A further search for *Hypocysta metirius* Butler 1875 (Lepidoptera: Nymphalidae) in southern New South Wales

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Introduction

The Brown Ringlet, *Hypocysta metirius* Butler, extends widely along the coastal region of eastern Australia, sporadically in northern Queensland, and more continuously from central Queensland to southeastern New South Wales (Braby 2000). In southern Queensland and northern New South Wales, there are also three discrete populations situated inland from the main areas of coastal occurrence. The larvae usually feed on soft grasses, including *Alexfloydia*, *Cynodon*, and *Eriachne* (Poaceae), with an historic report from *Imperata* that needs verification. An incidence of a larva on *Gahnia* (Cyperaceae) at one location only (Braby 2000) is interesting, and might indicate a broader host usage than historically thought, but more likely represents a rare event within the range of larval host options available to this species. In the Howe region of coastal southeastern Australia – a biogeographical construct from the Barlow system, southward of the 35th parallel of latitude (which crosses just north of Huskisson, NSW) – adults are active from at least October (there is a single September record) to April, based on the inventory of records compiled by Dunn and Dunn (1991, p.154). The remoteness of wilderness on the far south coast, some of which may contain habitat suited to this butterfly, means that small increasingly disjunct populations (beyond the known range) may await discovery. However, as vehicular access is rather limited in that region, this may make them hard to find. This paper explores this issue, and documents the most southern site known for the butterfly, which is new. It also offers suggestions on seeking the species in Victoria where extralimital or meta-populations might occur in moist refugia in some years of range expansion of the butterfly.

The historic southern limit

Dunn & Dunn (1991) recorded *H. metirius* to as far south as Eden, in southeastern NSW based on material in the ANIC, collected historically by Frank E. Parsons in March 1960. No further material from Eden has been lodged in museums of late, but it is known that the species lingered on in small numbers "near the tennis courts" at the base of Lake Curalo, just north of town centre (via the Aslings Beach Road), until at least October 1999 (G. Wurts pers. comm.). Dunn (2008) reinvestigated its local distribution (including the Aslings Beach Spit area and the boardwalk at the south end of Lake Curalo) and confirmed that the species was still locally common to as far south as the Bellbird Creek crossing, about 4.5km north (by road) of the Eden Post Office. That paper aroused belief that *H. metirius* might have once occurred south of Eden. It also evoked legitimate concerns that over the last 50 years or so local land use changes, which have included extensive "residential clearing at Two Fold Bay" and ongoing "forestry operations further south" (p.41), have degraded the habitat of that species during the 20th century, and possibly eliminated it from one or more sites at its southernmost limits beyond Eden. Along evolutionary time scales, this is very sudden and catastrophic change, and it is clear that this native butterfly (unlike the Common Brown, *Heteronympha merope*, which frequents residential gardens) has not adapted to it. *H. metirius* can survive in woodland remnants near townships, where adequate food plants remain. It still breeds in moderate numbers in Eucalypt -Banksia dominated coastal woodland, adjacent to the airport in Arthur Kane Drive, some 3km south of Merimbula, as one healthy site I found in March 2008. Of interest as well, G. Wurtz (pers. comm.) recently informed that, in December 2007, he found it lingering on in Beverley Street in the residential outskirts of Merimbula, where remnant habitat persists in a gully close by.

Survey procedures and areas examined

Museum specimens (and literature) provide for an immense repository of knowledge, but opportunistic samples, rather than systematic surveys (see Dunn 2014 for discussion) have built most of it. Obviously, distributions compiled from that information base may not fully encompass the species'

actual extent of occurrence, but serve as a satisfactory guide as to where particular species occur (Dunn & Franklin 2010). A field survey is the best approach to explore the range limits of a particular species, and for the Brown Ringlet, I had reasonably supposed that there might be a rather sporadic southern occurrence of it, beyond the known range, on the far south coast of NSW. Hence, in February and again in March of 2008 (both very suitable times of the year for adult presence), I had searched some potential sites south of Eden, without success. The initial focus in 2008 had been the southern portion of Two Fold Bay, close to the southern limit. It included riparian areas at Quarantine Bay (settlement) through to the Boydtown district, where native vegetation presenting ecological features that many satyrine butterflies favour, namely partly shaded situations, were investigated for the butterfly's presence. I also explored farther to the southwest (away from the coast) at Mt Imlay and closer to the Victorian border, at the Wallagaraugh River highway crossing, about 43km SSW by road of Eden, where extensive open forests remain. The Mallacoota Lookout area in Nadgee State Forest (accessed via Maxwell's Road), to the east-southeast of the Wallagaraugh River crossing, was surprisingly unrewarding with only *Geitoneura klugii* being detected in late afternoon – that species was present at several sites in dry sclerophyll, open forest (along Stringy Road and Timm's Road). The southern portion of the State Forest has been subject to extended forestry activities, which damages the permanency of canopy and thus modifies the extent of shadiness. Perhaps due to those operations, the region may have declined in overall butterfly species richness, particularly so for the satyrines, which are more sedentary and, hence, would seem more vulnerable because of that.

Weather conditions were often less than optimal during the February visit – it rained a lot – and partly because of that, those searches undertaken were forcibly brief. These factors meant that I was unable to be sure, as to whether *H. metirius* was absent or not, at some of the sites examined (Dunn 2008). Determining species absence is difficult at the best of times, so to better search the area to see what was present, I returned and spent one and a half days there in middle December 2009. On that visit, I carefully inspected (during mostly very suitable weather) stands of remnant woodland and open forest areas close to Eden. I revisited some more promising sites (including Aslings Beach) and then inspected more widely in previously unvisited areas southward from Eden, where I thought the species might linger on. During early afternoon at the Wallagaraugh River highway crossing, a 40 minute repeat inspection, surprisingly revealed only one satyrine species, that being the ubiquitous *He. merope*. The two species of *Geitoneura*, present in February 2008, remained unseen during the December visit. I had reasonably anticipated seeing both of them (albeit in low abundance, as it was still early in their flight season) as adults of each were active in places (but not everywhere) in far eastern Victoria a few days before my arrival in the Eden area.

I then visited the Womboyne River crossing, at 9km WNW by road of Womboyne village (about 6km beeline from the village), and after 35 minutes there (again during sunny weather) the only satyrine encountered was *He. merope*. Survey in open forests during late afternoon about the Edrom Lodge – Boyd Tower area, near Red Point, likewise revealed just the one species – in fact, it was the only satyrine butterfly obvious in most places. Other sites inspected included the Whaling Station, at the end of Boyd Road, at Quarantine Bay (proper), where in very late afternoon in an area where *Gahnia clarkei* (an acceptable larval food plant) was present, no satyrine butterflies were active during 25 minutes of overcast weather. Ben Boyd National Park, being relatively pristine, seemed a likely area for satyrine butterflies if shady grassy areas existed, so I went to the Pinnacles and Haycock Point between 12:00 and 13:10h AEDT. Open forest offering a prominent component of Banksia and native pines, with an understorey of bracken (suggesting a history of periodic wildfires), dominated – there was little green grass evident though, so the Pinnacles proved disappointing. Many *He. merope* were present in the grassy picnic ground at Haycock Point (which was not surprising as they frequent open grassy areas), but no satyrines were to be seen in the adjacent shrublands, which were dominated by coastal *Banksia* and *Leptospermum* (Myrtaceae) and contained limited grass. A quick visit inland (again in late afternoon) but this time to the Wolumla area, including Wolumla Peak which was recommended as 'worth a look' by a local Parks and Wildlife Officer at

Ben Boyd, as it contained more shady habitat of a permanent nature, I was told, achieved little. On route, the weather became suboptimal for regular butterfly activity (although *He. merope* remained active); it rained as soon as I arrived at the summit, where (not surprisingly) no butterflies were to be seen.

Survey persistence paid off in the end. After visiting sites near Quarantine Bay (settlement) and Boydtown (yet again), I ventured into the northern parts of Nadgee Nature Reserve (which is a conservation area, separate from the State Forest). During sunny weather, I travelled slowly southwards, via the Womboyne Lake, watching for suitable shady habitat or satyrine 'hot spots' (small areas of noticeably high numbers of flying butterflies) along the sandy and deeply potholed coastal track (yet still traversable with care by a conventional vehicle) to Greenglade (Figure 1), on Disaster Bay. This location contains a small area of *Melaleuca* swamplands, which I thought might include some flowering bushes to attract nectaring adults of various species. So I timed my arrival for 15:00h AEDT (that being 14:00h AEST), which I have found is a good hour to see feeding adults during the afternoon, in summer, in cool temperate southeastern Australia. A rock cliff, to the south of the track, provided a needed landform for a microclimate, one offering shelter and water runoff encouraging rich grass growth (Figure 2); it is visible as one arrives at the beach access car park, and the denser vegetation-thicket it supports looked a very promising butterfly haunt.

Fig. 1

Fig. 2

Figure 1. Coastal habitat: drier open forest area at 'Greenglades Beach' picnic area (as it is sometimes called, or 'Greenglade' – the signage indicates singular), adjacent to the sandy access road near the beach – no ringlets were active in this habitat.

Figure 2. Specialist habitat: the nearby richer grassy area in the shady vegetation-thicket, near the rock face – it was here that ringlets were abundant.

Drawing on experience - Ringlet habitats and general behaviour

The vegetation thicket at Greenglade (37°16.9'S 149°56.4'E) seemed reminiscent of the type of shady habitat utilised by one or more *Hypocysta* species in the broader Sydney area. I have seen the Orange Ringlet, *H. adiante*, in the lower Blue Mountains utilising creek bed 'flyways' (meaning corridors routinely patrolled by adult butterflies) in sheltered damp areas amidst shade-creating boulders. And, in the early 1980s, I had found the Rock Ringlet, *H. euphemia*, an elusive member of this group with strong shade-seeking behaviour, on the coast at a small roadside quarry near Bobbin Head. That quarry site, which probably provided a temporary local source of road repair materials back then, had jointly created a small rocky escarpment very suited to *H. euphemia* (but the rock quarry appears to be no longer there, and may have been landscaped and revegetated). I wondered if the latter species might be present here, at Greenglade, as it was historically known from Pambula (a century ago).

In both these cases, small landforms (whether they were boulders or rocky outcrops) coincided with where both species of *Hypocysta* maintained patrols, and provided for additional shade in more open areas where soft grasses may otherwise wither during the summer heat. They may also buffer the grasses and larvae from excessive exposure to wind chill during winter, and the increased shade offered means that they are predictably moister environments. These factors may be important, and Greenglade contained such a landform.

Where male ringlet butterflies of the various species are present in favoured habitat in southern New South Wales, they usually congregate and establish perch sites on patches of sunlit foliage, sometimes referred to as 'sunspots' (in some European literature dealing with forest satyrines) and maintain their flyways amidst the partial shade created by those landforms that co-exist in the habitat. Noteworthy (in relation to the two examples discussed above), is the fact that both *H. adiante* and *H. euphemia* were quite restricted – not widespread – and seemed to be absent (save occasional wandering individuals) from more open and predictably hotter and drier areas nearby. The likely purpose of that localised activity among *Hypocysta* is to defend resources such as oviposition sites (where newly emerged females might be present), and to perch, bask and defend territories in suitably positioned sunspots, from where they can oversee a flight space (into which a receptive female may wander). I have also seen a related species, the Grey Ringlet, *H. pseudirius*, in woodland areas among the northern Sydney suburbs (during the early 1980s). However, the adults of *H. pseudirius* were patrolling dappled sunlit areas in woodlands or open forest and did not seem associated with any particular landforms (that I can recall). Where they occur together though, which they do at some locations in the north, the Brown Ringlet and the Grey Ringlet can be easily confused whilst in flight (Jenkinson 2010), although the keen-eyed observer will detect their differing hues if the adults are not too aged or their wings not too worn.

Fig. 3

Fig. 4

Figure 3. Male of *H. metirius* (showing upper-side including part of the bright hind-wing band) perched on a fern (likely *Pellaea falcata* or possibly a *Blechnum* sp.) in a sunspot overlooking a flight space in the vegetation thicket (13 Dec 2009, between 15:00 and 15:50h AEDT). The rich brown forewing separates the Brown Ringlet from all allied species.

Figure 4. Male, basking on same frond extremity during mid-afternoon (and possibly the same adult, returned to that perch), showing underwing features; the wavy inner margin of the orange band, clearly displayed in this image, is useful in distinguishing this species from the Grey Ringlet, which looks very similar from beneath.

A new location for the butterfly

Given the presence of suitable habitat at Greenglade, I was not surprised then to glimpse what looked like a *Hypocysta* adult almost immediately. The bobbing flight of *Hypocysta*, as they meander through the undergrowth, is wholly characteristic. Indeed, as I entered the glade, there were three males 'dog-fighting' – spiralling in frenzy about two metres above ground over the soft fronds of one or more fern species, which were a prominent vegetative feature of the glade understorey fronting the base of the small north-facing cliff. I soon detected many males, each actively patrolling a flight space – the abundance of adults in medium to worn condition suggested that December is well into the peak flight season at this southernmost site. Upon settling to bask or perch on low vegetation, including sunlit fronds, they revealed themselves as *H. metirius* (Figures 3 & 4), easily distinguished from *H. euphemia* by the dark brown upper-side wing patterns. There were no adults of *H. euphemia* or *H. adiante* though – I was a little hopeful for one or both of these too. The former (in my experience) is uncommonly met with and is more often an upland butterfly, and the latter is rather sporadic at the southern limits of its range. Yet both species once extended to Victoria, and may still do so. Several adults of *H. metirius* were observed to feed at *Stellaria flaccida* (Caryophyllaceae), which was then in flower (Figure 5), and as chance would have it, a female was seen to feed at bird dung at 15:40h AEDT – an interesting and less commonly encountered foraging event (Figure 6). Six species of butterfly were present in that small sheltered area near the shore (counted during 50 minutes of focussed observation); of this fauna, the only other satyrine active was *He. merope*. A wider search of the area might have located a few individuals of *Geitoneura* species (which almost certainly occur there), but it was early in the season for that genus and adult numbers were probably still rather low (and so presumably escaped detection on that argument).

Fig. 5

Fig. 6

Figure 5. *Stellaria flaccida* (Forest Starwort) is a source of nectar for the Brown Ringlet during December at Greenglade. The Forest Starwort seems to favour the same shady habitat as the butterfly, and likely provides sustenance throughout summer at this location.

Figure 6. A female *H. metirius* observed feeding at bird dung on a fern frond (likely that of *Pellaea falcata* or possibly a *Blechnum* sp.) at 15:40h AEDT.

The Greenglade colony of *H. metirius* is localised and largely concentrated to the area sheltered by the rock face, where one or more larval hosts were likely growing in abundance in this moister enclave. The butterfly seemed to be absent from drier woodland areas farther north along the roadside to the beach area, habitat that was less shady generally. I searched broadly there as well. However, there may be other localised populations farther south in this rather inaccessible and remote nature reserve, if similar sheltered areas exist that provide a suitable microclimate. Greenglade, on the far

south coast, now stands as the most southern location known for this butterfly, and one that lies tantalisingly close to the border of Victoria (about 20 km away by beeline). Remote areas in the far east of Victoria may contain a remnant population still awaiting discovery, and which would add another species to the fauna of that state. Although time was limited and the species is one that will require determined and prolonged searching in Victoria in order to discover it, I was unable to resist a cursory look near Fairhaven (east of Mallacoota Inlet). There were no promising leads, but much habitat remains unexplored along the border track where the Brown Ringlet may occur.

I call for those visiting this remote area of southeastern Australia to keep watch for *H. metirius*, particularly in melaleuca thickets and damp areas near sheltered north-facing cliffs, small rocky outcrops, or boulders in parts of far eastern Victoria. In addition, the lengthy walking trail (some 50 kilometres one way) in Nadgee Nature Reserve, commencing at Merrica River to the southwest of Greenglade, and which leads to Mallacoota, is another section of the park in need of inspection (for those with good navigation skills, and about four days to spare). Those hiking naturalists might pay especial attention to protected grassy areas along the Nadgee River, near the estuary, and near Nadgee Lake, which are just a few kilometres north of the state border, which crosses very near Cape Howe. The adult butterflies are likely to be active in this southernmost region throughout summer and probably early autumn, which provides good seasonal scope for their encounter probability. There are also closed-off vehicular fire-tracks in Nadgee Nature Reserve that lead southward and inland (bypassing the Greenglade area) but access to these requires prior authorisation through the park regulatory bodies; a permit is also required for overnight bushwalking. Although a little pre-planning is involved either way, these could make for worthwhile survey opportunities for those interested, and the results might expand upon available knowledge.

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