of Coronation Island, Bonaparte Archipelago, May 1972, *Wilson 10940* (PERTH). **Northern Territory.** Middle Arm area, adjacent Inpex site, May 2020, *Brennan 11733* (DNA); Limmen National Park, Apr 2008, *Dixon 1806* (DNA); Bathurst Island, track NE of sewerage ponds Nguiu, Feb 2001, *Kerrigan & Risler 325* (DNA); Cooper Creek catchment, *c*. 47 km NW of Gunbalanya, Jul 1972, *Lazarides 7510* (CANB, DNA, K, L); Limmen National Park, St Vidgeons block, south of Limmen River adjacent to salt flats, Apr 2009, *Lewis 1157* (CANB, DNA); Middle Arm – Kittyhawk, Apr 2020, *Lewis 3099* (CANB, DNA); Bathurst Island, Delawa Long Arm, May 1998, *Michell & Harwood 1467* (DNA); N of Black Rock Landing, McArthur River, Feb 1976, *Rice 2387* (CANB); 3 km S of Bing Bong Homestead, May 1984, *Thomson 516* (DNA); Crab Claw Island, Bynoe Harbour, May 2010, *Westaway 3236* (DNA). **Queensland.** Cook District: Saibai, Jul 1973, *Stocker 1336* (CANB); *c*. 24 km SSE of the mouth of the Olive River, *c*. 3 km S of Mosquito Point, Apr 1993, *Clarkson 10012 & Neldner* (BRI, CANB, DNA, K); Lakefield National Park, Knifehole, 2 km from Saltwater Creek crossing on the Musgrave to Lakefield Road, May 1987, *Clarkson 7060 & Simon* (BRI, CNS, DNA, L, NSW, PERTH). Burke District: 54 km NW of Burketown on Escott Station (Gulf site 378), Apr 2007, *Thompson & Wilson WES1371* (BRI); 7 km NE of Normanton (Gulf site 57), Jun 2001, *Thompson & Turpin NOR294* (BRI); *c*. 10 km along the Normanton to 'Mogoura' Station road, SW of Normanton, Apr 1974, *Pullen 8858* (CANB); 15 km *c*. SW of Normanton on Burketown Road, Apr 1974, *Jacobs 1194* (NSW). North Kennedy District: Bohle River estuary, *c*. 13 km WNW of Townsville, Feb 1998, *Cumming 16799* (BRI); Townsville, at the east end of Marina Drive, Bushland Beach, Jul 2021, *Horsfall s.n.* (BRI, CANB 954477); Bushland Beach, Stony Creek, Bohle River boat ramp, Sep 2022, *Horsfall s.n.* (CANB 955859); Wunjunga Road, off Bruce Highway, S of Inkerman, S of Ayr, Jun 1997, *Cumming 16082* (BRI); Gloucester Island, S end, site 38, Apr 1994, *Batianoff & Figg 940430G* (BRI).

***Distribution and habitat*:** *Calandrinia halophila* is currently known from scattered locations along the northern Australian coast, including the Kimberley, greater Darwin region and Tiwi Islands, Gulf of Carpentaria and north-eastern Queensland north of Mackay (**Map 1**). There is also an occurrence on Saibai Island in the Torres Strait, approximately 5 km south of Papua New Guinea. It is anticipated that the species probably grows on the southern coast of mainland New Guinea.

Calandrinia halophila occurs within, or adjacent to estuarine environments in northern Australia. Plants are often found in areas lacking or with a very sparse overstorey canopy of *Melaleuca* spp. (predominantly *M. acacioides* F.Muell.) or mangrove species (**Fig. 2**). Associated ground layer species include *Sporobolus virginicus* (L.) Kunth, *Xerochloa imberbis* R.Br., *Fimbristylis* spp., *Calandrinia gracilis* Benth. *sens. lat*. and *Tecticornia* spp. Many collectors explicitly state or imply that the substrate is saline or subsaline, with sandy to gravelly surface soil over sandy saline clay being a typical description of the substrate. A small number of collections have been made on islands where the landform type may not be strictly estuarine but edaphic conditions are comparable. A collection from south-west of Normanton (*Jacobs 1194*) would appear to have been made from an atypical habitat described as 'ironstone pavement partially laterised, low open woodland with open shrub layer'. Typical habitat for *C. halophila* also occurs in the vicinity and although it is possible that the species extends into the habitat described, further field observations would provide clarification.

***Phenology*:** Flowering and fruiting specimens have been collected in the field between February and September.

***Affinities*:** Most specimens of *Calandrinia halophila* in Australian herbaria have hitherto been filed under *Calandrinia* indeterminate or an undescribed species; however, a few were determined as *C. pumila* (Benth.) F.Muell. *Calandrinia pumila* has a similar habit to *C. halophila* but the leaf is more clearly differentiated into a lamina (1–10 mm wide) and long petiole, the lamina being lanceolate,

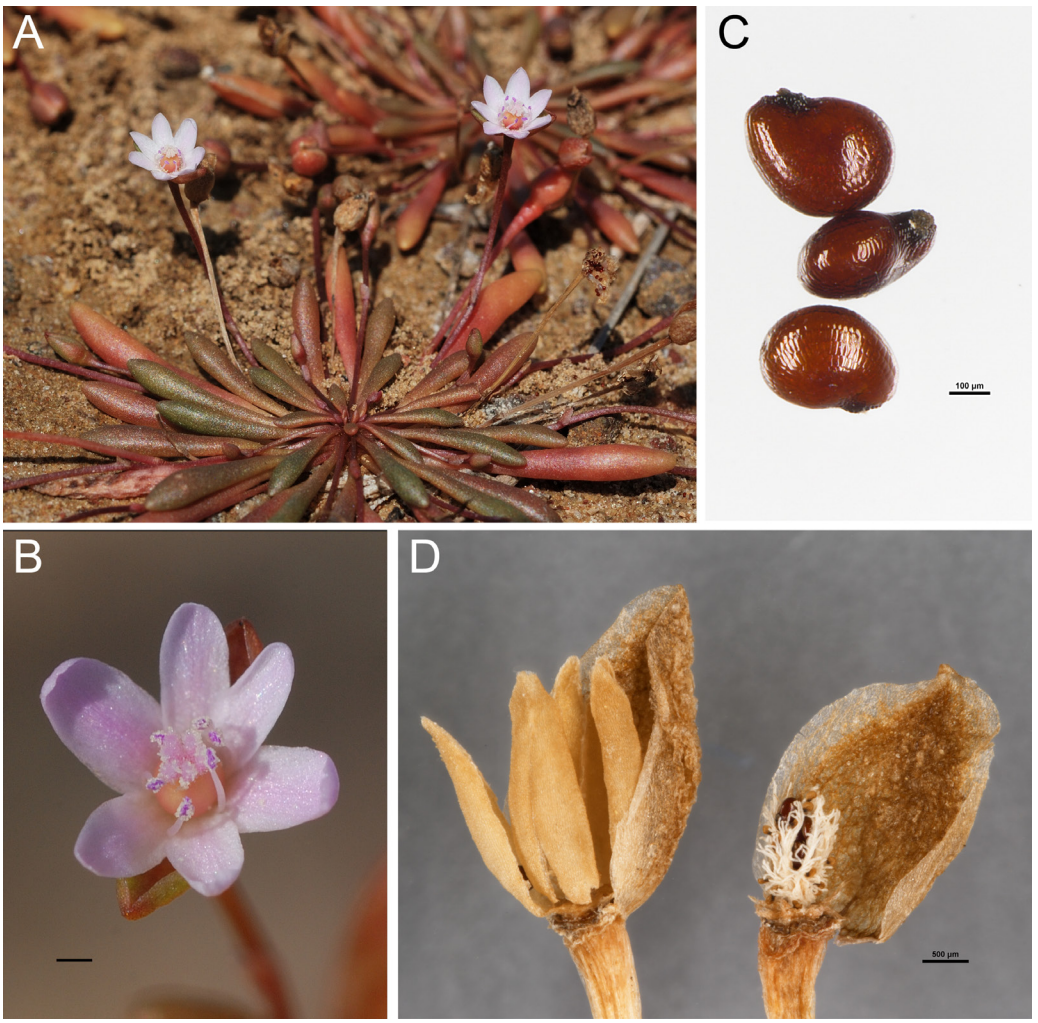

Fig. 1. ***Calandrinia halophila***: A. habit. B. flower. C. seeds. D. capsule valves separating with subtending sepal (LHS); exposed placentas, funicles and seed with abscising sepal (RHS). Scale bar: B = 0.5 mm; C = 0.1 mm; D = 0.5 mm. A, B & D from *Brennan 11733* (DNA); C from *Horsfall s.n.* (CANB 954477). Photos C & D: J. FitzGerald.

Fig. 2. Typical habitat of ***Calandrinia halophila.*** Bushland Beach, Townsville (*Horsfall s.n.*, CANB 955859). Photo: P. Horsfall.

elliptic, ovate, triangular or cordate, flower-bearing shoots usually distinctly exceeding the leaves and with more numerous (2–40+) flowers, opposite or rarely subopposite bracts, 5 petals, 3 stigmata, fruits that exceed the sepals and are basally circumscissile (lower part may split longitudinally but apex does not separate into valves), and slightly larger seeds (0.3–0.35 mm wide) with the swollen (but tiny) apex of the funicle persisting as a distinct strophiole. *Calandrinia pumila* occurs in more inland sites and is usually found in, or on the margins of temporary freshwater swamps, claypans and gilgais, and along intermittent non-saline watercourses and in run-on areas.

Dried herbarium specimens of *Calandrinia halophila* also resemble a species of rock pavements in eastern New South Wales and south-eastern Queensland recently described as *C. petrophila* J.G.West & Albr. However, that species differs from *C. halophila* in a range of features including being a perennial, having opposite bracts, fruiting pedicels 1.5–7 mm long, persistent sepals, 4 or 5 white petals (2.2–)3–6.5 mm long, longer (4–5.2 mm long) truncate capsules that split no deeper than halfway to the base into 4 persistent valves, and larger darker seeds (0.4–) 0.45–0.6 mm long, that are unevenly shiny and more prominently patterned.

***Notes*:** Although molecular sequence data are currently unavailable for *Calandrinia halophila*, stigmata and petal number would suggest placement in clade 6 recognised by Hancock *et al.* (2018). This clade aligns well with *Calandrinia* section *Basales* Poelln. and includes species with 4–6 stigmata and six or more petals. *Calandrinia halophila* differs from other species in clade 6 in having small petals, relatively few (5–10) stamens, and a unique combination of 5–7 stigmata and (5–)6–7(–8) petals.

***Conservation status*:** Very little is known about the size and health of populations and threatening processes operating regarding *Calandrinia halophila*. This uncertainty is reflected in the current risk category assigned for the NT (data deficient) and WA (priority one poorly known). In the NT the species occurs in Limmen National Park and in Queensland it occurs in Rinyirru (Lakefield) National Park. Significant disturbance caused by recreational activities is evident at one known site (Bushland Beach near Townsville) and appears to be impacting the currently extant population of *C. halophila* (P. Horsfall pers. comm.).

***Etymology*:** The specific epithet is derived from Greek *halo*-, salt, and *phileo*, I love, in reference to the species preference for saline or semi-saline environments.

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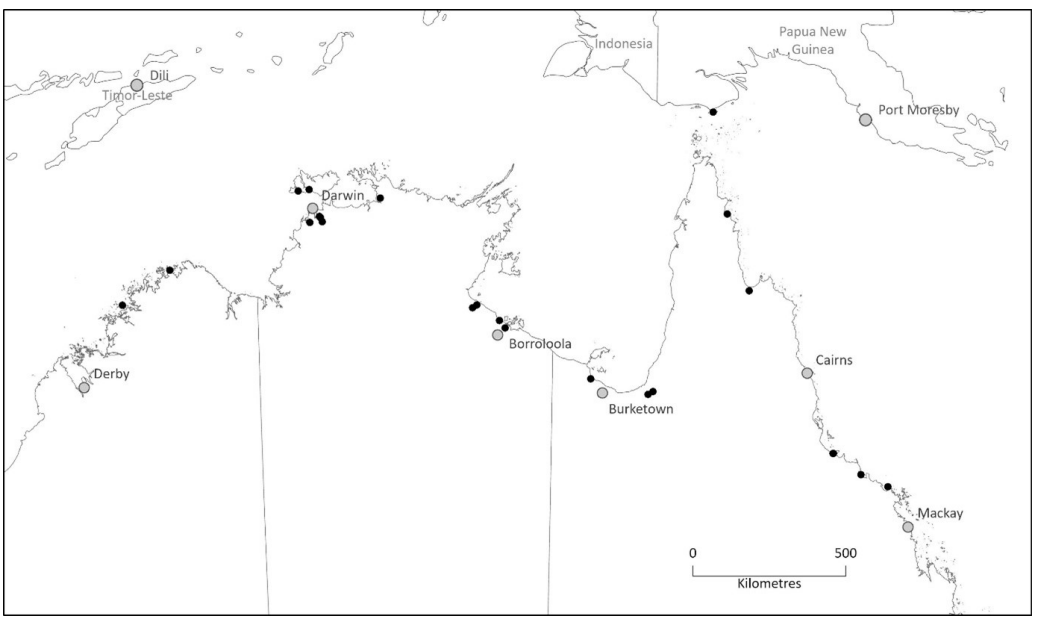

Map 1. Distribution of ***Calandrinia halophila***: based on specimens lodged at BRI, CANB, DNA, NSW and PERTH.