

***Thismia hawkesii* W.E.Cooper and *T. lanternatus*
W.E.Cooper (Thismiaceae), two new fairy lantern species
from the Wet Tropics Bioregion, Queensland, Australia**

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Summary

Cooper, W.E. (2017). *Thismia hawkesii* W.E.Cooper and *T. lanternatus* W.E.Cooper (Thismiaceae), two new fairy lantern species from the Wet Tropics Bioregion, Queensland, Australia. *Austrobaileya* **10(1): 130–138**. *Thismia hawkesii* and *T. lanternatus* are described and illustrated. Notes on habitat, habit and distribution are provided as well as a key to all species in Australia.

Key Words: Thismiaceae, *Thismia*, *Thismia hawkesii*, *Thismia lanternatus*, Australia flora, Queensland flora, Wet Tropics bioregion, new species, rainforest, identification key

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Introduction

Thismia Griffith (Thismiaceae) comprises c. 66 species occurring in Asia, America, New Zealand and Australia (Mabberley 2008; Mycoheterotrophic plants 2017) with the largest species diversity from South East Asia (Chantanaorrapint 2012). Most species are tropical, but a small number of species occur in subtropical and temperate areas in Australia, New Zealand and North America.

Thismia plants are terrestrial, achlorophyllous, mycoheterotrophic herbs that flower fugaciously amongst or beneath leaf litter and are very difficult to find, unless searchers are especially focused on finding plants of this genus during wet weather when they are only conspicuous by their flowers. *Thismia* plants lack chlorophyll and obtain carbohydrates and possibly other nutrients from adjacent photosynthetic plants by accessing fungal mycorrhizal networks (Leake 2005; Merckx & Wapstra 2013).

Five *Thismia* species have been described from Australia: *T. rodwayi* F.Muell. from Tasmania, Victoria, New South Wales (NSW), southeastern Queensland and New Zealand; *T. clavarioides* K.R.Thiele and *T.*

megalongensis C.Hunt, G.Steenbeeke & V.Merckx from NSW; *T. yorkensis* Cribb from Cape York Peninsula in far north Queensland and *T. tectipora* Cowie from Melville Island, Northern Territory.

In 1963, a fruiting specimen (*Hyland 2879*, BRI) of an undescribed species of *Thismia*, later phrase-named as *T. sp.* Scrubby Creek (M.S.Hopkins & A.W.Graham 94/8) in CNS, was collected from the Herberton Range (now Baldy Mountain Forest Reserve). Fifty-four years later in 2017, Bernie Hyland, now retired, took the collectors of the type specimen back to the exact site for recollection! This species is described herein as *Thismia hawkesii* W.E.Cooper.

A second undescribed species was collected as a flowering specimen by Rigel Jensen (*Jensen 940*, BRI) in 1998, during a survey sifting rainforest leaf litter for Lumholtz's tree-kangaroo scats on the property *Ty-Gwyn* at Chilverton near Ravenshoe. Flowers and fruits were collected from the same location in 2003 (*Cooper 1817*, CNS) for illustration in Cooper and Cooper (2004; as '*T. sp.* Ty-Gwyn'). A further search of the same property in 2017 resulted in the type collection (*Cooper 2407 et al.*, CNS) for the species, described herein as *Thismia lanternatus* W.E.Cooper.

These two new species bring the number of Australian species to seven.

Materials and methods

This study is based on examination of six voucher collections preserved in 70% ethanol from BRI, CNS and CANB, as well as freshly collected specimens. During the course of this study, hairs evident on fresh flowers of *T. hawkesii* were observed to diminish soon

after immersion in 70% ethanol. Indeed, most specimens observed quickly become somewhat soft and fleshy in ethanol. For these reasons, *Thismia* descriptions should be made from fresh material as soon as possible after collection.

Abbreviations used in the specimen citations include SFR (State Forest Reserve) and NP (National Park).

Taxonomy

Key to Australian species of *Thismia*

- 1 Mitre-processes absent 2
- 1. Mitre-processes present 3
- 2 Roots coralloid; mitre white; outer tepals distinct and slightly reflexed **T. yorkensis**
- 2. Roots vermiform; mitre black or dark brown; outer tepals absent or minute (not visible to the naked eye), not reflexed **T. lanternatus**
- 3 Mitre-process a solitary, terminal tentacle-like process 4
- 3. Mitre-processes comprised of 3 lateral or terminal tentacle-like processes 5
- 4 Perianth tube with 6 toothed ribs **T. hawkesii**
- 4. Perianth tube without toothed ribs **T. tectipora**
- 5 Perianth tube whitish or colourless; mitre-processes > 20 mm long **T. clavarioides**
- 5. Perianth tube yellow, orange or reddish; mitre-processes < 5 mm long 6
- 6 Outer perianth lobes terminating in a bristle 2–8 mm long **T. megalongensis**
- 6. Outer perianth lobes not bristle-tipped **T. clavarioides**

1. *Thismia hawkesii* W.E.Cooper sp. nov. Similar to *T. betung-kerihunensis* Tsukaya & H.Okada, but differing in the perianth tube bluish in basal area (rather than at the apices), urceolate (versus cone-shaped), having 6 dentate ribs (versus ribs lacking), and the mitre being blackish (versus blue-green) and dished (versus domed) at the apex. **Typus:** Queensland. COOK DISTRICT: Baldy Mountain Forest Reserve, Herberton Range, near Atherton, 29 January 2017, *W. Cooper 2407, R. Jensen, B. Hyland, T. Hawkes, T. de Groot & B. Gray* (holo: CNS [spirit only]).

Thismia sp. Scrubby Creek (M.S.Hopkins & A.W.Graham 94/8)

Achlorophyllous, fleshy herb, lacking above-ground stems and with flowers borne at ground level, fleshy; roots coralloid, densely clustered. **Leaves** spirally arranged, scale-

like, narrowly triangular, 2–3.5 mm long, *c.* 1 mm wide at base, whitish, glabrous, papillose; base truncate; apex acute, entire. **Bracts** subtending flowers ovate, mostly keeled, 3.5–6.5 mm long, to 3.5 mm wide, cream-coloured. **Flowers** solitary, sessile, terminal, actinomorphic, 18–26 mm long (including mitre-process); mitre-process a solitary, terminal tentacle-like process; **perianth** 14–22 mm long (including mitre process), 7–8 mm wide; **tube** inflated, urceolate, 6-ribbed with ribs dentate, glabrous except for short hairs lining the aperture margin, white in upper half, aqua-blue ageing to olive-green in lower half, the ribs blackish or very dark brown; **outer tepals** absent or comprising narrow wings to *c.* 0.15 mm long, blackish or very dark brown, glabrous; **inner tepals** 3, 8.5–9.5 mm long (including mitre-processes), *c.* 5.5 mm wide at the widest part, somewhat

trullate, connate (rarely separating with age), forming a hood over each opening and with 3 vertical lobes creating a dished or doughnut-shaped depression at apex; mitre-processes terminal, 3-sutured, slender, 5–8.5 mm long, blackish or very dark brown, glabrous; **stamens** 6, connate and forming a pendulous tube hanging from perianth aperture, each with 2 adaxially positioned shallow loculi, indigo-blue, abaxial and adaxial surfaces with erect, colourless, translucent trichomes; **connectives** rectangular with acute apical lobes; **lateral appendages** flattened, adaxial, large, wing-like, \pm square or sometimes almost hastate, with an acute apex and erect, colourless, translucent, marginal trichomes; **anthers** adaxial, extrorse, pale yellow; **style** c. 1 mm long with 3, erect, oblong, emarginate stigmatic lobes, each with minute erect trichomes abaxially and adaxially; **ovary** inferior, not delimited from hypanthium, unilocular, 3-carpellate, obovate, smooth, aqua-blue, glabrous; ovules numerous. **Fruit** a cup-shaped capsule c. 4.5 mm long and 7.5 mm wide, on a pedicel elongated to c. 75 mm above bracts; seeds numerous, spindle-shaped, c. 0.5 mm long. **Figs. 1 & 2.**

Additional specimens examined: Queensland. COOK DISTRICT: SFR 194, Scrubby Creek Water Intake, Carrington Road, Feb 1994, *Hopkins & Graham 94/8* (CNS); [SF]R194 CPT 50, Jun 1963, *Hyland 2879* (BR1).

Distribution and habitat: *Thismia hawkesii* occurs in simple notophyll vine forest dominated by *Cardwellia sublimis* F.Muell., *Darlingia darlingiana* (F.Muell.) L.A.S.Johnson, *Doryphora aromatica* (F.M.Bailey) L.S.Sm., *Flindersia brayleyana* F.Muell., *Neisosperma poweri* (F.M.Bailey) Fosberg & Sacht, *Neolitsea dealbata* (R.Br.) Merr. and *Toeichima erythrocarpum* (F.Muell.) Radlk.

Phenology: Flowers have been recorded in January and February; fruit has been recorded in June.

Notes: *Thismia hawkesii* is morphologically similar to *T. betung-kerihunensis* Tsukaya & H.Okada from Borneo (Tsukaya & Okada 2005) rather than to other Australian species. It most noticeably differs from that species in the perianth tube being bluish in the basal area

(rather than at the apices), urceolate (versus cone-shaped), with 6 dentate ribs (versus ribs lacking), and the mitre being blackish (versus blue-green) and dished (versus domed) at the apex.

Etymology: The specific epithet *hawkesii* is in honour of naturalist and enthusiastic field assistant, Tim Hawkes (1965–).

2. *Thismia lanternatus* W.E.Cooper sp. nov. Similar to *T. mucronata* Nuraliev but differing in the mitre black or very dark brown (versus greyish-white), mitre apex shortly nipple-like (versus an erect pyramidal mucro), outer tepals very short, wing-like and blackish (versus broadly triangular and greyish-white) and ovary conical (versus obconic). **Typus:** Queensland. COOK DISTRICT: Ty-Gwyn, Chilverton near Ravenshoe, 29 January 2017, *W. Cooper 2403, R. Jensen, T. Hawkes & T. de Groot* (holo: CNS [spirit only]).

Illustration: Cooper & Cooper 2004: 95 (as '*Thismia* sp. Ty-Gwyn')

Achlorophyllous, fleshy herb, lacking above ground stems and with flowers borne at ground level; roots vermiform, terete, branched, 1.6–2 mm thick. **Leaves** spirally arranged, scale-like, triangular, c. 5 mm long, 2.5–3 mm wide at base, whitish, glabrous, papillose; base truncate; apex acute, entire. **Bracts** subtending flowers triangular, keeled, 4–10 mm long, 2.5–5 mm wide, papillose, cream-coloured. **Flowers** solitary, sessile, terminal, actinomorphic, without mitral lobes; **perianth** 25–26 mm long; **tube** inflated, obovoid, dirty yellow with 12 longitudinal orange or dark-purplish veins, glabrous; aperture margin with 6 crenate lobes; **outer tepals** 3, very short and wing-like, c. 0.5 mm long and 7 mm wide, black or very dark brown; **inner tepals** 3, trullate, c. 11 mm long, to 11–12 mm wide at widest point, connate and together forming a flattish dome or mitre c. 6 mm above the perianth aperture with a nipple-like apex, black or very dark brown, glabrous; **stamens** 6, connate and forming a pendulous tube hanging from perianth aperture, each with 2 adaxially positioned shallow loculi, the abaxial surface facing the centre of the perianth tube whitish;



Fig. 1. *Thismia hawkesii* flowers with an immature fruit on the right hand side (Cooper 2407 et al., CNS). Photo: R. Jensen

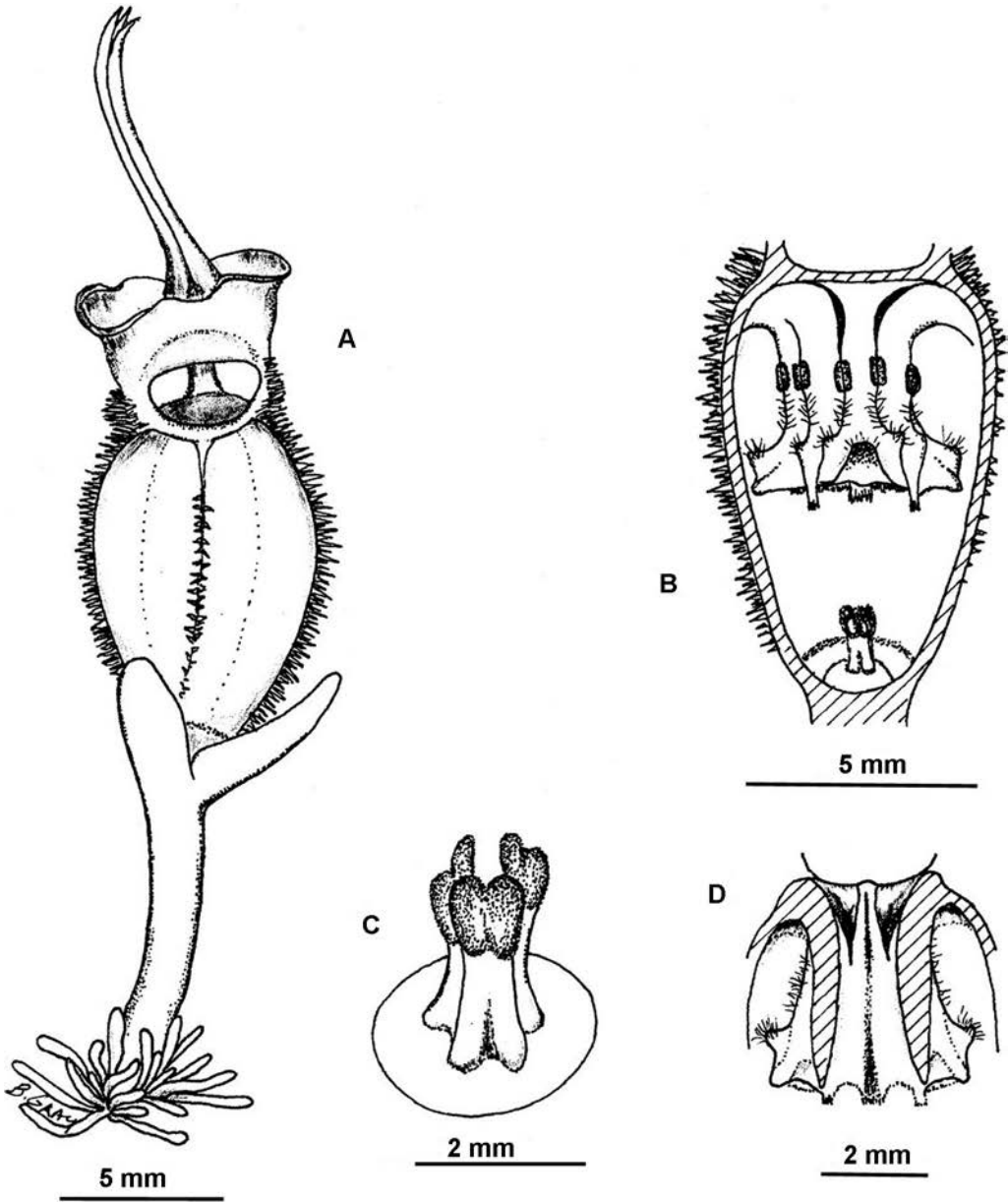


Fig. 2. *Thismia hawkesii*. A. habit showing stem, leaves, flower and roots. B. flower, longitudinal cross-section showing pendulous stamens, anthers, style and stigmas. C. stigmas and operculum. D. pendulous stigmas showing abaxial surface in the centre of the flower. Scales as indicated. All from Cooper 2407 et al. (CNS). Del. B. Gray.

connectives rectangular with 3- or 4-toothed apices; **lateral appendages** flattened and wing-like, adaxial, \pm square; **anthers** adaxial, extrorse, pale yellow; **style** *c.* 2.5 mm long with 3 deeply divided, narrowly-triangular, erect, lanceolate stigmatic lobes *c.* 1.8 mm long, each acute at apex and with minute, erect

trichomes abaxially and adaxially; **ovary** inferior, not delimited from hypanthium, unilocular, 3-carpellate, conical, *c.* 5 mm long and 3 mm wide, glabrous; ovules numerous. **Fruit** (only one unripe fruit seen) cup-shaped, *c.* 5 mm long and wide, cream-green with brownish dots. **Figs. 3 & 4.**



Fig. 3. *Thismia lanternatus* flowers (Cooper 2403 *et al.*, CNS). Photo: T. Hawkes

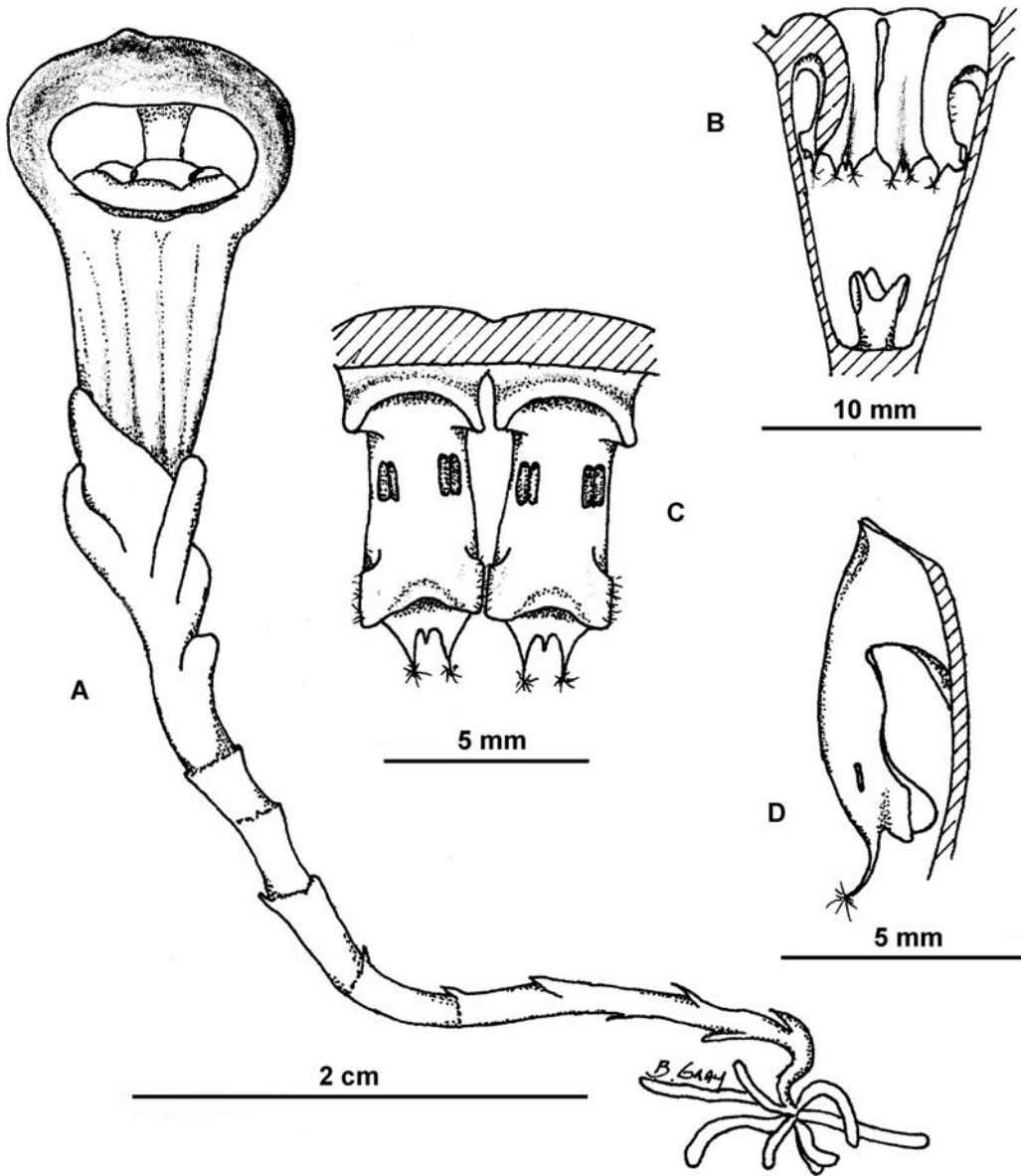


Fig. 4. *Thismia lanternatus*. A. habit showing stem, bracts, leaves, flower and roots. B. flower, longitudinal cross-section showing pendulous stamens, style and stigmas. C. pendulous stigmas showing adaxial surface and anthers. D. stamen lateral view showing lateral appendages. Scales as indicated. All from Cooper 2403 et al. (CNS). Del. B. Gray.

Additional specimens examined: Queensland. COOK DISTRICT: Chilverton on Kennedy Highway near Ravenshoe, Dec 1998, *Jensen RJ940* (BRI); Chilverton near Ravenshoe, March 2003, *Cooper WWC1817* & *Cooper* (BRI).

Distribution and habitat: *Thismia lanternatus* is known only from a small area of disturbed rainforest on metamorphic soil at Chilverton near Ravenshoe on the Atherton Tablelands. The surrounding forest is dominated by *Beilschmiedia tooram* (F.M.Bailey) B.Hyland, *Caesalpinia robusta* (C.T.White) Pedley, *Cardwellia sublimis* F.Muell., *Castanospora alphandii* (F.Muell.) F.Muell., *Daphnandra repandula* (F.Muell.) F.Muell., *Doryphora aromatica* (F.M.Bailey) L.S.Sm. & *Neolitsea dealbata* (R.Br.) Merr.

Phenology: Flowers have been recorded in December, January & February. Unripe fruit has been recorded in March.

Notes: *Thismia lanternatus* is morphologically most similar to *T. mucronata* Nuraliev from Vietnam (Nuraliev *et al.* 2014) rather than other Australia species. It differs from that species in the mitre of the flower being black or very dark brown (versus greyish-white), with the apex shortly nipple-like (versus an erect pyramidal mucro), the outer tepals very short, wing-like and blackish (versus broadly triangular and greyish-white) and the conical ovary (versus obconic).

Ho *et al.* (2009) noted that *Thismia tentaculata* K.Larsen & Aver. occurred in close proximity to both *Burmannia itoana* Makino (Burmanniaceae) and *Sciaphila ramosa* Fukuy. & T.Suzuki (Triuridaceae). An undetermined *Thismia* (*Brass* 23549, CANB) collected from Milne Bay in Papua New Guinea was associated with *Corsia* (*Brass* 23548, CANB) and *Sciaphila* (*Brass* 23550, CANB). We collected flowering *Corsia dispar* D.L.Jones & B.Gray (*Cooper* 2404, *Jensen, Hawkes & de Groot*, CNS), less than one metre from *Thismia lanternatus* (*Cooper* 2403 *et al.*, CNS). From these records, it seems likely that *Thismia* plants may often occur with other mycoheterotrophic plants.

Etymology: The specific epithet is derived from the Latin *lanterna* (lantern) and *-atus* (resembling), referring to the lantern-like flower.

Acknowledgements

I am especially grateful for expertise and good company in the field provided by Rigel Jensen, Tim Hawkes, Tony de Groot, Bernie Hyland and Bruce Gray. Many thanks to Kevin Thiele and Darren Crayn who provided valuable comments to an earlier manuscript and to Peter Bostock for Latin derivations. The curators of BRI, CNS and CANB are thanked for facilitating the examination of their collections, especially Frank Zich. Ceinwen and Trefor Edwards generously allowed us access to their property “Ty-Gwyn” to collect specimens of *T. lanternatus*. Permits to collect were issued to the Australian Tropical Herbarium by the Queensland Department of Environment and Heritage Protection. Bruce Gray kindly provided line drawings of both species.

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