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Notes on the Queensland species of *Hydrocotyle* (Araliaceae)

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Abstract

Hydrocotyle elegans R.Br. ex A.Rich. is newly reinstated and described. Eight species names are lectotypified and notes provided. An identification key for the 19 species of *Hydrocotyle* in Queensland is included.

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Introduction

Hydrocotyle L. comprises herbaceous species distributed worldwide (Eichler 1986). The genus is well-represented in Australia, particularly in the southern half of the continent, where its species favour moist microclimates in forests, or beside creeks, waterholes and dams. It includes perennial, annual and ephemeral species.

In Queensland, there are 19 named accepted species (Bean & Henwood 2003; Bean 2023). In this paper, *H. elegans* is reinstated, a full description given, and representative specimens cited. Eight species names are lectotypified, i.e. *H. densiflora* DC., *H. elegans* R.Br. ex A.Rich., *H. geraniifolia* F.Muell., *H. grammatocarpa* F.Muell., *H. laxiflora* DC., *H. pedicellosa* F.Muell. ex Benth., *H. pulchella* R.Br. ex A.Rich. and *H. tripartita* R.Br. ex A.Rich. A dichotomous identification key is provided for all Queensland species of *Hydrocotyle*.

Methods

This study was based on examination of dried herbarium specimens accessioned with the Queensland Herbarium (BRI), images of type specimens at MEL, images of herbarium specimens from NSW, specimen images viewed on JSTOR Global Plants (Global Plants on JSTOR) and the Global Biodiversity Information Facility (GBIF), and websites of various individual herbaria.

Taxonomy

Key to the species of *Hydrocotyle* in Queensland

1 Leaf lamina divided right to base into 3–5 segments or leaflets **2**
1 Leaf blades simple, although sometimes deeply divided **5**
2 Mericarps conspicuously winged; leaflets (3–)5, terminal leaflet longest, 1.5–4 cm long ***H. geraniifolia***
2 Mericarps not winged; leaflets 3, all about the same length, 0.5–1.5 cm long **3**
3 Leaflets narrowly cuneate; 0–10 hairs on the lower surface of each leaflet ***H. paludosa***
3 Leaflets broadly cuneate; 20–100 hairs on the lower surface of each leaflet **4**
4 Mericarps 0.9–1.2 mm long; peduncles 4–9 mm long; radius at sinuses of lateral leaflets 10–30% of leaflet radius ***H. digitata***
4 Mericarps 0.6–0.8 mm long; peduncles 13–35 mm long; radius at sinuses of lateral leaflets 40–70% of

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leaflet radius ***H. tripartita***

5 Leaves peltate, petioles inserted at or near the middle of the lamina **6**

5 Leaves not peltate, petiole attached at the base of the lamina **7**

6 Inflorescence a many-branched umbel, each branch racemose; leaf lamina broadly elliptical, crenate ***H. bonariensis***

6 Inflorescence spike-like in appearance, not or sparsely branched racemose; leaf lamina orbicular, crenulate ***H. verticillata***

7 Leaf lamina glabrous on both surfaces (although there may be some hairs at the apex of the petiole) **8**

7 Leaf lamina hairy, at least along the veins on the lower surface **14**

8 Fruits not markedly laterally flattened, mericarps indistinct **9**

8 Fruits markedly laterally flattened, mericarps readily distinguished **10**

9 Fruits pyriform to obconical, 0.8–1.0 mm long; pedicels 0.1–0.3 mm long ***H. tumida***

9 Fruits ellipsoidal, 0.5–0.6 mm long; pedicels 0.4–0.6 mm long ***H. grammatocarpa***

10 Mericarp with 2 lateral ribs; stipules deeply laciniate ***H. dipleura***

10 Mericarp with 1 lateral rib; stipules entire or shortly toothed **11**

11 Leaves 3-lobed, radius at major sinuses 10–30% of lamina radius ***H. oraria***

11 Leaves 5–9-lobed, radius at major sinuses 40–85% of lamina radius **12**

12 Upper surface of leaf lamina with many dark spots; petioles 45–90 mm long; mericarps 0.8–0.9 mm long ***H. maculosa***

12 Upper surface of leaf lamina lacking dark spots; petioles 4–50 mm long; mericarps 0.6–0.7 mm long **13**

13 Peduncles 0–1 mm long; mericarps with a central green or white mound; styles sessile or up to 0.1 mm long ***H. demissa***

13 Peduncles 2–9 mm long; mericarps without a mound; styles 0.2–0.3 mm long ***H. elegans***

14 Inflorescence typically branched with numerous pedunculate umbels of flowers at various positions on the rachis **15**

14 Inflorescence consisting of a single umbel **16**

15 Pedicels 1–1.7 mm long; peduncles 1–8 mm long; mature mericarps 1.4–1.7 mm long ***H. miranda***

15 Pedicels 3–8 mm long; peduncles up to 30 mm long; mature mericarps 1.1–1.3 mm long ***H. pedicellosa***

16 Leaves 3-lobed, radius at major sinuses 10–30% of lamina radius ***H. oraria***

16 Leaves 4–9-lobed, radius at major sinuses 45–90% of lamina radius **17**

17 Styles 0.6–1.0 mm long; plants unisexual; male flowers with pedicels 1.5–5 mm long; female flowers and fruits with pedicels 0–0.7 mm long ***H. laxiflora***

17 Styles 0.2–0.5 mm long; plants bisexual; all flowers with pedicels 0–0.7 mm long **18**

18 Mericarps 1.0–1.2 mm long, with abundant slender hairs 0.1–0.2 mm long ***H. inops***

18 Mericarps 0.6–0.8 mm long, glabrous or with short papillae **19**

19 Leaves shallowly lobed (radius at major sinuses 75–85% of lamina radius), upper surface glabrous, with many tiny reddish punctate glands, < 0.1 mm apart; mericarps glabrous ***H. fontana***

19 Leaves usually deeply lobed (radius at major sinuses 45–75% of lamina radius), upper surface at least sparsely hairy, without punctate glands; mericarps nearly always papillose ***H. acutiloba***

Hydrocotyle geraniifolia F.Muell., *Trans. & Proc. Victorian Inst. Advancem. Sci.* 1: 126 (1855).

Type: Victoria. Dandenong Ranges, January 1853, *F. Mueller s.n.* (lecto: MEL 7903, here chosen; isolecto: E 00807165, K 000686186).

Illustrations: Hastings & Wiecek (1992: 100); Leiper *et al*. (2017: 490)

Distribution. In Queensland, confined to a few isolated locations from Mount Abbot (near Bowen) to Mount Barney National Park. Also in New South Wales and Victoria.

Notes. There are two localities cited in the protologue; Dandenong Ranges and Mt Disappointment, and there are extant specimens associated with both localities. The Dandenong Ranges syntype has been chosen as the lectotype because it is of good quality and is duplicated in other herbaria.

Hydrocotyle elegans R.Br. ex A.Rich., *Monogr. Hydrocotyle* 58, t. 32 (1820).

Type: New South Wales. Port Jackson, undated, *R. Brown* (lecto: P 00115408, here chosen).

H. pulchella R.Br. ex A.Rich., *Monogr. Hydrocotyle* 59 (1820). Type: New South Wales. Port Jackson, undated, *R. Brown* (lecto: P 00115424, here chosen), ***syn. nov.***

H. hirta var. *pusilla* Benth., *Fl. Austral.* 3: 340 (1867). Type citation: "From Queensland to Tasmania, including some of Sieber's specimens, n. 14". Type: Nova Hollandia, [1823], *F.W. Sieber 114* (syn: G 00388561, M 0172694).

[*H. peduncularis auct. non* R.Br. ex A.Rich.: Wakefield (1951), in part; Stanley (1986: 244); Hastings & Wiecek (1992: 101); Bean (2022)]

Prostrate stoloniferous herb; stems filiform, glabrous or rarely sparsely hairy. Stipules orbicular, 0.5--0.9 x 0.6--1.1 mm, translucent; margin entire or ciliate. Peti-

oles of fully developed leaves terete, 7--29 mm long, inserted at base of lamina, glabrous or with a few retrorse hairs (0.5--0.9 mm long) at the distal end. Lamina orbicular-cordate, radius 3.0--7.0 mm, with 5--6 major palmate veins; margin with 3--6 deep lobes, each lobe crenate or lobed; radius at major sinuses 50--71% of lamina radius; upper surface glabrous, with or without reddish punctate glands; lower surface glabrous. Inflorescence umbellate, 4--10-flowered, all flowers bisexual; peduncles 2--9 mm long, shorter than the adjacent petiole, glabrous. Involucral bracts few, elliptical, c. 0.6 mm long; pedicels 0.3--0.4 mm long; petals white or purple, 0.2--0.3 mm long, anthers c. 0.15 mm long. Schizocarps symmetrical, compressed; mericarps 2, +/- lenticular, 0.6--0.9 mm long, 0.45--0.55 mm wide, green, glabrous or papillose; dorsal ribs not winged; lateral rib prominent. Fruiting styles 0.2--0.4 mm long, style base swollen.

Queensland. Darling Downs. 6 km from Mt Colliery towards Gambubal State Forest, 11 Apr 1999, *A.R. Bean 14807* (BRI, MEL, NSW); Mount Huntley, 4 Oct 1992, *P.I. Forster PIF11840 et al.* (BRI). Wide Bay. Gin Gin Creek, 7 km NE of Gin Gin, 29 May 1995, *A.R. Bean 8660* (BRI, MEL); Glastonbury Creek, 1.5 km NE of Glastonbury, 7 Oct 1993, *A.R. Bean 6735* (BRI, CANB). Cook. Wongabel State Forest, S of Atherton, 27 Apr 2002, *A.R. Bean 18893* (BRI, DNA, MEL, NSW). Leichhardt. Blackdown Tableland, 10 Sep 1971, *R.J. Henderson H1128 et al.* (BRI). Burnett. Bunya Mountains National Park, Mt Kiangarow lookout, 18 Nov 1983, *H. Eichler 23363* (BRI, CANB); 7.2 km along Dangore Mtn road, WSW of Tingoora, 21 May 1996, *A.R. Bean 10316* (BRI, MEL). Moreton. Petrie, 18 miles [29 km] N of Brisbane, Sep 1931, *S.T. Blake 2690* (BRI); Chermside, Brisbane, 5 Oct 1977, *E. Ross s.n.* (BRI, AQ378608). Port Curtis. Boyne River, Bulburin State Forest 391, 15 Jun 1995, *E.J. Thompson CAL344 & G.P. Turpin* (BRI).

New South Wales. North Western Slopes. Out of Tamworth, Boonie Creek, 14 Nov 1983, *H. Eichler 23331*(NSW); Sydenham, 4 miles [6.4 km] N of Linton, Barraba District, Jan 1913, *H. Rupp 19* (NSW). Northern Tablelands. Lands End road, Brother State Forest, E of Glen Innes, 27 Dec 2005, *A.R. Bean 24526* (BRI, NSW); Mt Yarrowyck, 19 Oct 1990, *S. McIntyre 10-20* (NSW); Near Bendemeer, 2 Nov 1955, *G.L. Davis s.n.*(NSW78255). North Coast. Gloucester Bucketts c. 1 mile [1.6 km] W of Gloucester, 8 Apr 1967, *R.G. Coveny s.n.* (NSW219454); Brumby Plains Road, 300 m from junction with Nth Yabbra Rd, W side of road, Unumgar State Forest, 9 Mar 1993, *A. Benwell 9* (NSW); Orara River, 18 Nov 1992, *S. Jacobs 6646* (NSW). Central Tablelands. Oberon-Tarana Road, 11 Nov 1983, *H. Eichler 23312* (NSW). Central Coast. Yellow Rock, Albion Park, 17 Nov 1949, *E.J. McBarron 4053* (NSW); Wallacia, 29 Aug 1974, *J. Thompson 2084* (NSW). South Coast. Currowar Creek, Yutteyuttoh Nature Reserve, 15 Apr 1997, *A. Bofeldt s.n.* (NSW434233).

Illustrations: Stanley (1986: 243), as *H. peduncularis*; Hastings & Wiecek (1992: 100), as *H. peduncularis*.

Diagnostic features. This species is characterised by its small, glabrous, rather deeply-lobed leaves (radius at major sinuses 50-71% of lamina radius), few-flowered umbels and small fruits. It matches the type specimens of both *Hydrocotyle pulchella* and *H. elegans*. Richard (1820) described these as separate species, but his reason for doing so is unclear; both their protologue descriptions (translated from the original French and Latin) and their type specimens are very similar. *H. pulchella* and *H. elegans* were both listed in the Australian Plant Census (CHAH 2011) as "names of uncertain application".

Distribution. In Queensland, mainly south and east of Gladstone, but with some disjunct populations further west and on the Atherton Tableland. Also widespread in eastern New South Wales, south to around Batemans Bay.

Notes. The name *H. peduncularis* was previously misapplied to this species in Queensland and New South Wales, firstly by Wakefield (1951). *H. peduncularis* was named from a type collected in northern Tasmania, and has sparsely hairy laminae, petioles and peduncles, and larger fruits; it is currently placed in the synonymy of *H. sibthorpioides* Lam. (CHAH 2011).

The only specimen cited by Bentham for *H. hirta* var. *pusilla* (Sieber No. 114, erroneously cited by Bentham as 'n. 14') matches the type of *H. elegans*.

Hydrocotyle tripartita R.Br. ex A.Rich., *Monogr. Hydrocotyle* 69 (1820).

Type: New South Wales. Cow pastures, [18--23 October 1803], *R. Brown s.n.* [Bennett number 4506] (lecto: P 00115431 (here chosen); isolecto: BM 000795173, E 00000011, E 00000012, K 000686174, K 000686175).

Illustrations: Hastings & Wiecek (1992: 100); Leiper et al. (2017: 508), as *H. peduncularis.*

Distribution: In Queensland, mainly from Kenilworth southwards, but with isolated populations further north at Kroombit Tops and Eungella. Also in New South Wales, Victoria, South Australia, Tasmania, and New Zealand (AVH 2023).

Notes: "Cow pastures" was a place visited by Robert Brown (with his guide George Caley) in October 1803. It was near present-day Camden, and close to the Nepean River (Vallance et al. 2001). Robert Brown apparently made only one gathering of *H. tripartita* from "Cow pastures", but there are numerous duplicates. The specimen at P is selected as the lectotype as it is the only one that was definitely seen by Richard.

Hydrocotyle acutiloba (F.Muell.) N.A.Wakef., *Vict. Naturalist* 68: 7 (1951).

Type: Queensland. Dawson River, [November 1856], *F. Mueller* (lecto: MEL 7777, *fide* Wakefield (1951); isolecto: BM 000810387; K 000686160).

H. hirta var. *acutiloba* F.Muell., *Fragm.* 4: 181, index (1864)

Illustrations. Stanley (1986: 243); Leiper et al. (2017: 256)

Distribution. In Queensland, widespread from the Windsor Tableland (west of Daintree) southwards, and west almost to Tambo. Also in New South Wales and eastern Victoria.

Notes. The type specimen of *H. hirta* var. *acutiloba* is a plant with large sparsely hairy leaves each with 5 prominent lobes, and it closely matches perhaps half a dozen specimens at BRI, from central and southern Queensland. However, there appears to be continuous variation between this form and the more often seen forms with smaller, more densely hairy leaves with less pronounced lobing. The flower number and size, and the mericarp size remain more or less constant, and the mature mericarps are papillose in almost all specimens.

The distinctions between *H. acutiloba* and *H. hirta* (originally described from Tasmania), are unclear to me. The only key I have seen that includes both species is in the Flora of Victoria (Duretto 1999), repeated on Keybase (2023), and evidently partly derived from the short paper by Wakefield (1951). The character states used there to separate *H. acutiloba* and *H. hirta* are overlapping and difficult to interpret.

A further unknown is the identity and status of *Hydrocotyle gaudichaudiana* DC., a poorly known species described from Bathurst, New South Wales. Based on an image of the type at P, it appears to be part of the *hirta/acutiloba* complex. *H. gaudichaudiana* postdates *H. hirta* but predates *H. acutiloba*.

I propose to maintain the use of the name *H. acutiloba* for all Queensland material for the present.

Hydrocotyle pedicellosa F.Muell. ex Benth., *Fl. Austral.* 3: 341 (1867).

Type: New South Wales. Richmond River, undated, *H. Beckler s.n.* (lecto: MEL 8099 (here chosen); isolecto: K 000686173; MEL 8101).

Illustrations: Stanley (1986: 243); Hastings & Wiecek (1992: 100); Nicholson & Nicholson (2007); Leiper et al. (2017: 390).

Distribution: In Queensland, found in the Mount Lewis area and the Atherton Tableland in north Queensland, and from Yandina to the MacPherson Range in south-east Queensland. Also found in north-eastern New South Wales.

Note: The sheet MEL 8099 is chosen as the lectotype as it includes the notation 'Richmond River, Beckler' in Mueller's hand.

Hydrocotyle grammatocarpa F.Muell., *Fragm. 2: 128* (1861).

Type: [Northern Territory?] Around lakes, Gulf of Carpentaria, [1855-56], *F. Mueller s.n.* (lecto: K 000686139, here chosen; isolecto: MEL 7928).

Distribution: In Queensland, found adjacent to the Gulf of Carpentaria, and from Cape York Peninsula to Shoalwater Bay. Also in the Northern Territory.

Notes. The duplicate at K has been chosen as the lectotype because it is a much better specimen than the one at MEL. Mounted on the same sheet as the lectotype and intermixed with it are fragments of at least two other species i.e. a grass, and an opposite-leaved herb.

Hydrocotyle laxiflora DC., *Prodr.* 4: 61 (1830).

Type: New Holland, Port Jackson, [1819], *C. Gaudichaud s.n.* (lecto: P 00115417, here chosen).

H. densiflora DC., *Prodr.* 4: 67 (1830). Type: New Holland, [1819], *C. Gaudichaud s.n.* (lecto: P 00115416, here chosen).

H. laxiflora var. *minor* Benth., *Fl. Austral.* 3: 340 (1867). Type. Queensland. Moreton Bay, undated, *C. Stuart s.n.* (syn: K 000686172), ***syn. nov.***

H. rhombifolia F.Muell., *Fragm.* 7: 147 (1871). Type: New South Wales. Armidale, 1871, *R. Perrott s.n.* (syn: NSW 78095; syn: K 000686164), ***syn. nov.***

H. candollei F.Muell., *Key Vict. Pl.* 1: 267 (1888), *nom. illeg.* (*H. laxiflora* cited in synonymy). Type: not cited.

Illustrations: Stanley (1986: 243); Hastings & Wiecek (1992: 100); Leiper et al. (2017: 198).

Distribution: In Queensland, *H. laxiflora* extends from Gympie southwards, and west to the Bunya Mountains, with a disjunct occurrence in the Mount Moffatt area of central Queensland. Also widespread in New South Wales, Victoria, and south-eastern South Australia (AVH 2023).

Notes: Hydrocotyle laxiflora var. *minor* and *H. rhombifolia* were listed in the Australian Plant Census (CHAH 2011) as "names of uncertain application", but the types of both are clearly attributable to *H. laxiflora*. Lectotypes have not been chosen for *H. rhombifolia* and *H. laxiflora* var. *minor* because I am not confident that I have seen all of the existing original material.

Disclosures

No conflicts of interest.

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