

# The Australian Museum and Friends of Lord Howe Island survey of large Coleoptera on Lord Howe Island, August 2022

CHRIS A. M. REID<sup>1\*</sup> , IAN HUTTON<sup>2</sup> & EWAN C.A. REID<sup>3</sup>

<sup>1</sup>Entomology, Australian Museum Research Institute, Australian Museum,  
1 William Street, Sydney NSW 2010, Australia

<sup>2</sup>Lord Howe Museum, Middle Beach Road, Lord Howe Island, NSW, Australia

<sup>3</sup>Helensburgh, NSW, Australia

**ABSTRACT.** A survey of large beetles, one centimetre or more in length, on Lord Howe Island, was conducted in August 2022 and the results are discussed. In total, 32 large species were found. This was the first survey made at least one beetle generation after eradication of the rodents in 2019, and there was some evidence of recovery, in particular of the large flightless endemic cerambycid, *Xylotoles wollastoni* (White, 1856), but also of a leaf beetle, *Dematochroma picea* (Baly, 1864) and an exotic pest of lawns, *Heteronychus arator* (Fabricius, 1775). There was also evidence of recovery of Carabidae species after the prolonged dry years of 2016 to 2019.

## Introduction

The Lord Howe Archipelago is listed as a World Heritage Site (Anonymous, 2018) and has a highly diverse and endemic flora and fauna. The archipelago consists of Lord Howe Island (14,000 ha) and Blackburn Island (2.4 ha), plus several other small islands not included in this survey. The fauna includes at least 535 species of Coleoptera, most of which are endemic to the archipelago (Cassis *et al.*, 2003; Reid *et al.*, 2020). Most of these beetle species are small, less than 6 mm in length, and have therefore been poorly sampled and poorly studied taxonomically in historical surveys of the beetle fauna, as reported by Olliff (1889) and later authors (Reid *et al.*, 2018a). On the other hand, beetles one centimetre or more in length are generally well collected and well understood taxonomically. From a biodiversity monitoring perspective, this group of beetles is the best for

sampling as it has the best historical record. Large beetles are also more likely to be eaten by exotic rodents and therefore more likely to show change after rodent eradication. There are approximately 78 species of Coleoptera in the Lord Howe Archipelago with body length at least one centimetre.

Exotic rodents arrived on Lord Howe Island in the 1860s (house mouse, *Mus musculus*) and 1918 (black rat, *Rattus rattus*) (Hutton *et al.*, 2007). There had been only one small collection of insects before the 1860s (Reid & Hutton, 2024), so the effect of the mice is largely unknown. However, the rats arrived shortly after two important surveys of beetles, in the 1880s (Olliff, 1889) and 1915 (Lea, 1916) and had a clear impact. Since 1918 several large beetle species have either disappeared or become scarce. Two species, which are now absent from the main island, have been discovered on tiny Blackburn Island, which has remained rodent free (Reid & Hutton, 2019; Reid *et al.*, 2020).

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**ORCID:** Chris Reid <https://orcid.org/0000-0003-1899-9839>

**Corresponding author:** Chris Reid **Email:** [chris.reid@australian.museum](mailto:chris.reid@australian.museum)

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In 2019 the rodents on Lord Howe Island were exterminated (Harper *et al.*, 2020). Our surveys of large beetles, in 2017, 2018 and 2019 provide pre-rodent extermination data for large beetles (Reid *et al.*, 2018a; Reid & Hutton, 2019; Reid *et al.*, 2020). These annual surveys were interrupted by the closure of the island 2020–2021 to protect the inhabitants during the Covid-19 pandemic. This review reports the results of a similar survey, conducted in August 2022, after the eradication of rodents. There are no lifecycle data for any of the beetles on Lord Howe Island, however it is likely the average large beetle has an annual life cycle. Therefore, the 2022 survey took place possibly three generations after rodent elimination.

The objectives of this study were to: 1) assess possible recovery of large beetles after eradication of rodents; 2) repeat night walks made in previous years at two sites; 3) visit new or poorly surveyed areas at day and night; and 4) survey Blackburn Island at night for the two beetle species listed as Critically Endangered under the New South Wales *Biodiversity Conservation Act 2016*.

## Methods

Unlike surveys of 2018 and 2019, the 2022 survey did not engage casual members of the public but coincided with the annual Friends of Lord Howe Island weeding program. This group of about 20 people, already dedicated naturalists, were shown illustrations of large beetles and asked to spend some of their time searching at weeding sites. The senior author accompanied them at the weeding sites and searched throughout as much of the island as possible at other times during a 10-day visit. Additionally, all authors visited Blackburn Island at night for a survey of the beetles there.

The following sites or areas were investigated by us on Lord Howe Island in August 2022: forest between Ocean View and Arajilla (day & night), forest at start of Malabar Ridge walk (night), Red Point walk near Dinner Run (day), Smoking Ridge (day), south facing slopes above Catalina and Old Settlement Beach (day), Blackburn Island (day & night), forest and littoral vegetation at Middle Beach (day & night), Erskine Valley (day & night), Transit Hill track from Board Offices to summit (day), forest and littoral vegetation at Hells Gate (day), forest above Ned's Beach (day), Stevens Reserve (day & night), Old Settlement Beach (day & night), lower Soldier Creek (day), Boat Harbour track (day), walk to Grey Face of Mount Lidgbird (day), Valley of Shadows (night), Blinky Beach (day), North Beach area (day) and forest by airport buildings (day). We were unable to visit the top of the eastern slopes of Mount Lidgbird, accessed from Goat House, because a rockfall had damaged the path. The Friends of Lord Howe Island weeding group provided photographs or specimens from additional localities including: Lagoon Road (night), summit of Gower (day), Malabar Ridge (day), Somerset Apartments (night).

Collecting effort at each site varied from 10 minutes to one hour, however the survey of Blackburn Island took the authors about 3 hours (one hour daylight, two hours night). Night walks of about 30 minutes duration were undertaken from about 300 metres of track in Stevens Reserve (two consecutive nights) and Valley of the Shadows, repeating similar walks in previous years. Similar surveys were conducted at two new sites: Middle Beach track and the lower part of the track up Dawsons Point Ridge. Erskine Valley was surveyed at night for the first time: two of us camped for one night near the Erskine Creek crossing and searched upslope on both sides of the crossing. Large larvae were also

identified *in situ* where possible (larvae of Lucanidae and large Cerambycidae). Collecting methods included hand-searching, sweep netting, beating and litter sieving.

The weather during the survey period was windy with two days of light showers and one day of rain. Maximum diurnal temperature showed little variation, from 18 to 20°C, but nocturnal minimum temperature varied considerably, 8.5–17°C (Bureau of Meteorology, 2023).

Specimen label data is provided as written but excluding the phrase 'Lord Howe' to avoid needless repetition. Abbreviations used in label data: c = circa, ck = creek, jn = junction, LHIF = Friends of Lord Howe Island, m = metres, N = north, nr = near, Rds = roads, rf = rainforest, veg = vegetation, W = west. Specimens examined but not collected are listed with data in a similar format, from the field notes of CAMR. All collected specimens are preserved in the Australian Museum collection.

## Results

Approximately 500 specimens of Coleoptera were collected or observed by the authors and the weeding group, comprising at least 130 species. The 32 large (length  $\geq 1$  cm) species collected or observed are listed below. No new large species were recorded for Lord Howe. The night walk results are presented in Table 1 (Stevens Reserve) and Table 2 (Valley of the Shadows).

### Order Coleoptera, Linnaeus, 1758

#### Family Cantharidae Imhoff, 1856

Cantharidae are generally brightly coloured, similar to the colours of 18th Century military uniforms, hence the vernacular name soldier beetles. They are chemically protected, with toxins including alkaloids (Moore & Brown, 1978), and therefore unlikely to be predated by rodents.

##### *Chauliognathus apterus* (Olliff, 1889)

**Material examined.** One pair photographed at summit of Gower (at visitor book) 22 August 2022, LHIF.

**Remarks.** *Chauliognathus apterus* is endemic to Lord Howe Island. Previously widespread on the island, this conspicuous flightless species has only been seen at high elevation in recent years. In 2022 we failed to find it in the southern mountains below 250 m elevation in the Erskine Valley and at 350 m on the north side of Mount Lidgbird. The prolonged drought of 2016–2019, with annual rainfall 984–1369 mm compared with the average 1483 mm (Bureau of Meteorology, 2023), might have negatively affected the distribution and abundance of this species. Where present, adults of *Chauliognathus apterus* are commonly found crawling on the ground and on shrubs and bushes, often as a pair *in copula* (Reid *et al.*, 2018a). Larvae are also conspicuous. Adult length 8–18 mm.

#### Family Carabidae Latreille, 1802

Members of this family are generally known as ground beetles and almost all the species on Lord Howe Archipelago are terrestrial predators, as adults and larvae. Carabids are generally chemically protected from vertebrate predation (Brandmayr *et al.*, 2009). Terrestrial carabids are predated

**Table 1.** Large beetles recorded on night surveys in Stevens Reserve, 2018–2022. Data for 2018 and 2019 from Reid & Hutton (2019) and Reid *et al.* (2020).

Stevens Reserve	25 July 2018	13 August 2019	22 August 2022	23 August 2022
Chemically protected				
<i>Celibe exulans</i>	0	c5	10+	3
<i>Eurystomis castelnaui</i>	1	0	1	2
<i>Hydissus vulgaris</i>	1	1	3	0
<i>Metisopus curtulus</i>	1	c5	5	7
<i>Notoplatynus hilaris</i>	0	0	10	6
Not known to be chemically protected				
<i>Austrelater howensis</i>	0	0	1	0
<i>Dematochroma picea</i>	0	0	0	2
<i>Heteronychus arator</i>	0	1	0	0
<i>Phanodesta pudicum</i>	1	0	0	0
<i>Porithodes parenthetica</i>	0	3	0	0
<i>Xylotoles wollastoni</i>	0	0	0	1

**Table 2.** Large beetles recorded on night surveys in Valley of Shadows, 2019–2022. Data for 2019 from Reid *et al.* (2020).

Valley of Shadows	15 August 2019	25 August 2022
Chemically protected		
<i>Celibe exulans</i>	c5	20+
<i>Prosopogmus suspectus</i>	5	23
<i>Hydissus vulgaris</i>	0	2
<i>Metisopus curtulus</i>	0	5
Not known to be chemically protected		
<i>Aethreus cicatricosus</i>	0	1
<i>Dematochroma picea</i>	1	6
<i>Heteronychus arator</i>	0	1
<i>Mecocerinopsis balli</i>	1	0
<i>Stenellipsis</i> species	3	0
<i>Xylotoles segrex</i>	1	0
<i>Xylotoles wollastoni</i>	0	15

by *Rattus rattus* in New Zealand, but at relatively low level (Clapperton *et al.*, 2019). Their population fluctuations on Lord Howe Archipelago may therefore be from other causes. At least 32 species have been collected there (Moore, 1992; CAMR, *pers. obs.*).

#### *Eurystomis castelnaui* Chaudoir, 1878

**Material examined.** 1/ W end Stevens Reserve 31.5241S 159.0633E, 14m, at night 22.viii.2022 C Reid; 2 seen, not collected, same data except 23.viii.2022 C Reid.

**Remarks.** *Eurystomis castelnaui* is endemic to Lord Howe Island and is easily distinguished amongst the similar sized black carabids there by its broad prothorax and rounded elytra. It is a lowland forest species, recorded from the east slope of Phillip Point to the southeast slope of Mount Lidgbird (at unknown elevation). It was commonly collected 23–45 years ago in Stevens Reserve (material in Australian Museum), but since 2017 it has been scarce there (Reid *et al.*, 2018a; Reid & Hutton, 2019). As noted previously, Stevens Reserve seems to hold the main population of this species on the island, as *E. castelnaui* was not found by us during night walks in similar forest at Middle Beach or Valley of the Shadows. Length 8–10 mm.

#### *Notoplatynus hilaris* (Olliff, 1889)

**Material examined.** 1/ Blackburn Id, under large fig 31.5346S 159.0604E, 5m, on/under fig at night 19.viii.2022 C Reid, I Hutton, E Reid; >10 seen, not collected, Blackburn Island, under trees at 31.5347S 159.0601E, 31.5346S 159.0599E, 31.5346S 159.0598E, 31.5347S 159.0595E, at night, 19.viii.2022 C Reid, I Hutton, E Reid; at least 10 (3 collected)/ W end Stevens Reserve 31.5241S 159.0633E, 14m, at night 22.viii.2022 C Reid; 6 seen not collected, same data except 23.viii.2022 C Reid; 1/ start Transit Hill track 31.5286S 159.0696E 12m, pasture/forest margin 22.viii.2022 C Reid.

**Remarks.** *Notoplatynus hilaris* is endemic to Lord Howe Archipelago and is also easily distinguished amongst the black carabids by the cordate prothorax. It was a widespread and commonly recorded forest species 22–45 years ago throughout the main island (Moore, 1992). However, we failed to find this species anywhere on the main island in 2017–2019 and speculated that it had declined due to drought. The 2022 survey shows that this species had recovered in Stevens Reserve but we did not find it at Middle Beach forest or Valley of the Shadows. *Notoplatynus hilaris* remains common on Blackburn Island. Length 8–11 mm.

### *Prosopogmus suspectus* Chaudoir, 1878

**Material examined.** 1/ forested start Malabar track 31.5191S 159.0643E, 17m, on ground 5am, 18.viii.2022 C Reid; 1/ Blackburn Id 31.5346S 159.0596E, 21m, debris under *Araucaria* 19.viii.2022 C Reid & E Reid; 1/ Blackburn Id stunted *Lagunaria* on S slope 31.5349S 159.0594E, 20m, on or under bush 19.viii.2022 C Reid; 1 fragment [elytron]/ Blackburn Id W end of S cliff 31.5348S 159.0585E, 29m, under *Melaleuca* bush 19.viii.2022 C Reid; 11/ Valley of Shadows track 31.527S 159.075E, 25m, open forest at night, 25.viii.2022 C Reid & I Hutton; 9/ Valley of Shadows track 31.5278S 159.0745E, 30m, closed forest at night, 25.viii.2022 C Reid & I Hutton; 3/ Valley of Shadows 31.5288S 159.0758E, 50m, palm/fig forest at night, 25.viii.2022 C Reid & I Hutton; 7/ Middle Beach N end track 31.5250S 159.0720E, 42m, on path at night 25.viii.2022 C Reid.

**Remarks.** *Prosopogmus suspectus* is flightless and endemic to Lord Howe Archipelago where it is fairly commonly recorded and widespread, including on the larger offshore islands (Moore, 1992; Reid *et al.*, 2020). Our records confirm its presence on both the main island and Blackburn Island. We collected a large number of the specimens seen because a second, possibly undescribed, species of *Prosopogmus* (slightly smaller at 7.5–8 mm length, with different male genitalia) was mixed with *P. suspectus*. Length 8–10 mm.

### *Scaraphites rotundipennis* (Dejean, 1825)

Fig. 1

**Material examined.** 1, fragmented [head & elytron]/ Valley of Shadows track 31.5278S 159.0745E, 30m, closed forest at night, 25.viii.2022 C Reid & I Hutton (K621559).

**Remarks.** *Scaraphites rotundipennis* is a large (2–3.5 cm long) flightless terrestrial predator, which was probably accidentally introduced to Lord Howe Island in the 19th century, although Moore (1992) thought it was more likely to have arrived naturally. It was recorded as common on the island in 1887–1888 by Olliff (1889). The species is widespread on the Australian mainland, from Sydney to Tasmania, including the Bass Strait islands. It possibly arrived on Lord Howe Island in imported turf; *S. rotundipennis* was a predator of scarab larvae in golf course turf on Flinders Island, Tasmania, where 78 adults per 100 m<sup>2</sup> were recorded (McQuillan, 1983). Moore (1992) was unaware of any Lord Howe Island specimens collected after 1888. The Australian Museum collection includes two of the specimens examined by Olliff, plus two collected in Stevens Reserve, in December 2000 and May 2022. This burrowing species has evidently survived at low numbers during the rodent infestation.

There is some confusion concerning the correct name for the species on Lord Howe Island. It was originally recorded as *S. macleayi* [sic, for *macleaii*] (Westwood, 1842), which was placed in synonymy with *S. rotundipennis* by Sloane (1905), as noted by Moore *et al.* (1987). However, it has recently been claimed that “*S. insulanus* Sloane” (Baehr & Will, 2019: 84) is the valid name of the species on Lord Howe. These authors cite Bänninger (1940) for taxonomy of the genus. Bänninger placed *S. insulanus* in junior synonymy with *S. rotundipennis* and we cannot find any source for the validity of Sloane’s name, which has been regarded as a junior synonym of *S. rotundipennis* since 1905 (Sloane, 1905; Bänninger, 1940; Moore *et al.*, 1987; Moore, 1992). Length of Lord Howe Island specimens 25–35 mm.

### Family Cerambycidae Latreille, 1802

The longhorn beetle family Cerambycidae includes many large and conspicuous species but most adults are only active at night. The larvae feed in plant stems, usually in hard woody tissue. The cerambycid fauna of Lord Howe Archipelago is diverse, with at least 22 species (Ślipiński & Escalona, 2013, 2016; Reid *et al.*, 2018a).

### *Acalolepta antenor* (Newman, 1842)

**Material examined.** 1/ Blackburn Id, under large fig 31.5346S 159.0604E, 5m, on/under fig at night 19.viii.2022 C Reid, I Hutton, E Reid.

**Remarks.** *Acalolepta* is a widespread and speciose genus of large wood boring beetles, found from southeast Asia to Australia and the west Pacific. It has been found infrequently on Lord Howe Island since Olliff first recorded it (1889). Olliff noted two species, repeated by Ślipiński & Escalona (2013) but we have only seen specimens of one, hitherto named *A. fasciata* (Montrouzier, 1855) in Australian collections, including at least some of the specimens seen by Olliff in the Australian Museum collection. This taxon has been revised (Vitali, 2017) and is considered to belong to a superspecies, *A. antenor*, with five subspecies, although Vitali gave no clear diagnoses of the subspecies and notes that two supposed subspecies overlap in Australia. Vitali states that *Acalolepta antenor fasciata* is the subspecies occurring on Lord Howe Island. Several species of *Acalolepta* are known to be polyphagous, with hosts including *Ficus*. This is the first record of *A. antenor* on Blackburn Island, where it is probably feeding on the solitary large *Ficus*. Length 20–27 mm.

### *Agrianome howei* (Olliff, 1889)

**Material examined (larvae not collected).** 1 fragment [elytron]/ North Beach 31.5171S 159.0421E, 20m, tall forest patch by New Gulch track, 26.viii.2022 C Reid. Large larvae seen in rotting wood, not collected, at: Slope above Catalina 31.5161S 159.0604E, 65m, 19.viii.2022; creek line N of Catalina 31.5154S 159.0594E, 53m, 19.viii.2022; ridge NW of Catalina 31.5153S 159.0575E, 104m, 19.viii.2022; creek line WNW Catalina 31.5151S 159.0553E, 75m, 19.viii.2022; Blackburn Island, under large fig 31.5346S 159.0604E, 5m, 19.viii.2022; above Hells Gate 31.5185S 159.0709E, 36m, 22.viii.2022; along Transit Hill path from Board offices, 31.5288S 159.0715E 19m, 31.5298S 159.0724E 20m, 31.5308S 159.0740E 47m, 31.5320S 159.0768E 88m, all 22.viii.2022; above N end Middle Beach 31.524S 159.073E 30m, 24.viii.2022; track to North Beach 31.515S 159.049E 92m 26.viii.2022; North Beach 31.5171S 159.0420E 20m 26.viii.2022.

**Remarks.** The two large macrotomine prionine species recorded from Lord Howe Archipelago have recently been revised (Jin *et al.*, 2020). These authors showed that there is only one large species, *Agrianome howei*, which is endemic to the Archipelago. We have previously referred to this species as *A. spinicollis* (MacLeay, 1826). The other species, *Hermerius howei* (Thomson, 1864), was erroneously described from Lord Howe Island and is confined to mainland Australia (Jin *et al.*, 2020). *Agrianome howei* is the largest beetle on the islands, and the mature larvae are huge and easily identifiable to this species. Similar smaller larvae may belong to the other species of prionine cerambycid on the island, *Howea angulata* Olliff, 1889 (adults 18–25 mm long), so we have only included



**Figure 1.** Head capsule of *Scaraphites rotundipennis* (Dejean, 1825) (K621559). Photo: Natalie Tees, Australian Museum.

records of large larvae. *Agrianome howei* larvae occur throughout the lowlands but appear to be absent from the mountains - they were not found in Erskine Valley. Adults are noticeably rare and were not seen on any night search, similar to previous years. However, adult prionines do not feed after emergence and live for a week at most (Ślipiński & Escalona, 2013). *Agrianome spinicollis* evidently continues to be generally common in dead wood throughout the lowland forests. Length (of adult): 35–50 mm.

#### ***Ceresium flavipes* (Fabricius, 1792)**

**Material examined.** 1/ Blackburn Id, landing place 31.5344S 159.0600E, 5m, on planted *Lagunaria*, 19.viii.2022 C Reid.

**Remarks.** *Ceresium flavipes* is a widespread exotic species in Australia, originally from southern Africa (Ślipiński & Escalona, 2016) and first recorded from Lord Howe Archipelago by Olliff (1889, as ‘*Ceresium* species’). It is well-established on Blackburn Island (Reid *et al.*, 2020). Length: 12–19 mm.

#### ***Howea angulata* Olliff, 1889**

Figs 2, 3.

**Material examined.** 2 fragments [heads]/ ridge N of Old Settlement Beach, 31.5153S 159.0604E, 104m, beaten/ swept/dead wood 19.viii.2022, C Reid.

**Remarks.** The two heads (one illustrated here, Fig. 2) were found in debris at the base of a rotting tree stump. *Howea angulata* was described from just two specimens, one of which still exists in the Australian Museum collection but is in poor condition (Fig. 3). There are no other specimens in this collection. We are only aware of two specimens collected since the arrival of rats in 1918, collected at light in 1991 and 1992 (Australian National Insect Collection, Canberra). This is therefore a rarely seen species, which may have been suppressed by the introduced rodents and which may show a positive response to their eradication. However, like its prionine relative *Agrianome howei*, *Howea* probably has non-feeding adults, living at most for a few days. Survey for this species may be most appropriate through larvae, but



**Figure 2.** Head capsule of *Howea angulata* Olliff, 1889 (K621558). Photo: Natalie Tees, Australian Museum.

there is at present no means of accurately separating smaller larvae of these two genera. Length 18–25 mm.

#### *Xylotoles segrex* Olliff, 1889

**Material examined.** 1/ forested start Malabar track 31.5191S 159.0643E 17m on tree trunk 5m 18.viii.2022 C Reid; 2/ Hells Gate (bottom) 31.518S 159.071E 2–3m swept/beaten low veg grass & chenopod 22.viii.2022 C Reid.

**Remarks.** *Xylotoles segrex* is one of several flightless species of *Xylotoles* on Lord Howe Archipelago, where it is found throughout the lowlands, in forest and coastal heath (Reid *et al.*, 2020). Length 6–11mm.

#### *Xylotoles wollastoni* (White, 1856)

Fig. 4

**Material examined.** 15 seen [2 collected]/ Lynwood nr Ocean View, 31.5204S 159.0596E 20m, on *Howea forsteriana* at night 17.viii.2022, Reid & Hutton; 12 seen [3 collected]/ same data except 26.viii.2022; 1 photographed/ on Lagoon Road between Museum & Town, 31.525S 159.063E, 10m, at night, 22.viii.2022, LHIF; 1 photographed/ Somerset Apartments, 31.522S 159.063E, 17m, at night 22.viii.2022, LHIF; 1 photographed/ Lagoon Road @ Wilsons Bikes entrance 31.5251S 159.0627E., 9m, at night 22.viii.2022 LHIF; 1 seen/ Stevens Reserve 31.523S 159.065E, 14m, on Kentia palm at night 23.viii.2022 C Reid; 1/ Ocean View Appts 31.5211S 159.0602E 20m, on ground at night 22.viii.2022 C Reid; 1 [not collected]/ same data except 23.viii.2022 C Reid; 15 seen [3 collected]/ Valley of Shadows



**Figure 3.** *Howea angulata* Olliff, 1889, syntype (K36073). Photo: Natalie Tees, Australian Museum.



**Figure 4.** Male *Xylotoles wollastoni* (White, 1856) on broken palm frond. Photo: Ian Hutton.

first 250m, 31.528S 159.075E, 56m, on *Howea forsteriana* at night 25.viii.2022 C Reid & I Hutton; 2/ Middle Beach N end track 31.5250S 159.0720E, 42m, on palm at night 25.viii.2022 C Reid.

**Remarks.** *Xylotoles wollastoni* is a large flightless cerambycid (Fig. 4) which was relatively common before the arrival of rats (Olliff, 1889), then almost exterminated by them, with just five records from 1918 to 2019. The large number of specimens of *X. wollastoni* seen in 2022 was remarkable and a clear example of post-rodent eradication recovery. We discuss our observations of this species in detail elsewhere (Reid & Hutton, 2024). Length 15–25 mm.

### Family Chrysomelidae Latreille, 1802

Leaf beetles primarily feed on leaves as adults, although the larvae are often stem or root feeding (Reid, 2017). There are at least 28 species on the island, including a few synanthropic species.

### *Brontispa castanea* Lea, 1926

**Material examined.** 1/ Erskine Valley 31.5770S 159.0786E, c205m, swept/beaten/leaf litter 20.viii.2022 C Reid.

**Remarks.** This specimen was beaten off *Howea belmoreana*. *Brontispa castanea* is endemic to Lord Howe Island where it feeds as adults and larvae on fronds of at least three of the endemic palm species. It is therefore widespread on the island from sea level to the summit of Mount Gower, although surprisingly never abundant. It was not found in 2018 and 2019 surveys (Reid & Hutton, 2019; Reid *et al.*, 2020), but two specimens were collected in 2017, although overlooked in the report of that survey (Reid *et al.*, 2018a). There are 43 specimens in the Australian Museum, from 1887 to present, with most collected in summer months. *Brontispa castanea* appears to have been unaffected by rodents. Length 8–10 mm.



### *Dematochroma picea* (Baly, 1864)

**Material examined.** 1 fragment [elytron]/ Lynwood nr Ocean View, 31.5203S 159.0594E 20m, palm/fig forest/garden at night 17.viii.2022, Reid & Hutton; 1/ Neds Beach Rd, 31.5200S 159.0648E 19m, on ground, 5am, 18.viii.2022 C Reid; 1 fragment [elytron]/ Red Point track @ Dinner Run 31.5669S 159.0929E, 142m, low veg/dead wood 18.viii.2022 C Reid; 3 (1 collected)/ Erskine Valley, 31.5761S 159.0784E, c205m logs/tree trunks at night 20.viii.2022 C Reid; 1 fragment [elytron]/ Erskine Valley, 31.5770S 159.0786E, c205m swept/beaten/leaf litter 20.viii.2022 C Reid; 1/ start Transit Hill track 31.5286S 159.0696E 12m, pasture/forest margin 22.viii.2022 C Reid; 1 photographed/ Lagoon Road @ Wilsons Bikes entrance 31.5251S 159.0627E., 9m, at night 22.viii.2022 LHIF; 2/ Ocean View Appts 31.5211S 159.0602E 20m, on ground at night 22.viii.2022 C Reid; 1, same data except '23.viii.2022'; >15 [10 collected], same data except 'on lawn at night, 25.viii.2022'; 2 seen not collected/ Stevens Reserve 31.523S 159.065E, 14m, on ground at night 23.viii.2022 C Reid; 2/ Middle Beach N end track 31.5250S 159.0720E, 42m, on path at night 25.viii.2022 C Reid; 5 [2 collected]/ Valley of Shadows first 250m, 31.5288S 159.0758E, 50m, palm/fig forest at night 25.viii.2022 C Reid & I Hutton; 1/ Valley of Shadows track, 31.527S 159.075E, 25m, open forest at night 25.viii.2022 C Reid & I Hutton.

**Remarks.** The eumolpine leaf beetle *Dematochroma picea* is endemic to Lord Howe Island where it is widespread in mid and low elevation forest. Adults feed on leaves of the tree *Dryptes deplanchei* and probably other broad-leaved trees. Larvae of Eumolpinae inhabit soil, feeding on roots, and pupate there, so adults may be found crawling on the ground. We have previously suggested that adults of this species emerge in spring, occur throughout summer and are absent in winter (Reid *et al.*, 2020). The 2022 survey took place one week later than in 2019 and many more live adults were present (at least 34 live adults in 2022 compared with 2 in 2019). The majority were found on the ground, suggesting they had recently emerged, or were possibly ovipositing, but also that in the absence of rodents they had increased in numbers. Length 8–12 mm.

### Family Cleridae Latreille, 1802

Cleridae are predatory beetles, most of which are diurnal, actively hunting for insect prey on foliage and flowers. Lord Howe Archipelago has a small fauna of six species (Bartlett, 2009; Reid *et al.*, 2018a), which includes a large flightless nocturnal predator, related to fully winged subcorticolous predators on mainland Australia (Bartlett, 2021).

#### *Cormodes darwini* Pascoe, 1860

**Material examined.** 14 seen not collected/ Blackburn Island at night 19.viii.2022 C Reid, I Hutton, E Reid.

**Remarks.** In 2018 this supposedly extinct endemic species was rediscovered (Reid & Hutton, 2019), and it is now listed as critically endangered under the *New South Wales Biodiversity Conservation Act 2016* (Anonymous, 2023a). In August 2022 we undertook our first night survey for this species, seeing 14 individuals on 4 of the 13 trees on the island. A daytime survey of debris under small *Melaleuca* bushes along the southern edge of the island failed to find this species, supporting previous evidence that *C. darwini* is strictly associated with the trees on the island (Reid *et al.*,

2020). See discussion under Blackburn Island survey, below. Length: 11–15 mm.

### Family Curculionidae Latreille, 1802

The family Curculionidae, the true weevils, is the most speciose group of beetles on Lord Howe Archipelago, with more than 100 species known. All are plant feeding as adults and larvae, the latter almost always cryptic, feeding inside plant tissue or in soil. Most species are small, <4 mm long.

#### *Aethreus cicatricosus* Pascoe, 1875

Fig. 5

**Material examined.** 1/ Valley of Shadows track 31.527S 159.075E, 25m, open forest at night, 25.viii.2022 C Reid & I Hutton.

**Remarks.** *Aethreus cicatricosus* is endemic to Lord Howe Island, as both genus and species, and has rarely been collected since the arrival of rats in 1918. It was described from a single specimen collected by Masters (Pascoe, 1875), who visited Lord Howe Archipelago on behalf of the Australian Museum, in 1869 (Olliff, 1889). Olliff (1889) reviewed collections made in 1869 by Masters and in the 1880s by Australian Museum staff, and noted another specimen of *A. cicatricosus* (no longer in the Australian Museum collection). Currently, the Australian Museum has 5 specimens collected by Lea (December 1915 to January 1916), including 3 'on kentia palms', and 2 specimens collected at night in Stevens Reserve, February 2001, by the museum's arachnologist, Graham Milledge. The South Australian Museum has a further 14 specimens, 13 collected by Lea on kentia and one older specimen, which may be from Masters. There is no material of this species in the Australian National Insect Collection. The recent records show that *A. cicatricosus* is found in the forests of the central lowlands. This species might be expected to increase in abundance following the removal of rodents. Length 9–10.5 mm.

#### *Eutyrrhinus mediatundus* (Fabricius, 1775)

**Material examined.** 1/ Middle Beach N end track 31.525S 159.072E c40m, swept/beaten forest veg, 24.viii.2022 C Reid.

**Remarks.** This widespread weevil species is commonly observed on the island, where it is restricted to lowland forest (Olliff, 1889; Reid & Hutton, 2019). Length 7–12 mm.

### Family Elateridae Leach, 1815

Elateridae, or click beetles, are well-represented on Lord Howe Archipelago, with at least eight species, several of which are large. Most species are black or dark brown, nocturnal and are not known to be chemically protected from vertebrate predators. Larvae of Elateridae are generally omnivorous (Calder, 1996); those of the rainforest associated species are probably in dead wood, whereas larvae of grassland species may be root-feeding or predate scarab larvae.



**Figure 5.** *Aethreus cicatricosus* Pascoe, 1875 (K621560). Photo: Natalie Tees, Australian Museum.

### *Austrelater howensis* Calder, 1993

Fig. 6

**Material examined.** 1 ♀/ W end Stevens Reserve 31.5241S 159.0633E, 14m, at night 22.viii.2022 C Reid. Additionally, a ♂ was collected by IH in garden at night, Lynwood, 31.520S 159.059E 20m, 4.viii.2022.

**Remarks.** *Austrelater howensis* is a rare species endemic to Lord Howe Island, only previously known from the holotype, collected in 1955, and two possible larvae collected in 1980 (Calder *et al.*, 1993). The holotype was described as orange with pale yellow appendages, but our specimens are blackish-brown dorsally, with dark reddish-brown margins to the pronotum and brown to orange appendages. We suspect the holotype was teneral. The antennomeres of our male have longer and thinner lobes than indicated in the original description (Calder *et al.*, 1993) and the antennae of the hitherto unknown female (Fig. 6), are similar to *A. macphersonensis* Calder, 1993. The holotype is described with a declivous prosternum and pentagonal scutellum, but these features are absent in our specimens, in which the prosternum is raised to the edge of the procoxae and the scutellum has rounded sides and pointed apex, its greatest width being just before the anterior margin. The holotype is 9.8 mm long but our male is 12.5 mm and female 13.5 mm. *Austrelater howensis* is therefore almost identical to *A. macphersonensis*. It is possible that our material represents another species, but this seems unlikely on a small island. Length 9.8–13.5 mm.

### *Monocrepidius striatus* (Macleay, 1872)

**Material examined.** 1 fragment [elytron]/ Blackburn Id, E end of S cliff 31.5349S 159.0606E 10m, under *Melaleuca* bush, 19.viii.2022 C Reid.

**Remarks.** The correct generic name for this species is *Monocrepidius* Eschscholtz, 1829 (Kundrata *et al.*, 2019), not *Conoderus* Eschscholtz, as previously used (Reid & Hutton, 2019). *Monocrepidius striatus* is widespread and common in eastern Australian and in the lowlands of Lord Howe Island, where it occurs in both disturbed and natural habitats (Reid & Hutton, 2019). This is the first record of this grassland species from Blackburn Island. Length 8–15 m.

### *Ochosternus howensis* Lea, 1929

**Material examined.** 1 fragment [prothorax]/ Erskine Valley, 31.5770S 159.0786E, c205m swept/beaten/leaf litter 20.viii.2022 C Reid.

**Remarks.** *Ochosternus howensis* is endemic to Lord Howe Island, where it is infrequently seen but widespread in lowland forest and associated with dead wood (Reid *et al.*, 2018a). The genus is restricted to the southwest Pacific and is absent from mainland Australia (Calder, 1996). Length 13–20 mm.

## Family Lucanidae Latreille, 1804

Lucanidae are known as stag beetles, because some species have males with elaborately enlarged mandibles. Lord Howe Island has three species, all with only modestly sized mandibles. One species is endemic and one has only recently arrived and may not be established as it has not been seen since first recorded (Reid *et al.*, 2018a). The larvae are generally found in rotting wood and the adults drink sap or nectar.

### *Figulus nitens* Waterhouse, 1874.

**Material examined (larvae not collected).** 1 fragment [prothorax]/ Erskine Valley, forest on ridge above campsite 31.575S 159.079E, c235m sifted leaf litter 20.viii.2022



**Figure 6.** *Austrelater howensis* Calder, 1993, female (K621561). Photo: Natalie Tees, Australian Museum.

C Reid; larva/ N end Lidgebird cliff walk, 31.5705S 159.0759E, 90m, in rotting palm, 21.viii.2022 C Reid; 1/ start Transit Hill track 31.5286S 159.0696E 12m, pasture/forest margin 22.viii.2022 C Reid; larva/ Transit Hill 31.5298S 159.0724E, in rotting palm, 22.viii.2022 C Reid; 1 adult, 1 larva/ Boatharbour Track 31.554S 159.091E, 75m, low veg/dead wood, 23.viii.2022 C Reid; 1 adult [not collected]/ Soldiers Ck path, 31.5528S 159.0839E 55m rotting log 23.viii.2022 C Reid; 1/ Mt Lidgbird, palm pocket below Grey Face 31.5619S 159.0842E 328m beaten dead palm fronds etc 25.viii.2022 C Reid; larvae/ North Beach 31.5171S 159.0421E 20m, tall forest patch by New Gulch track, under bark, 26.viii.2022 C Reid.

**Remarks.** *Figulus nitens* is widespread in the lowlands of the island, with a slightly broader distribution than the other widespread stag beetle, *Lamprima insularis*, apparently tolerating wetter conditions in the southern mountains (Reid *et al.*, 2020). Here we record it at 335 m elevation on the slopes of Mount Lidgbird and at 235 m in Erskine Valley. The larva is easily distinguished from that of *L. insularis* by the presence of distinct claws at the apices of the legs. Length of adult 10–13 mm.

### *Lamprima insularis* Macleay, 1885

**Material examined (larvae not collected).** 1 fragment [elytron], larvae/ Red Point track @ Dinner Run 31.5669S 159.0929E, 142m, low veg/ dead wood 18.viii.2022 C Reid; 1 larva/ Red Point track 31.562S 159.093E 175m, under log, 18.viii.2022 C Reid; larva/ slope above Catalina 31.5161S 159.0604E, 65m, 19.viii.2022; larva/ creek line N of Catalina 31.5154S 159.0594E, 53m, 19.viii.2022; larva/ ridge NW of Catalina 31.5153S 159.0575E, 104m, 19.viii.2022; larva/ creek line WNW Catalina 31.5151S 159.0553E, 75m, 19.viii.2022; larva/ above Hells Gate 31.5185S 159.0709E, 36m, 22.viii.2022; larva/ Boat Harbour Track 31.554S 159.091E, 75m, low veg/dead wood, 23.viii.2022 C Reid; larva/ above N end Middle Beach 31.524S 159.073E 30m, 24.viii.2022; larva [photographed]/ Somerset Apartments, 31.522S 159.063E, 17m, rotting log 25.viii.2022, LHIF.

**Remarks.** *Lamprima insularis* is endemic to Lord Howe Island. Its status, biology and distribution within the island have been reviewed (Reid *et al.*, 2018b). The larva is easily distinguished from that of *F. nitens* by the absence of distinct claws at the apices of the legs. Here we confirm that the species is widespread in the lowlands, occurring up to 175 m elevation. *Lamprima insularis* larvae are rarely found with *Figulus* larvae but commonly found with larvae of the cerambycid, *Agrianome*. Length of adult 16–33 mm.

## Family Melandryidae Leach, 1815

Melandryids are mostly small brown beetles, with adults that are short-lived and larvae that bore into hardwoods. There are two species on Lord Howe Island (Lea, 1929).

### *Talayra brevipilis* Lea, 1929

**Material examined.** 2 fragments [pairs of elytra]/ N Beach track 31.5156S 159.0490E 90m under bark, dead tree, 26.viii.2022 C Reid.

**Remarks.** *Talayra brevipilis* is endemic to Lord Howe Island and the largest species of the family in Australia. Melandryid larvae are mostly borers of hardwood and these fragments were found in cylindrical burrows. *Talayra brevipilis* is

relatively rarely seen but widespread in lowland forest (Reid *et al.*, 2020). Length 11–14 mm.

## Family Scarabaeidae Latreille, 1802

The family Scarabaeidae includes the familiar lawn scarabs, dung beetles and chafers. All larvae are C-shaped ‘curl grubs’ with well-developed legs and head capsule, feeding on rotting vegetation (including herbivore dung) or plant roots. Lord Howe Archipelago has 16 recorded species (Reid & Tees, 2023), including some from mainland Australia that have been accidentally introduced in garden material, or deliberately introduced for cow dung burial.

### *Cryptodus tasmanianus* Westwood, 1841

**Material examined.** 1 fragment [elytron]/ Blackburn Id, W end S cliff, 31.5348S 159.0585E 29m, under *Melaleuca* bush 19.viii.2022 C Reid; 2 fragments [elytra]/ Blackburn Id, under large fig, 31.5346S 159.0604E, 5m, on/under fig at night, 19.viii.2022 C Reid, I Hutton, E Reid.

**Remarks.** This widespread species in southeast Australia was recently recorded from Blackburn Island (Reid & Hutton, 2019) where it may have previously been overlooked through lack of intensive collecting. It is not definitely known from Lord Howe Island. Length 17–22 mm.

### *Heteronychus arator* (Fabricius, 1775)

**Material examined.** 1 fragment [prothorax]/ Blackburn Id, 31.5346S 159.0596E 21m, debris under *Araucaria* 19.viii.2022 C Reid; 1/ Valley of Shadows track 31.527S 159.075E, 25m, open forest at night, 25.viii.2022 C Reid & I Hutton; >40 [12 collected]/ Old Settlement Beach, dune track 31.5190S 159.0557E, 2m, on path at night 26.viii.2022 C Reid.

**Remarks.** Although only recently recorded from Lord Howe Archipelago (Reid *et al.*, 2018a; Reid & Tees, 2023), this exotic pasture and lawn pest is evidently well-established in the cultivated parts of the island. Here it is first recorded from Blackburn Island. Previously we have only seen *H. arator* in low numbers (one in 2017, two in July 2018, one in August 2019), so the large number (>40) seen on the ground at night at Old Settlement Beach suggests that the species has increased in the absence of rodents. Length 10–12 mm.

### *Pimelopus fischeri* (Montrouzier, 1860)

**Material examined.** 1 fragment [elytron]/ Blackburn Id, W end S cliff, 31.5348S 159.0585E 29m, under *Melaleuca* bush 19.viii.2022 C Reid; 1/ Middle Beach/Anderson Rds jn 31.5256S 159.0709E, 43m, on road at night 25.viii.2022 C Reid; 1/ Somerset Apartments, 31.5221S 159.0633E, 16m, on path at night 25.viii.2022, LHIF.

**Remarks.** *Pimelopus fischeri* is widespread in lowland forest on Lord Howe Archipelago, including Blackburn Island (Reid *et al.*, 2020; Reid & Tees, 2023). All of our recent records have been fragments of dead specimens but here we record two living specimens crawling on the ground, in the absence of rodents. Length 16–20 mm.

### *Sericesthis geminata* Boisduval, 1835

**Material examined.** 1 fragment [head capsule]/ Red Point track @ Dinner Run 31.5669S 159.0929E, 142m, low veg/ dead wood 18.viii.2022 C Reid.

**Remarks.** *Sericesthis geminata* is an abundant native species on the east coast of Australia, where it is a pest of lawns and vegetables (Carne & Chinnick, 1957), similar to the exotic lawn pest *Heteronychus arator* (see above). It arrived on Lord Howe Island relatively recently and is now evidently well-established (Reid *et al.*, 2018a). Our observations suggest it is not restricted to disturbed or cultivated habitats on the island and the fragment collected in 2022 was deep in the forest of the east side of Mount Lidgbird. Length 14–18 mm.

### Family Staphylinidae Latreille, 1802

The larger species of staphylinids, or rove beetles, are active predators, particularly of fly maggots. There are approximately 50 species of Staphylinidae on Lord Howe Archipelago, most of which are small, and about half of the species are undescribed.

#### *Thyrecephalus orthodoxus* (Olliff, 1887)

**Material examined.** 2/ start Transit Hill track 31.5286S 159.0696E 12m, pasture/forest margin, 22.viii.2022 C Reid.

**Remarks.** Both specimens were collected under a log in grazed woodland. *Thyrecephalus orthodoxus* is a common and widespread south-eastern Australian species that was first collected on Lord Howe Island in 1966 (Bordoni, 2005). On Lord Howe Island it appears to be associated with anthropogenically disturbed habitats (Reid & Hutton, 2019). Length 13–14 mm.

### Family Tenebrionidae Latreille, 1802

The family Tenebrionidae (darkling beetles) mainly consist of rather dull black or brown crepuscular species, 12 of which have been collected on Lord Howe Archipelago. Many of these species are flightless and endemic. Tenebrionids are generally associated with rotting vegetation, plant roots and fungi. The large species emit an offensively smelly chemical when handled, which may protect them from predators such as rats.

#### *Celibe exulans* (Pascoe, 1866)

**Material examined.** >20 seen, not collected, Blackburn Island, under various trees at 31.5347S 159.0603E, 31.5347S 159.0601E, 31.5346S 159.0599E, 31.5347S 159.0599E, 31.5346S 159.0596E, 31.5347S 159.0595E, at night, 19.viii.2022 C Reid, I Hutton, E Reid; >10 (2 collected)/ W end Stevens Reserve 31.5241S 159.0633E, 14m, at night 22.viii.2022 C Reid; 3 seen not collected, same data except 23.viii.2022 C Reid; 3/ Malabar 31.5143S 159.0609E 128m under stones 24.viii.2022 LHIF; 1 (not collected)/ Middle Beach N end track 31.524S 159.073E, 30m, under log, coastal forest 24.viii.2022 C Reid; at least 20 (2 collected)/ Middle Beach N end track 31.5250S 159.0720E, 42m, on path at night 25.viii.2022 C Reid; at least 20 (1 collected)/ Valley of Shadows first 250m, 31.5278S 159.0745E, 30–50m, open and closed forest at night 25.viii.2022 C Reid & I Hutton; 1 photographed/ Somerset Apartments, 31.5221S 159.0633E, 16m, on path at night 25.viii.2022, LHIF.

**Remarks.** *Celibe exulans* is an abundant flightless species, endemic to Lord Howe Archipelago, found throughout the lowlands of the main island and also on Balls Pyramid and Blackburn Island (Reid *et al.*, 2018a; Reid & Hutton, 2019).

It is the most commonly seen black tenebrionid species in the central lowlands but not as widespread as the other two common species. The larvae of this helicine tenebrionid may inhabit soil (Matthews & Bouchard, 2008). Length 7–17 mm.

#### *Hydissus vulgaris* (Olliff, 1889)

**Material examined.** 1 (not collected)/ Red Point track @ Dinner Run 31.5669S 159.0929E, 142m, low veg/ dead wood 18.viii.2022 C Reid; 1/ Blackburn Id 31.5346S 159.0604E, under large fig, 5m, on/under fig at night 19.viii.2022 C Reid, I Hutton, E Reid; >15 seen, not collected, Blackburn Island, under various trees at 31.5347S 159.0603E, 31.5347S 159.0601E, 31.5346S 159.0599E, 31.5347S 159.0599E, 31.5346S 159.0598E, 31.5346S 159.0596E, 31.5347S 159.0597E, at night, 19.viii.2022 C Reid, I Hutton, E Reid; about 10 [4 collected]/ Erskine Valley, 31.5761S 159.0784E, c205m logs/tree trunks at night 20.viii.2022 C & E Reid; about 10 (not collected)/ Erskine Valley, 31.5760S 159.0786E, c205m on logs at night, 20.viii.2022 C & E Reid; 3 (not collected)/ W end Stevens Reserve 31.5241S 159.0633E, 14m, at night 22.viii.2022 C Reid; 2 (1 collected)/ Valley of Shadows first 250m, 31.5288S 159.0758E, 50m, palm/fig forest at night 25.viii.2022 C Reid & I Hutton.

**Remarks.** *Hydissus vulgaris* is a flightless species, endemic to Lord Howe Archipelago and widespread in the forested lowlands of the main island, but also occurring on Balls Pyramid and Blackburn Island (Reid *et al.*, 2018a; Reid & Hutton, 2019). It is the least often seen of the three common black tenebrionids on the island. Larvae develop in rotting wood (Matthews & Bouchard, 2008). Length 8–13 mm.

#### *Metisopus curtulus* (Olliff, 1889)

**Material examined.** 1 [not collected]/ Lynwood nr Ocean View, 31.5204S 159.0596E 20m, on *Howea forsteriana* at night 17.viii.2022, Reid & Hutton; 2 (1 not collected)/ Red Point track @ Dinner Run 31.5669S 159.0929E, 142m, low veg/ dead wood 18.viii.2022 C Reid; 2/ ridge N of Old Settlement Beach 31.5153S 159.0575E, 104m, beaten/swept/dead wood 19.viii.2022 C Reid; 1/ W ck above Old Settlement Beach 31.5152S 159.0550E, c80m, beaten/swept/sifted in rf gully, 19.viii.2022 C Reid; 1 fragment [elytron]/ Blackburn Id, W end S cliff, 31.5348S 159.0585E 29m, under *Melaleuca* bush 19.viii.2022 C Reid; 1/ Blackburn Id 31.5346S 159.0604E, under large fig, 5m, on/under fig at night 19.viii.2022 C Reid, I Hutton, E Reid; 1/ Blackburn Id 31.5346S 159.0596E, 21m, debris under *Araucaria*, 19.viii.2022 C Reid, I Hutton, E Reid; >20 seen, not collected, Blackburn Island, under various trees at night, 31.5347S 159.0603E, 31.5347S 159.0601E, 31.5346S 159.0599E, 31.5347S 159.0599E, 31.5346S 159.0598E, 31.5346S 159.0595E, 31.5347S 159.0595E, 31.5347S 159.0597E, 19.viii.2022 C Reid, I Hutton, E Reid; about 10 [3 collected]/ Erskine Valley, 31.5761S 159.0784E, c205m logs/tree trunks at night 20.viii.2022 C & E Reid; 5 (1 collected)/ W end Stevens Reserve 31.5241S 159.0633E, 14m, at night 22.viii.2022 C Reid; 7 (not collected)/ Stevens Reserve 31.523S 159.065E, 14m, on logs at night 23.viii.2022 C Reid; 5 (not collected)/ Valley of Shadows first 250m, 31.528S 159.075E, 56m, on *Howea forsteriana* at night 25.viii.2022 C Reid & I Hutton; 1 fragment [prothorax]/ North Beach 31.5171S 159.0421E 20m, tall forest patch by New Gulch track, 26.viii.2022 C Reid.

**Remarks.** *Metisopus curtulus* is flightless and endemic to Lord Howe Archipelago, where it is widespread in the forested lowlands, but also occurs on Balls Pyramid and Blackburn Island (Reid *et al.*, 2018a; Reid & Hutton, 2019). It is the most widespread of the three common black tenebrionids, occurring from New Gulch to Erskine Valley. Larvae develop in rotting wood (Bouchard & Yeates, 2001; Bouchard & Steiner, 2004). Length 7–13 mm.

### *Promethis sterrha* (Olliff, 1889)

**Material examined.** 23 seen not collected/ Blackburn Island at night 19.viii.2022 C Reid, I Hutton, E Reid; 2 fragments [elytra]/ Blackburn Id 31.5346S 159.0604E, under large fig, 5m, on/under fig at night 19.viii.2022 C Reid, I Hutton, E Reid; 1 fragment [elytron]/ Blackburn Id 31.5346S 159.0596E, 21m, debris under *Araucaria*, 19.viii.2022 C Reid, I Hutton, E Reid.

**Remarks.** *Promethis sterrha* is now listed as critically endangered under the *New South Wales Biodiversity Conservation Act 2016* (Anonymous, 2023b). In August 2022 we undertook our first night survey for this species, seeing 23 individuals on or under 6 of the 13 trees on the island. However, a daytime survey of debris under *Melaleuca* bushes along the southern edge of the island failed to find any evidence of it. See discussion under Blackburn Island survey, below. Length: 11–15 mm. Length 20–25 mm.

## Family Trogossitidae Latreille, 1802

### *Phanodesta pudica* (Olliff, 1889)

**Material examined.** 1/ North Beach 31.5171S 159.0421E 20m, tall forest patch by New Gulch track, under bark, 26.viii.2022 C Reid.

**Remarks.** *Phanodesta pudica* is endemic to Lord Howe Island. We recently recorded this rarely seen species from Stevens Reserve in the central lowlands (Reid & Hutton, 2019) and it was originally recorded from Mount Lidgbird in the south (Olliff, 1889). This new record suggests that the species is found throughout the island in lower elevation forest.

## Discussion

### Night surveys in Stevens Reserve and Valley of the Shadows

We initiated night surveys of these sites in July 2018. Prior to that, Coleoptera had been collected at night on Lord Howe Island, particularly in Stevens Reserve, but unsystematically. The night surveys of these sites in 2022 were the first since rodent eradication in October 2019, although the 2019 survey overlapped with the rodent eradication which began in May 2019 (Harper *et al.*, 2020). By August 2019 the mice had been eliminated but there were still rats present (Harper *et al.*, 2020). The 2019 survey may be treated as intermediate, in that adults that emerged at that time were less likely to be predated than in 2018, but were descended from the previous generation (assumed to be annual for large Coleoptera on Lord Howe Island) which had been fully exposed to predation. Stevens Reserve was the easiest site to access at night and has now been surveyed in 2018, 2019, 2022 (Table 1). The Valley of the Shadows track was surveyed in 2019 and 2022 (Table 2), and in 2022 we surveyed the track to

the north end of Middle Beach.

The night surveys are not strictly comparable, as they varied in date, number of observers, weather and time taken. There was great variation between consecutive days at the same site in similar weather conditions. For example, CAMR walked the same track in Stevens Reserve on consecutive nights, 22 August and 23 August 2022, observing 30 individuals of 6 species on the first night and 21 individuals of 6 species on the second night, with only 3 species shared. Temperature ranges were similar on the two days, 13–19°C on 22 August and 13.9–19.8°C on 23 August (Bureau of Meteorology, 2023).

However, we think repeated night surveys will be a useful general guide to trends in diversity and abundance of large Coleoptera, especially if repeated often. For example, the effect of rodent eradication appeared to be minimal in Stevens Reserve, whether the beetles were chemically protected or not (Table 1). Numbers of chemically protected beetles in Stevens Reserve increased, but only slightly. In contrast, both groups of beetles in Valley of the Shadows increased from 2019 to 2022. The most significant increases were in *Celibe exulans*, *Prosopogmus suspectus* and *Xylotoles wollastoni*. The first two are chemically protected, and by August 2019 the rats were in low numbers at most, so the increase of these beetle species may be due to climatic variation. *Celibe* and *Prosopogmus* were abundant in the Australian Museum's surveys of the early 2000s, when there were several above average rainfall years (Bureau of Meteorology 2023). The years 2020 and 2022 also had above average rainfall, so perhaps these species prefer wetter conditions. On the other hand, *X. wollastoni* has been virtually unknown since Lea collected many specimens in 1915 (Reid & Hutton, 2024). The great increase of this species, noted at Valley of the Shadows and elsewhere on the Island in 2022, was almost certainly due to eradication of the rats.

### Blackburn Island survey

Blackburn Island is small (2.4 hectares), of low elevation (32 metres) and situated within the Lord Howe lagoon (Carlile & Priddell, 2013). It is only 680 metres from Lord Howe Island and the water depth between them is generally less than two metres. Blackburn Island is therefore not strongly isolated from Lord Howe Island, unlike other offshore islands such as Roach Island, which is separated by one kilometre of ocean and a marine trench about 15 metres deep. The vegetation of Blackburn Island is mostly grassland, dominated by the exotic species *Chloris gayana*, but much of the centre of the island has recently been planted with a mixture of shrubs and trees as part of a phasmid restoration program undertaken by the Lord Howe Island Board. The southern edge of the island is a high ridge, dropping abruptly to the sea in a series of low cliffs and sloping shallowly to the northeast where several mature trees are sheltered from westerly winds. These trees, about 12 individuals altogether, include a large *Ficus macrophylla* ssp. *columnaris*, a *Howea forsteriana* sheltered by the *Ficus*, several *Lagunaria patersonia* and three exotic *Araucaria heterophylla*. Blackburn Island has at least three large beetles no longer found on Lord Howe Island, *Cormodes darwini*, *Cryptodus tasmanianus* and *Promethis sterrha* (Reid & Hutton, 2019).

We surveyed the areas under 12 trees and most of the bushes on the southern side of the island in 2019 (Reid *et al.*, 2020). The 2022 survey continued the diurnal examination of debris under melaleuca bushes on the south side and undertook a night survey of the same 12 trees on the middle

and north side of the island.

Based on surveys to 2019, we listed 13 large beetle species on Blackburn Island (Reid *et al.*, 2020). To these we add: *Acalolepta faciata* and *Monocrepidius striatus*. The first is a dead wood borer, possibly breeding in the large *Ficus* on the island, as other *Acalolepta* species are associated with this plant (Ślipiński & Escalona, 2013). The second is an introduced species on Lord Howe, associated with grassland and abundant in cleared areas of Lord Howe.

There are now 15 beetle species at least one centimetre long known from Blackburn Island. Two of these species, *C. darwini* and *P. sterrha*, are Lord Howe endemics which have not been collected on the main island since 1916, before black rats arrived. Both have been listed as critically endangered species under the *New South Wales Biodiversity Conservation Act 2016* (Anonymous, 2023a, 2023b). In 2019 four sites on the steep and rocky southern edge of Blackburn Island were surveyed to see if either species was in the dead wood debris produced by a stunted *Lagunaria patersonia* and some of the approximately 45 *Melaleuca howeana* bushes. *Promethis sterrha* was found at two such localities (only about 40 m apart) and we speculated that it may be present wherever there is dead wood on Blackburn Island (total population area <1 ha). *Cormodes darwini* was not found under any of the southern bushes.

In 2022 the senior author searched for both species under some of the bushes on the southern edge missed in 2019, but failed to find evidence of either. Fragments of three individuals of *P. sterrha* were found later at night in debris under the araucarias, so their absence from most bushes on the south side suggests that *P. sterrha* is more restricted in distribution on the island than previously thought.

Our night survey of Blackburn Island examined all the larger trees and bushes found on the north side, which is more sheltered than the south side. Weather conditions were mild. The first *Cormodes* emerged at about 6 pm and the first *Promethis* at about 6.20 pm. Altogether we found 14 live *Cormodes* and 23 live *Promethis*. The *Cormodes* were all found on exposed roots, stems and branches of *Lagunaria* whereas the *Promethis* were found on exposed roots, trunks and lower branches of *Araucaria* (13), *Ficus* (8) and *Lagunaria* (2). This suggests that the two species are not closely associated. The tenebrionids *Celibe* and *Metisopus* were always present with *Cormodes*, but they were present on or under almost every tree on Blackburn Island. Adults and larvae of these two genera may be the prey of *Cormodes*.

### Summary of 2017–2022 surveys of large Coleoptera

The four surveys of Lord Howe Archipelago (2017, 2018, 2019, 2022) found 53 species of large Coleoptera, 13 flightless and 40 flighted (Reid *et al.*, 2018a; Reid & Hutton, 2019; Reid *et al.*, 2020). Nine of these species were new records for the Archipelago; in contrast 2022 was the first year in which no additions were made. We are aware of a further 10 flightless and 25 flighted large species which have been collected on Lord Howe Archipelago but were not found in our surveys. Some of these species were probably missed because three out of four surveys were in winter, when there is reduced adult beetle activity. However, at least five flightless and five flighted species have not been seen since 1916 and these species are of particular concern. At least two are considered extinct: *Hybomorphus melanosomus* Saunders & Jekel, 1855, last collected alive in 1853, and *Hesperus gigas* (Lea, 1929), last collected alive in the 1880s (Jensen *et al.*, 2020).

### Coleoptera and rodent eradication

Signs of the benefits of rodent eradication in our 2022 survey include the explosion in numbers of the large flightless cerambycid, *Xylotoles wollastoni*, and relatively large numbers of living beetles found exposed on the ground, of species which are not known to be chemically protected and therefore vulnerable to generalist predators. For example on one night there were 40 or more *Heteronychus arator* at Old Settlement Beach and more than 15 *Dematochroma picea* on the lawn at Ocean View Apartments. The *Heteronychus* is an exotic species, and it is to be expected that both native and exotic large Coleoptera will benefit. However, since rodent eradication there has been a great increase of native wood hens, which are predatory (O'Dwyer *et al.*, 2022), and it may be some time before populations of large beetle species stabilise. It will be interesting to see how the effects of this historic event ripple through the larger Coleoptera.

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