

New and important distribution records for *Candalides* butterflies in Australia, with observations on their biology and adult food plants

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Abstract

This paper lists fourteen (14) new or important locations in Australia for six species of butterflies from the genus *Candalides* Hübner (Lepidoptera: Lycaenidae: Polyommatainae), namely *C. helenita* (Shining Pencil-blue), *C. cyprotus* (Copper Pencil-blue), *C. hyacinthina* (Varied Dusky-blue), *C. erinus* (Small Dusky-blue), *C. delospila* (Spotted Dusky-blue) and *C. heathi* (Rayed Blue). Notes associated with particular records provide insight into the ecological circumstances and the behaviour of the species at particular sites.

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Handling editor: Peter Valentine

Citation: Dunn KL. 2017. New and important distribution records for *Candalides* butterflies in Australia, with observations on their biology and adult food plants. *North Queensland Naturalist* 47: 1-5.

Introduction

Over the last 15 years, I have deliberately sought to expand knowledge of butterflies in more remote parts of Australia, including the smaller species of the family Lycaenidae, such as those belonging to the genus *Candalides* Hübner, one group given attention when larval food plants, which are often conspicuous, were seen. Records of *Candalides* are relatively sparse in remote areas and I compiled 14 records of interest for *C. helenita* (Shining Pencil-blue), *C. cyprotus* (Copper Pencil-blue), *C. hyacinthina* (Varied Dusky-blue; *C. hyacinthinus* in Braby 2016), *C. erinus* (Small Dusky-blue), *C. delospila* (Spotted Dusky-blue) and *C. heathi* (Rayed Blue), several being remote from other known sites. Biological notes enhance some encounters and include nectar sources for the adult butterflies where these were identifiable. This paper records the results from four field trips (from Victoria) to southern Cape York Peninsula (January 2002), southern Western Australia (October and November 2008), western New South Wales and western Queensland (October and

November 2011), and the Gulf Country (September to November 2012), in total involving about 26 weeks of survey. I sampled on a daily basis subject to weather and travel constraints. The second trip to northwestern Queensland (2012) commenced three weeks earlier in spring than the trip in 2011 to coincide with the predicted flowering period in the outback of northern Queensland, which increased the number of new records obtained for this genus. The spelling of scientific names aligns with Braby (2000), the main source used for this distribution-focused study.

Methods

I utilised a roadside search that involved surveys for adult butterflies at numerous sites along major inland highways and byroads on the trips involved. Adults were identified by observation and sampling. I often retained vouchers (where permissible) to strengthen field diagnoses because some species of *Candalides* can be challenging to identify, and to support the records, particularly

given their isolation from other known locations. In those few cases where I identified adults by observation-only, these were done at close range whilst the butterflies were perching or feeding at flowers. At such times their wings are held reasonably still and can usually be seen clearly. Where ambiguity in detecting fine wing patterns occurred, those observation records are given lower category ratings: 'C2' being almost certain and 'C3' being very probable identifications. Although the author presently holds voucher specimens, the intention is for most, if not all, of these to go to the Australian National Insect Collection (ANIC), Canberra. In determining the distances from the nearest population I chose the nearest records in my database, which Braby (2000: xix) had used as a baseline to synoptically map the species' distributions, and measured between these and each new site using Google Earth tools, rounding to the nearest 10 km.

Results

Table 1 lists six species from 14 new or important locations across Australia. It includes a distance in kilometres from the nearest population; half of the records extend ranges by more than 250 km, with three sites being over 300 km from the nearest population at subspecies level. A site at Rotary Lookout, west of Cloncurry involves two separate searches, based on sampling a week apart. The reports from near Burke & Wills Roadhouse involves two minor sites detected during separate visits to that junction during 2012 and comprise a single location at one-minute resolution. All sites fall outside (or if not, then very close to) the boundaries defined or inferred by Braby (2000) for the species concerned and so are new on that criterion. A superscript indicates that field diary notes offer additional insight into particular records. In addition to explaining the importance of particular sites in the table, these notes often discuss the ecological circumstances. These may include habitat data, flowering plants sought for nectar, other butterflies the focus species was associated with, the behaviour of the species itself, field impressions on species abundance and any limiting factors, and other evidence gained from follow-up visits (where applicable) at those particular sites.

Discussion

Each of the records is from a location that falls either beyond or near the boundaries of the species' distributions, as interpreted from the range-fill maps provided by Braby (2000), a work that provides a compendium of distributional knowledge and baseline information. The revised synoptic maps by Braby (2016) are less rigorous but are useful to interpret areas where the species probably occur. Their usage should accompany the evidence-based original work of 2000 when comparing and discussing new distribution and important boundary records that make those distributions evidence-based.

Candalides delospila stands as one species whose range-fill map is worthy of scrutiny because of the major change in its distribution between that proposed by Braby (2000) and the revision by Braby (2016). Given that few new records of this butterfly have come to hand (at least in recent literature), the specific sites recorded here add detail to the portrayal of that species' wider distribution as indicated in Braby (2016) and help support that new map.

One location in this report appears to be within the currently accepted distribution of *C. cyprotus* (Braby 2016). This record is spatially important, as there do not appear to be any locations listed in the literature from that area to support the generalised range given in the field guide (Braby 2016). The report from Fitzgerald River National Park – a very remote wilderness visited by few entomologists – now underpins that National Park's inclusion by Braby (2016). It provides a fixed point for the eastern limit, near the coast, in WA.

The new locations for the species tabled add to our understanding of the spatial distribution of *Candalides* butterflies across the continent. Additional survey in inland areas will help strengthen knowledge of the finer distributions of the species.

References

- Braby MF. 2000. *Butterflies of Australia: their Identification, Biology and Distribution*. CSIRO Publishing: Collingwood, Vic.
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Table 1. Fourteen new locations for species of *Candalides* butterfly in northern Queensland and elsewhere.

'Distance' is from the nearest previously-reported population (see Methods).

'C2' indicates an almost certain identification and 'C3' a very probable identification.

Species Location	Location coordinates	Distance	Date	Details
<i>C. helenita</i> (Shining Pencil-blue)				
1. Pax Piel Bridge, at Myall Creek, 55 km ESE of Weipa, Qld	12°39'S, 142°16'E	100 km	07 Jan 2002	voucher
<i>C. cyprotus</i> (Copper Pencil-blue)				
2. Sepulcralis Hill, 6 km NNW of Cave Point, Fitzgerald River Nat. Park, WA	33°54'S, 119°57'E	260 km	17 Oct 2008	observed ^{Note 1}
<i>C. hyacinthina</i> (Varied Dusky-blue)				
3. Bandy Creek Harbour, near Esperance, WA	33°50'S, 121°56'E	360 km	24 Nov 2008	voucher ^{Note 2}
4. Near Spencer Rd, at 4.1 km SW by road of Pink Lake Lookout, near Esperance, WA	33°51'S, 121°48'E	350 km	14 Oct 2008	voucher ^{Note 2a}
<i>C. erinus</i> (Small Dusky-blue)				
5. Gregory River crossing, Gregory Downs, Qld	18°39'S, 139°15'E	360 km	23 Oct 2012	observed ^{C2}
6. 13.3 km WNW of Burke & Wills Roadhouse, Qld	19°11'S, 140°14'E	270 km	23 Oct 2012	voucher
7. 13.7 km WNW of Burke & Wills Roadhouse, Qld	19°11'S, 140°14'E	270 km	10 Oct 2012	voucher
8. Lake Moondarra on hill behind 'Transport Bay', N of Mt Isa, Qld	20°35'S, 139°35'E	150 km	18 Oct 2012	observed ^{C3}
9. Rotary Lookout, 2km W of Cloncurry, Qld	20°42'S, 140°29'E	110 km	08 Oct 2012	voucher ^{Note 3, Figs. 1- 2}
<i>C. delospila</i> (Spotted Dusky-blue)				
10. 9 km SE by E of Burke & Wills junction (near Roadhouse), Qld	19°16'S, 140°24'E	180 km	09 Oct 2012	voucher
11. Terry Smith Lookout, 80 km by road NNW of Cloncurry, Qld	20°05'S, 140°14'E	180 km	16 Oct 2012	voucher ^{Note 4}
12. Rotary Lookout 2km W of Cloncurry, Qld	20°42'S, 140°29'E	110 km	08 Oct 2012 15 Oct 2012	voucher ^{Note 5} voucher ^{Note 5a}
13. Top Crossing, Surprise Creek, Bladensburg Nat. Park (southern entrance), Qld	22°34'S, 142°58'E	280 km	06 Oct 2012	photo ^{Note 6, Figs. 3-5}
<i>C. heathi</i> (Rayed Blue)				
14. Ivanhoe (off Elkington St.), NSW	32°54'S, 144°18'E	240 km	20 Oct 2011	voucher

Footnotes are on the next page.

Footnotes to Table 1

Note 1. The presence of *C. cyprotus* in low scrubland in the eastern section of this remote National Park, being at that time well outside its supposed range, now presents as an eastern boundary record based on the revised synoptic map by Braby (2016).

Note 2. Two males of subspecies *gilesi* were taken flying on dunes in shrub-land during late morning (between 10:00-11:15h AWST). One adult was dry mounted and another was preserved in ethanol for DNA analysis (currently cryogenically preserved in ANIC; vial B107). The adults were uncommon and seen flying with *C. acasta*. The presence of subspecies *gilesi* in the east of the state and, seemingly, within the broader range of subspecies *simplexa* provides a major extension to the known range. This site at Bandy Creek Harbour, east of Esperance, and the other west of town along Eleven-Mile Beach Road, beyond the Pink Lake Lookout, where a female was flying near *Cassytha* near the Spencer Road junction (**2a**), are either remotely isolated from the southwestern population or evidence that subspecies *gilesi* extends narrowly eastward along the shore to the Esperance region. (Although the specimens were labelled 'SW' (see Table 1), the high-resolution maps on Google Earth indicate the direction from the Pink Lake Lookout (which is a parking bay viewpoint along the road) was close to west.).

Note 3. Three males of *C. erinus* were seen in open woodland near the lookout-viewing platform (227 m asl), flying about a couple of furry-stemmed flowering plants, at which one or more adults fed during mid-morning (Figs. 1 & 2); these flowers appeared to be a *Ptilotus* sp. (Amaranthaceae). I suspect the species involved was *P. latifolius*, the Tangled Mulla Mulla, which is widespread in desert areas, but the photographs taken were insufficient for a reliable identification. Despite searching broadly on the hilltop, including careful coverage of an extensive area where a mat of fine *Cassytha* sp. (not identified but possibly *C. capillaris*) was prominent amongst spinifex, the adults were only seen flying and perching in close vicinity to these fluffy flowers. A week later, on 15th October, I found no further evidence of *C. erinus* and the flowers by then appeared spent, presumably linked to the rising day-temperatures as the month progressed. Instead, a *Crotalaria* sp. (Fabaceae) was then blossoming and attracting several males of *Lampides boeticus* (Lycaenidae), a species not seen on the previous visit. It appeared that as spring advanced the nectar resources lasted briefly along with the particular butterfly species they attracted in the desert areas. Without these flowers, few butterflies of any species were conspicuous. *C. erinus* is rare in the region.

Note 4. A single adult of *C. delospila* was taken in grassy woodland during late afternoon (between 17:00-17:15 h AEST – the duration of the visit) at a slight rise (197 m asl) that provides for a named lookout. It was flying about a fine *Cassytha* sp. (not identified but possibly *C. capillaris*). The twiner was sprawling across bare ground in an area of grassy woodland that was without spinifex, and where it was evidently parasitising small ground plants nearby. A search of the broader area revealed a small patch of spinifex about 30 metres away but no *Cassytha* was parasitising its foliage. The late hour of the day in the tropics would most likely explain the scarcity of the butterfly on that visit but it was also late in the season for the species in the broader region (see Note 5a).

Note 5. A few aged males of *C. delospila* were flying in open woodland near spinifex infested with a fine *Cassytha* (again not identified, but possibly *C. capillaris*) between 10:10 and 10:50 h AEST (duration of visit). Adults were not common and it appeared that the flight season was nearing its end. During that visit, a few adults fed at fluffy flowers, believed to be a *Ptilotus* sp. (Amaranthaceae) (see Note 3). These feeding adults were in close proximity to males of *C. erinus*, which were far less common than *C. delospila* on the summit area. On a return visit the following week on 15th October (**5a**), *C. delospila* was by then quite scarce (only 4 males recorded in 1 hour 20 minutes of continuous looking) and *C. erinus* was not to be seen during sunny weather in late afternoon (16:20-17:40 h). However, after 17:00 h very few butterflies of any species were active on the summit area (despite hot weather and cloudless sky). Reduced flight activity during late afternoon, a feature I have seen broadly in the tropics in the Asia-Pacific region, may be a strategy to avoid predation during the peak feeding times of the local birds (see Van der Poorten & Van der Poorten 2016). It is likely that these two species of *Candalides* were sharing the same larval host at this location. I suspect that *C. erinus* (which is normally an abundant butterfly) does not compete well with *C. delospila* (with which it rarely co-occurs) in the outback. If the two species occur in similar abundance in the region, they may differ slightly in their seasonality to reduce competition for the host foliage and/or the limited nectar resources available when adults are active.

Note 6. A number of *C. delospila* (both sexes) were active in open woodland during late morning (between 11:00-11:50 h AEST) near a large *Cassytha* sp. (not identified) parasitising a small shrub, at the crossing, some 26 km by road SSW of Winton. A finer *Cassytha* (not identified but possibly *C. capillaris*) was parasitising spinifex on the ground and the adults were active about this *Cassytha* rather than the arboreal *Cassytha* nearby. A female was photographed ovipositing on young shoots of the ground *Cassytha* growing amidst the *Triodia* (Spinifex) leaves and another fed at an unidentified flower (Fig. 5). No other *Candalides* species was detected in the area despite the presence of the arboreal *Cassytha*, which drew my attention to the area whilst passing and enabled the encounter record with this species; this site stands as the most southern in Australia for this species. A return visit during mid-afternoon (14:30-15:20 h) that same day to check for other *Candalides* species was again unrewarding; *C. delospila* was far less active at that hour, with only a few males seen.



Figure 1. *Candalides erinus* (Small Dusky-blue) male (under side); feeding at flowers of a *Ptilotus* sp. (Amaranthaceae), possibly *P. latifolius* – the Tangled Mulla Mulla – amongst spinifex at Rotary Lookout west of Cloncurry.



Figure 2. *Candalides erinus* (Small Dusky-blue) male (upper side; same individual as Fig. 1) feeding at same flowers at Rotary Lookout west of Cloncurry.



Figure 3. *Candalides delospila* (Spotted Dusky-blue) female (under side) perched amidst tangle of spinifex at Top Crossing, near the southern entrance to Bladensburg National Park.



Figure 4. *Candalides delospila* (Spotted Dusky-blue) female inspecting *Cassytha* sp. (dodder-laurel) trailing across spinifex (foliage in background) at Top Crossing, near the southern entrance to Bladensburg National Park.



Figure 5. *Candalides delospila* (Spotted Dusky-blue) female (under side) feeding at undetermined flower at Top Crossing, near southern entrance to Bladensburg National Park.