Evidence suggesting that the natural range of a butterfly, the Plumbago Blue (*Leptotes plinius*), extends to far western Queensland

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Abstract

The Plumbago Blue (*Leptotes plinius*) is a small lycaenid butterfly whose larvae feed on the buds and flowers of native Wild Leadwort (*Plumbago zeylanica*) and cultivated Cape Leadwort (*Plumbago auriculata*). In Australia, the butterfly is currently understood to occur in eastern Queensland and New South Wales with sporadic records elsewhere. I observed the species extra-limitally in six locations, three in far western Queensland and three in the western Einasleigh Uplands. I also review other published and unpublished extra-limital observations. These observations fall into two categories, those in towns and gardens often explicitly associated with Cape Leadwort, and those in natural environments often explicitly associated with Wild Leadwort. I suggest two hypotheses for its extra-limital occurrence in natural environments: 1. that there may be rarely detected natural populations along watercourses across most of tropical Queensland, and 2. that these records might reflect dispersal from populations established in towns and gardens, the latter the result of transfer of eggs, larvae or pupae with nursery specimens of Cape Leadwort. Evidence is presented lending support to both hypotheses.

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Introduction

The Plumbago Blue (*Leptotes plinius*, Lycaenidae) is a small butterfly that occurs in Australia and tropical and subtropical Asia as far as India, Sri Lanka and China (Braby 2000; Wikipedia 2023). Its distinctive underside markings (Fig. 1) have earned it the alternative common name of Zebra Blue and render easy identification when the adult is at rest. Within Australia it occurs mainly along the east coast and up to 400 km inland (Fig. 2). Sporadic records elsewhere (four green outliers in Fig. 2) hint of a wider distribution.

In Australia, larvae feed on flower buds and flowers of two species of Plumbago (Braby 2000). The only native foodplant in Australia is Wild Leadwort (*Plumbago zeylanica*; Fig. 3), a diminutive clambering or ground-covering sub-shrub of vine thickets and inland stream banks that is easily overlooked when not flowering. The butterfly also utilises Cape Leadwort (*P. auriculata*; Fig. 4), a garden shrub commonly planted in the dry tropics. It has been hypothesized that butterfly eggs, larvae or pupae (chrysales) have been transferred with nursery plants, generating sporadic "out of range" records (Dunn 2016).

Figure 1. Plumbago Blue (*Leptotes plinius*) feeding at the flowers of Kapok Bush (*Aerva javanica*), Beames Brook, north-west Queensland.
All photos are by Don Franklin.

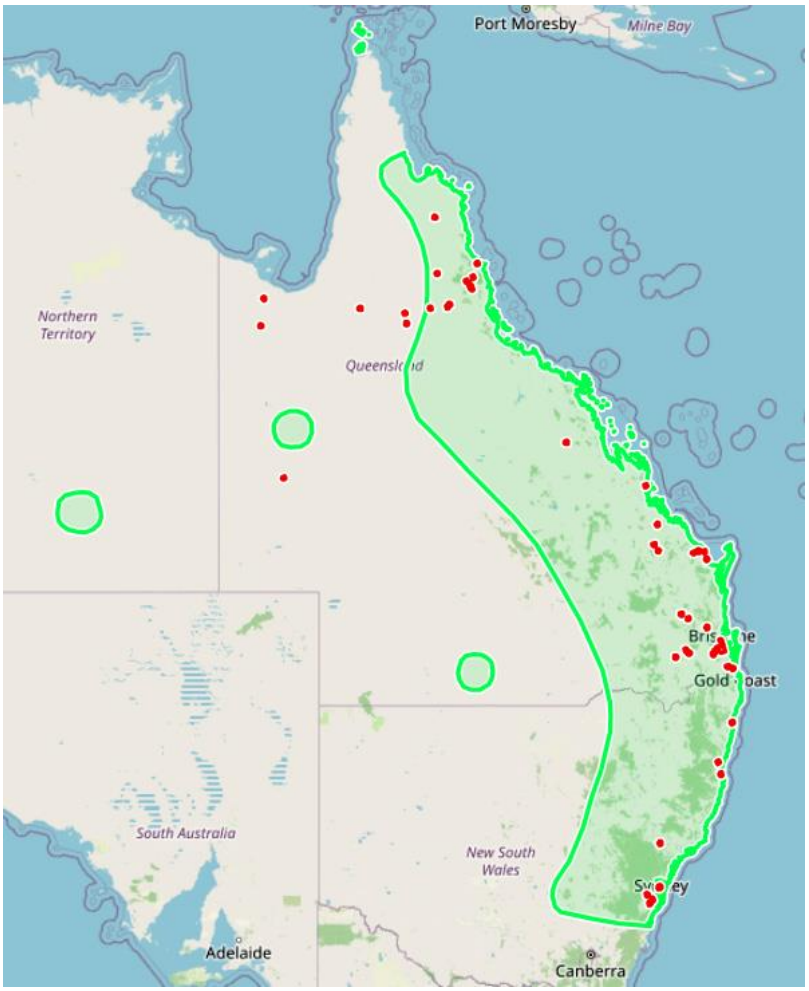

Figure 2. The known range of the Plumbago Blue (*Leptotes plinius*) in Australia (shaded within green outlines), with Butterflies Australia records of the species (red circles). The range polygons comprise the main range along the east coast and four historical outliers (Alice Springs, Cunnamulla, Selwyn Range, Torres Strait and northern Cape York Peninsula) – see Discussion for details of the outliers. Range polygons and records are from Butterflies Australia (2023); base map © OpenStreetMap (*https://www.openstreetmap.org/copyright*); downloaded 20 Sept. 2023.

Figure 3. Flowering inflorescence of Wild Leadwort (*Plumbago zeylanica*).
Photographed on the bank of the Burke River near Boulia, western Queensland.

Figure 4. Flowers of Cape Leadwort (*Plumbago auriculata*).
Photographed in cultivation, Herberton, north-eastern Queensland.

In this article I provide details of six extra-limital records, three of which were remote from gardens and one of them explicitly associated with the native foodplant. This and other evidence collated in the Discussion suggests that the Plumbago Blue occurs naturally much further west, and in much drier country, than previously thought.

Observations

The Plumbago Blue was observed extra-limitally at three locations in far western Queensland and three locations in the west of the Einasleigh Uplands (Table 1). These are the six extra-limital Butterflies Australia records shown in Fig. 2. Two of the far western records were on riverbanks remote from gardens, and one of the Einasleigh Upland records was on a hilltop remote from gardens.

On the bank of the Burke River near Boulia I noticed a small butterfly visiting flowers of an herbaceous pea (species unknown), which proved to be a Plumbago Blue. I observed it intermittently over a period of about 30 minutes flying along the edge of a thicket of Lollybush (*Clerodendrum floribundum*) as if it were a male displaying, before disappearing around the back of the thicket and occasionally revisiting pea flowers. I returned the following morning and found two clumps of the larval foodplant (Fig. 3) at the back edge of the thicket. Habitat was River Red Gum (*Eucalyptus camaldulensis*) open forest on red-brown clay loams well elevated above the sandy river course.

Beames Brook, location of a sighting remote from settlement in north-west Queensland, is an anabranch of the Gregory River with a strong flow at the time. It flows within gently sloping banks more than 15 m high forming a wide floodplain lined with well-developed gallery forest featuring River She-oak (*Casuarina cunninghamiana*), River Pandanus (*Pandanus aquaticus*) and Northern Swamp Mahogany (*Lophostemon grandiflorus*), with groves of Cathormion (*Cathormion umbellatum*) higher on the bank.

Black Mountain near Croydon is *c.* 175 m ASL at the summit, rising 65 m above the surrounding landscape (Qld Gov. 2023). It is capped by tall Lancewood (*Acacia shirleyi*) thicket, with a clearing around a telecommunication tower, and is surrounded by tropical eucalypt savanna. Inaccessible rock faces on the southern side appear (when viewed from afar) to support an arid form of vine thicket.

Discussion

My observations of the Plumbago Blue fall into two categories; those in natural environments, and those in towns. Most other extra-limital observations of the butterfly can also be so

Table 1. Extra-limital observations of the Plumbago Blue (*Leptotes plinius*) by the author.

Date	Location	No. seen	Notes on habitat and behaviour
Far western Queensland			
27 Aug. 2023	bank of Burke River 3.8 km NE of Boulia -22.8885°, 139.9389°	1	associated with Wild Leadwort (*Plumbago zeylanica*) (Fig. 3); see text for details
8 Sept. 2023	Gregory (township) -18.6512°, 139.2532°	1	in watered garden; cultivated foodplant not seen but could have been present
10 Sept. 2023	Beames Brook, 26 km SW of Burketown -17.8787°, 139.3429°	1	feeding at flowers of *Aerva javanica* (Fig. 1) by road and bridge over Beames Brook
Western Einasleigh Uplands			
14 June 2020	Georgetown (township) -18.2898°, 143.5499°	>50	at flowers of planted Cape Leadwort (*Plumbago auriculata*)
12 Jan. 2021	Forsayth (township) -18.5873°, 143.6037°	3	at flowers of planted Cape Leadwort (*Plumbago auriculata*)
31 May 2021	Black Mountain, 5.8 km NW of Croydon -18.1584°, 142.2189°	*c.* 10	hill-topping, including mating pair (Fig. 5)

Figure 5. Mating pair of Plumbago Blues (*Leptotes plinius*) at Black Mountain near Croydon, north Queensland.

classified, and the majority of these are in towns (or in a few cases are inferred to be in towns but the record is not specific enough to confirm this). Town records include Alice Springs and Cunnamulla (Fig. 2; these records being derived from Common & Waterhouse 1991), Georgetown, Forsayth and Gregory (this study), Richmond, Barcaldine, Blackall, Tambo, Augathella, Charleville and St George in Queensland and Walgett, Coonamble and Nyngan in New South Wales (Dunn 2016), Mitchell in Queensland and Perth in Western Australia (ALA 2023). ALA (2023) also shows a second, more recent report (2019) from Alice Springs. Many of these town records are explicitly associated with cultivated Cape Leadwort and some involve multiple individuals (more than 50 in Georgetown) and multiple years, suggesting established populations.

However, it is the fewer extra-limital records of the Plumbago Blue associated with natural environments that are of greater relevance to this article. In addition to my three observations, the Queensland Museum holds a collection from the bank of the Gilbert River in Rungulla National Park 48 km SW of Forsayth in Queensland (ALA 2023, record no. T257412, by Lambkin & Wright). Further, the species is common and associated with Wild Leadwort in the Selwyn Range 95 km S of Cloncurry, and along the Flinders River near Richmond (Terry Woodger, personal communication). Though not extra-limital, Braby (1994) also reported the species on the bank of the Flinders River – 20 km NW of Prairie – at *Melaleuca* flowers.

Wild Leadwort is widely distributed in northern Australia (Fig. 6), much more so than the Plumbago Blue. My record on the bank of the Burke River near Boulia is further inland than most, but the

Figure 6. Herbarium records of Wild Leadwort (*Plumbago zeylanica*) in Australia and nearby areas. The map is from AVH (2023).

Queensland Herbarium holds a collection (BRI AQ0569043) from the bank of the Burke River 70 km upstream in similar habitat – "Sandy soil on bank of river, in *Euc. camaldulensis* and *Bauhinia*" (AVH 2023). In higher rainfall regions of eastern Queensland the species is often associated with "monsoon forest and vine thickets" (ATRP 2023), but in north-west Queensland it occurs "in sandy areas adjacent to creeks and rivers" (Milson 2000). Terry Woodger (personal communication) has found it commonly along the Flinders, Cloncurry and Burke Rivers and several of their tributaries. Its occurrence along stream banks in western Queensland is consistent with most of the observations of the Plumbago Blue nominated in the previous paragraph.

The Plumbago Blue is not known to be migratory, does not have a particularly strong flight, and most observations are at the foodplant or nectaring at nearby flowers of other plants. Though it undoubtedly has a capacity to seek out its foodplants, I find it difficult to conceive of it crossing the vast savannas of northern Queensland to reach isolated occurrences of its native foodplant along watercourses. So whence come these isolated occurrences in western Queensland?

It is probable that the Plumbago Blue is much more widespread along these rivers than is currently understood. A short annual flight period in western Queensland seems likely due to strong seasonality of rainfall curtailing the flowering period of Wild Leadwort, and this may render detection less likely. I may have been fortunate to encounter the Plumbago Blue in far western Queensland in August and September due to the unusual combination of a strong prior wet season (150–>200% of average rainfall at Boulia and Beames Brook) and widespread moderate to heavy unseasonal rainfalls in early July (BoM 2023). (My observation at Black Mountain was in late May.) Further, these rivers are relatively remote, generally unattractive to butterfly observers, and frequently inaccessible to observers because they are mostly on pastoral leases. Additional surveys, targetted in habitat and time of year, may prove fruitful and informative.

A second, intriguing possibility is that these are recently established populations dispersed along watercourses from sources, themselves recently established, in towns and station gardens. Dunn (2016) proposed that town records are the result of transfer of eggs, larvae or pupae with nursery plants of Cape Leadwort. In contrast, Terry Woodger (personal communication) pointed out that potted plants of Cape Leadwort are generally too young to have produced the inflorescences on which the butterfly breeds. In his experience from Richmond, the butterfly colonised cultivated Cape Leadwort from populations breeding nearby on Wild Leadwort along the Flinders River, not *vice versa*. However, records of the Plumbago Blue outside the range of Wild Leadwort, i.e. Perth in Western Australia, southern Queensland (Charleville, Mitchell and St George), and the inland slopes of New South Wales (Walgett, Coonamble and Nyngan), suggest that transfer on nursery plants happens at least occasionally. Both hypotheses for the occurrence of the Plumbago Blue in western Queensland are therefore possible and the truth might be some combination of both.

Three further location records are worth mentioning. The first relates to the fourth outlier polygon in Fig. 2 – in Torres Strait and the tip of Cape York Peninsula. This is not truly a geographic outlier as the Plumbago Blue also occurs in New Guinea (Braby 2000), and Wild Leadwort occurs on a number of Torres Strait islands (AVH 2023). It is based on a putative observation on Moa Island attributed to "P.S. Valentine" (Braby 2000). This is, however, an error, possibly a misinterpretation of "Mer" (Peter Valentine, personal communication). There are three records from Mer (Murray Island) in the Torres Strait, two (1986, 1989) in Lambkin and Knight (1990) and one in 1994 (Peter Valentine, personal communication). The second location record is that Burns (1989) who reported four males and three females collected in May or June 1985 from the South Alligator River in Kakadu National Park, Northern Territory. This record was rejected by Braby (2014) and Braby *et al.* (2018) due to claimed unreliability of the collector and lack of further sightings in the Northern Territory. However, it is well within the range of its native foodplant (Fig. 6), and the early dry season is likely appropriate for sightings. Both the butterfly and its foodplant may be hard to detect at other times of the year, creating a challenge for future surveys. Thirdly, the Plumbago Blue is recorded south to Wollongong south of Sydney in New South Wales (Fig. 2) and 135 km further south to Kioloa (Dunn 2008). However, the native foodplant has been recorded only as far south as Port Macquarie in northern New South Wales (Fig. 6). Southern records

are associated with cultivated Cape Leadwort (Braby 2000; Dunn 2008).

The Plumbago Blue is a successful species in Australia, having expanded its range with its adoption of the cultivated Cape Leadwort as a larval foodplant. However, its range associated with its native foodplant, Wild Leadwort, remains to be fully determined, and the origin of outlying populations remains to be understood.

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References

Atlas of Living Australia (ALA). 2023. 'Leptotes plinius'. *https://www.ala.org.au/*, viewed 20 Sept. 2023.

Australian Tropical Rainforest Plants (ATRP). 2023. 'Plumbago zeylanica'. *https://apps.lucidcentral.org/rainforest/text/intro/about.htm*, viewed 22 Sept. 2023.

Australasian Virtual Herbarium (AVH). 2023. 'Plumbago zeylanica'. *https://avh.chah.org.au/*, downloaded, 22 Sept. 2023.

Braby MF. 1994. Range extensions and distribution records for some butterflies in north-eastern Queensland - Part lll. *Queensland Naturalist* 32: 121-129.

Braby MF. 2000. *Butterflies of Australia. Their Identification, Biology and Distribution*. CSIRO: Collingwood, Vic.

Braby MF. 2014. Remarks on the spatial distribution of some butterflies and diurnal moths (Lepidoptera) in the Top End of the Northern Territory, Australia. *Northern Territory Naturalist* 25: 29-49.

Braby MF, Franklin DC *et al*. 2018. *Atlas of Butterflies and Diurnal Moths in the Monsoon Tropics of Northern Australia*. ANU Press: Canberra.

Bureau of Meteorology (BoM). 2023. 'Recent and historical rainfall maps'. *http://www.bom.gov.au/*, viewed 22 Sept. 2023.

Burns JF. 1989. New records for Australian Lepidoptera distribution. *Victorian Entomologist* 19: 84.

Butterflies Australia. 2023. 'Leptotes plinius'. *https://butterflies.org.au/external/home*, downloaded 21 Sept. 2023.

Common IFB, Waterhouse DF. 1981. *Butterflies of Australia*. Angus & Robertson: London.

Dunn KL. 2008. New and interesting spatial and temporal butterfly records from eastern Australia. *Victorian Entomologist* 38: 36-45.

Dunn KL. 2016. New distribution records for *Leptotes plinius* (Fabricius, 1793) (Lepidoptera: Lycaenidae) in eastern Australia. *Victorian Entomologist* 46: 131-134.

Lambkin TA, Knight AI. 1990. Butterflies recorded from Murray Island, Torres Strait, Queensland. *Australian Entomological Magazine* 17: 101-112.

Milson J. 2000. *Trees and Shrubs of North-west Queensland*. Department of Primary Industries: Brisbane.

Queensland Government (Qld Gov.). 2023. Queensland Globe. *https://qldglobe.information.qld.gov.au/*, accessed 21 Sept. 2023.

Wikipedia. 2023. 'Leptotes plinius'. *https://en.wikipedia.org/wiki/Leptotes_plinius*, viewed 23 Sept. 2023.