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The Australian Museum Lord Howe Island Expedition 2017

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The Australian Museum Lord Howe Island Expedition 2017—Land Snail Fauna

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ABSTRACT. Land snail surveys undertaken in 2016 and 2017 on Lord Howe Island by members of the Australian Museum have produced new occurrence records of at least 44 species of land snail. These include three probably species new as well as six introduced species.

KEYWORDS. Lord How Island; Mollusca; Gastropoda; Neritimorpha; Eupulmonata; Caenogastropoda.

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Introduction

The land snail fauna of Lord Howe Island comprises 62 currently recognised, extant native species (or subspecies), of which 59 are endemic to the island. One species, *Epiglypta howinsulae*, is extinct most likely as result of rodent predation. In addition, twelve introduced species have so far been documented, some of which are generally considered as pests (Stanisic *et al.*, 2010).

The endemic species represent ten different families belonging to three major gastropod clades, the Neritimorpha, Eupulmonata and Caenogastropoda. Each of these families must have colonized Lord Howe Island at least once independently and most families have since radiated into more or less diverse flocks of endemic species. Neritimorphs are represented by the Hydrocenidae (1 species), eupulmonates are represented by Achatinellidae (4 species), Bulimulidae (1 species), Charopidae (13 species), Helicarionidae (6 species or subspecies), Microcystidae (11 species), and Punctidae (12 species), and caenogastropods are represented by Assimineidae (3 species) and Diplommatinidae (10 species) (Table 1).

In addition, up to 37 potentially undescribed species have been identified among material held by the Australian Museum through curatorial work (Table 2). Clarifying the taxonomic status of these candidate species requires verification by detailed comparative taxonomic study. Preferably, such studies should include examinations of morphological, anatomical and molecular genetic characters. Hence, the need to collect additional samples that are suitable for such systematic investigations in the near future.

Five gastropod species are currently listed as Endangered or Critically Endangered nationally (EPBC Act 1999), and one species is extinct (Table 1). Predation by introduced rodents is considered as the single most significant threat causing on-going decline in these species. However, based on the limited distribution of all island species and the ubiquitous presence of rodents on the island, it is probable that additional species are eligible for listing as endangered or critically endangered in accordance with the criteria of the EPBC Act.

Current knowledge of the distribution and abundance of most species is based on a series of comprehensive surveys undertaken since the early 19070s, namely in 1971 (534



Figure 1. Occurrence records of land snails on Lord Howe Island. Blue dots: historic occurrence records from the Australian Museum collection. Red dots: occurrence records of the 2016 survey. Yellow dots: occurrence records of the 2017 survey. Map data ©2018 Google.

lots in the AM collection), 1978 (325 lots), 1999 (866 lots), 2000 (898 lots), 2001 (762 lots), and 2002 (550 lots) (Fig. 1). These surveys have covered nearly the entire surface of the island, but some inaccessible parts have remained unsurveyed or poorly represented in the collection (Fig. 1). The samples collected during past surveys provide a baseline for delineating species ranges and for estimating trends in the distribution of species over the past few decades, especially when compared with equally detailed contemporary occurrence data.

Here we provide a first summary of the new occurrence records of non-marine gastropods that stem from the land snail survey undertaken as part of the AM Lord Howe Island Expedition in 2017. Additionally, we are incorporating occurrence records from an earlier survey undertaken in 2016 as part of the environmental assessment for the planned rodent eradication project on Lord Howe Island (Köhler *et al.* 2017).

Material and methods

Survey sites were determined prior to arrival on the island based on occurrence records of species retrieved from the Australian Museum collection, so that the ranges of all known species and putatively undescribed species were covered in the sampling regime.

The land snail survey took place between 10 and 18 February 2017 with two participants. Additional survey data stems from a survey in 2016 when a team of three people collected land snails between 10 and 13 September. Living snails and well-preserved shells of dead specimens were collected by manual search in leaf litter, under logs, on bark and leaves and other hiding places during day times and occasionally at night. Observations of endangered and critically endangered species were recorded without taking living specimens. We also collected leaf litter samples in bags, from which minute specimens were extracted in the lab by using a microscope.

We also searched for terrestrial gastropods on Ball's Pyramid from 21–26 March 2017. One AM malacologist visited three sites at the base and lower slopes of Balls' Pyramid while climbers, who were instructed to collect leaf litter samples and macroinvertebrates, visited sites at altitudes higher than 100 m above sea level.

Results

Overall, we collected 113 specimen lots from 19 different sites on Lord Howe Island in 2017, 104 lots from 11 sites in 2016, and 4 lots from Balls' Pyramid in 2017 (Fig. 1).

Samples collected in 2017 represented 33 species, one of which is undescribed (*Mystivagor* sp. LHI 1) and five of which were introduced to the island. Four additional morphospecies could not be confidently associated with an already introduced taxon name. In 2016 we found 35 species (including three undescribed and four introduced species) as well as one unidentified species.

Both surveys combined resulted in records of 44 species (three new, and six introduced) plus up to five species that have not yet been identified (Table 4). Some of the species found are shown in Fig. 2.

On Ball's Pyramid we found one widespread species, *Tornatellinops* sp., whose taxonomic status is pending closer examination, and one shell fragment of *Howearion* sp.

All occurrence records are available from the collection database of the Australian Museum.

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Reference

Köhler, F., I. Hyman, and A. Moussalli. 2017. Lord Howe Island Rodent Eradication Project: Assessment of potential impacts on land snails. In: *Lord Howe Island Rodent Eradication Project NSW Species Impact Statement*. Lord Howe Island: Lord Howe Island Board.



Figure 2. Photographs of some notable species. (a) *Howearion belli*, Mt Gower; (b) *Pseudocharopa whiteleggi*, Mt Gower; (c) *Parmellops perspicuus*, Mt Gower; (d) *Mystivagor* LHI 1, Mt Gower; (e) *Placostylus bivaricosus*, Old Settlement Beach; (f) *Goweroconcha wilsoni*, Mt Gower; (g) *Parmellops ethridgei*, Steven's Reserve; and (h) *Howearion hilli*, Steven's Reserve. All photographs courtesy of Adnan Moussalli, Museum Victoria.

Table 1. Native land snail species on Lord Howe Island (taxonomy following Stanicic *et al.*, 2010) with information on their status and basic ecology. Abbreviations: *E*, endemic; *EN*, endangered; *CE*, critically endangered; and *EX*, extinct.

family	species	endemic	threat status	life style / substrate preference
Achatinellidae	<i>Elasmias wakefieldiae</i> (Cox, 1868)			arboreal
Achatinellidae	<i>Tornatellides lordhowensis</i> Shea & Griffiths, 2010	E		arboreal
Achatinellidae	<i>Tornatellinops jacksonensis</i> (Cox, 1864)			arboreal
Achatinellidae	<i>Tornatellinops lidgbirdense</i> (Iredale, 1944)	E		arboreal
Assimineidae	<i>Limborelia exquisita</i> (Pfeiffer, 1855)	E		leaf litter
Assimineidae	<i>Limborelia innesi</i> (Iredale, 1944)	E		leaf litter
Assimineidae	<i>Opinorelia howeinsulae</i> (Iredale, 1944)	E		leaf litter
Bulimulidae	<i>Placostylus bivaricosus</i> (Gaskoin, 1855)	E	EN	leaf litter
Charopidae	<i>Charopella wilkinsoni</i> (Brazier, 1889)	E		leaf litter
Charopidae	<i>Charopella zela</i> Iredale, 1944	E		leaf litter
Charopidae	<i>Goweroconcha waterhousiae</i> (Hedley, 1897)	E		leaf litter
Charopidae	<i>Goweroconcha wenda</i> Iredale, 1944	E		leaf litter
Charopidae	<i>Goweroconcha wilsoni</i> Iredale, 1944	E		leaf litter
Charopidae	<i>Gyropena minuta</i> Shea & Griffiths, 2010	E		leaf litter
Charopidae	<i>Gyropena verans</i> Iredale, 1944	E		leaf litter
Charopidae	<i>Hedleyoconcha addita</i> Iredale, 1944	E		leaf litter
Charopidae	<i>Mystivagor mastersi</i> (Brazier, 1872)	E	CE	leaf litter
Charopidae	<i>Pseudocharopa exquisita</i> Peile, 1929	E		leaf litter
Charopidae	<i>Pseudocharopa ledgbirdi</i> (Brazier, 1889)	E	CE	leaf litter
Charopidae	<i>Pseudocharopa whiteleggei</i> (Brazier, 1889)	E	CE	leaf litter
Charopidae	<i>Pulcharopa plesa</i> Iredale, 1944	E		leaf litter
Diplommatinidae	<i>Palaina arborfumosa</i> Shea & Griffiths, 2010	E		leaf litter
Diplommatinidae	<i>Palaina capillacea</i> (Pfeiffer, 1855)	E		leaf litter
Diplommatinidae	<i>Palaina deliciosa</i> Iredale, 1944	E		leaf litter
Diplommatinidae	<i>Palaina edwardi</i> Iredale, 1944	E		leaf litter
Diplommatinidae	<i>Palaina embra</i> Iredale, 1944	E		leaf litter
Diplommatinidae	<i>Palaina intercollis</i> Shea & Griffiths, 2010	E		leaf litter
Diplommatinidae	<i>Palaina levicostulata</i> Iredale, 1944	E		leaf litter
Diplommatinidae	<i>Palaina lucia</i> Iredale, 1944	E		leaf litter
Diplommatinidae	<i>Palaina macgillivrayi</i> (Pfeiffer, 1855)	E		leaf litter
Diplommatinidae	<i>Palaina waterhousei</i> Iredale, 1944	E		leaf litter
Helicarionidae	<i>Epigypta howeinsulae</i> (Cox, 1873)	E	EX	?
Helicarionidae	<i>Gudeoconcha sophiae sophiae</i> (Reeve, 1854)	E		ground
Helicarionidae	<i>Gudeoconcha sophiae magnifica</i> Iredale, 1944	E	CE	ground
Helicarionidae	<i>Howearion belli</i> Iredale, 1944	E		leaf litter
Helicarionidae	<i>Howearion hilli</i> (Cox, 1873)	E		leaf litter
Helicarionidae	<i>Parmellops etheridgei</i> (Brazier, 1889)	E		arboreal
Helicarionidae	<i>Parmellops perspicuus</i> Hyman, 2016	E		arboreal
Hydrocenidae	<i>Monterissa gowerensis</i> Iredale, 1944	E		rock face
Microcystidae	<i>Deliciola charis</i> Iredale, 1944	E		arboreal
Microcystidae	<i>Dignamoconcha dulcissima</i> Iredale, 1944	E		arboreal
Microcystidae	<i>Innesoconcha aberrans</i> Iredale, 1944	E		arboreal
Microcystidae	<i>Innesoconcha catletti</i> (Brazier, 1872)	E		arboreal
Microcystidae	<i>Innesoconcha princeps</i> Iredale, 1944	E		arboreal
Microcystidae	<i>Innesoconcha segna</i> Iredale, 1944	E		arboreal
Microcystidae	<i>Melloconcha delecta</i> Iredale, 1944	E		arboreal
Microcystidae	<i>Melloconcha flavescens</i> (Iredale, 1944)	E		arboreal
Microcystidae	<i>Melloconcha miranda</i> (Iredale, 1944)	E		arboreal
Microcystidae	<i>Melloconcha prensa</i> Iredale, 1944	E		arboreal
Microcystidae	<i>Melloconcha rosacea</i> (Iredale, 1944)	E		arboreal
Punctidae	<i>Allenella formalis</i> Iredale, 1944	E		arboreal
Punctidae	<i>Allenella planorum</i> Iredale, 1944	E		arboreal
Punctidae	<i>Charopinesta goweri</i> Iredale, 1944	E		leaf litter
Punctidae	<i>Dignamoconcha dulcissima</i> Iredale, 1944	E		arboreal
Punctidae	<i>Goveriana berniceae</i> Shea & Griffiths, 2010	E		leaf litter
Punctidae	<i>Paralaoma caputspinulae</i> (Reeve, 1851)			leaf litter
Punctidae	<i>Pernastela charon</i> Iredale, 1944	E		leaf litter
Punctidae	<i>Pernastela gnoma</i> Iredale, 1944	E		leaf litter
Punctidae	<i>Pernastela howensis</i> Iredale, 1944	E		leaf litter
Punctidae	<i>Semilaoma costata</i> Shea & Griffiths, 2010	E		leaf litter
Punctidae	<i>Semilaoma laevis</i> Shea & Griffiths, 2010	E		leaf litter
Punctidae	<i>Semilaoma lidgbirdensis</i> (Iredale, 1944)	E		leaf litter
Pupillidae	<i>Pupisoma evada</i> (Iredale, 1944)			arboreal

Table 2. Potentially undescribed species from Lord Howe Island as recognized in the Australian Museum collection through curatorial work.

family	species
Assimineidae	Assimineidae sp. LHI 1
Assimineidae	Assimineidae sp. LHI 2
Assimineidae	Assimineidae sp. LHI 3
Assimineidae	<i>nitida</i> -like sp.
Charopidae	<i>Mystivagor</i> sp. LHI 1
Charopidae	<i>Pernastela</i> sp. LHI 2
Charopidae	new genus 1 sp. LHI 3
Charopidae	new genus 1 sp. LHI 4
Diplommatinidae	<i>Palaina</i> sp. LHI 1
Diplommatinidae	<i>Palaina</i> sp. LHI 2
Diplommatinidae	<i>Palaina</i> sp. LHI 3
Diplommatinidae	<i>Palaina</i> sp. LHI 4
Diplommatinidae	<i>Palaina</i> sp. LHI 5
Diplommatinidae	<i>Palaina</i> sp. LHI 7
Diplommatinidae	<i>Palaina</i> sp. LHI 8
Punctidae	<i>Allenella</i> sp. LHI 1
Punctidae	<i>Allenella</i> sp. LHI 2
Punctidae	<i>Allenella</i> sp. LHI 3
Punctidae	<i>Iotula</i> sp. LHI 3
Punctidae	<i>Iotula</i> sp. LHI 13
Punctidae	new genus 1 sp. LHI 8
Punctidae	new genus 2 sp. LHI 5
Punctidae	new genus 2 sp. LHI 9
Punctidae	new genus 3 aff. <i>innesi</i>
Punctidae	new genus 4 sp. LHI 10
Punctidae	new genus 6 sp. LHI 12
Punctidae	<i>Paralaoma</i> sp. LHI 14
Punctidae	<i>Paralaoma</i> sp. LHI 15
Punctidae	<i>Paralaoma</i> sp. LHI 6
Punctidae	Punctidae sp. LHI 1
Punctidae	Punctidae sp. LHI 10
Punctidae	Punctidae sp. LHI 16
Punctidae	Punctidae sp. LHI 18
Punctidae	Punctidae sp. LHI 20
Punctidae	Punctidae sp. LHI 21
Punctidae	Punctidae sp. LHI 8
Punctidae	<i>Semilaoma</i> sp. LHI 7

Table 3. Introduced land snail species recorded on Lord Howe Island (based on occurrence records from the Australian Museum collection).

family	species
Agriolimacidae	<i>Deroceras invadens</i> (Reise, Hutchison, Schunack & Schitt, 2011)
Bradybaenidae	<i>Bradybaena similaris</i> (Férussac, 1821)
Charopidae	<i>Diphyoropa saturni</i> (Cox, 1864)
Gastrodontidae	<i>Zonitoides arboreus</i> (Say, 1817)
Gastrodontidae	<i>Hawaiiia minuscula</i> (Binney, 1840)
Helicidae	<i>Cornu aspersum</i> (Müller, 1774)
Hygromiidae	<i>Prietocella barbara</i> (Linnaeus, 1758)
Limacidae	<i>Lehmannia nyctelia</i> (Bourguignat, 1861)
Limacidae	<i>Limax maximus</i> Linnaeus, 1758
Subulinidae	<i>Allopeas clavulinus</i> (Potiez & Michaud, 1838)
Valloniidae	<i>Vallonia excentrica</i> Sterki, 1893
Zonitidae	<i>Oxychilus alliarius</i> (Miller, 1822)

Table 4. Species recorded during the AM surveys in 2016 and 2017. Abbreviations: *E*, endemic; and *I*, introduced; *N*, native, not endemic.

species	status
<i>Allenella formalis</i> Iredale, 1944	E
<i>Allenella planorum</i> Iredale, 1944	E
<i>Allenella</i> sp. LHI 2	E
<i>Allenella</i> sp. LHI 8	E
<i>Allopeas clavulinus</i> (Potiez & Michaud, 1838)	I
<i>Charopella wilkinsoni</i> (Brazier, 1889)	E
<i>Charopinesta goweri</i> Iredale, 1944	E
<i>Deroceras invadens</i> Reise et al., 2011	I
<i>Dignamoconcha dulcissima</i> Iredale, 1944	E
<i>Diphyoropa saturni</i> (Cox, 1864)	I
<i>Elasmias wakefeldiae</i> (Cox, 1868)	N
<i>Goweroconcha waterhousiae</i> (Hedley, 1897)	E
<i>Goweroconcha wilsoni</i> Iredale, 1944	E
<i>Gudeconcha sophiae sophiae</i> (Reeve, 1854)	E
<i>Gyropena verans</i> Iredale, 1944	E
<i>Hawaiia minuscula</i> (Binney, 1840)	I
<i>Howearion belli</i> Iredale, 1944	E
<i>Howearion hilli</i> (Cox, 1873)	E
<i>Innesoconcha catletti</i> (Brazier, 1872)	E
<i>Innesoconcha princeps</i> Iredale, 1944	E
<i>Innesoconcha</i> sp.	E
<i>Limax maximus</i> Linnaeus, 1758	I
<i>Limborelia exquisita</i> (Pfeiffer, 1855)	E
<i>Limborelia innesi</i> Iredale, 1944	E
<i>Melloconcha delecta</i> Iredale, 1944	E
<i>Melloconcha flavescens</i> (Iredale, 1944)	E
<i>Melloconcha rosacea</i> (Iredale, 1944)	E
<i>Melloconcha</i> sp.	E
<i>Mystivagor</i> sp. LHI 1	E
<i>Opinorelia howeinsulae</i> Iredale, 1944	E
<i>Palaina capillacea</i> (Pfeiffer, 1855)	E
<i>Palaina deliciosa</i> Iredale, 1944	E
<i>Palaina intercollis</i> Shea & Griffiths, 2010	E
<i>Palaina levicostulata</i> Iredale, 1944	E
<i>Palaina lucia</i> Iredale, 1944	E
<i>Palaina macgillivrayi</i> (Pfeiffer, 1855)	E
<i>Palaina</i> sp.	E
<i>Palaina waterhousei</i> Iredale, 1944	E
<i>Parmellops etheridgei</i> (Brazier, 1889)	E
<i>Parmellops perspicuus</i> Hyman, 2015	E
<i>Pseudocharopa ledgbirdi</i> (Brazier, 1889)	E
<i>Pseudocharopa whiteleggei</i> (Brazier, 1889)	E
<i>Pulcharopa plesa</i> Iredale, 1944	E
<i>Pupisoma</i> sp.	N
<i>Semilaoma costata</i> Shea & Griffiths, 2010	E
<i>Semilaoma lidgbirdensis</i> (Iredale, 1944)	E
<i>Semilaoma</i> sp.	E
<i>Tornatellinops jacksonensis</i> (Cox, 1864)	N
<i>Zonitoides arboreus</i> (Say, 1817)	I

