

Report by Western Australian Museum - 1



**The Invertebrate Fauna
of the Mt Gibson region, Western Australia:
the land snails**

Report to ATA Environmental

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Background

Land snails included in samples collected by S. Thompson and M.S. Harvey from Mt Gibson in April, May and June 2005 were submitted to me for identification. The 2005 survey was conducted using two techniques. The first involved a visual search of invertebrate habitats in the Mt Gibson area that were likely to support short-range endemic species (SRE). Millipedes, snails and other SREs were searched for under rocks, logs, and other debris lying on the ground. They were collected using jewellers' forceps and transferred directly into 75% ethanol, labelled and transported to the Western Australian Museum for identification. Pitfall traps were also used. The traps, 2 litre ice-cream containers, were dug into the ground so that the tops of the containers were flush with the soil. Approximately 500 ml of ethylene glycol was poured into the containers, and these were left *in situ*. The traps were cleared every two weeks between April and June, with the trapped animals transferred to 75% ethanol, labelled and provided to the Western Australian Museum for identification. The sampling program and timing was developed in consultation with, and approved by, curatorial staff of the WA Museum (Table 2).

Results

The identifications of the land snail specimens are presented in Table 1, together with the collecting data that accompanied them.

Sinumelon vagente Iredale, 1939,

This species is a member of the family Camaenidae, a generally tropical family that is widespread in northern Australia and in the more arid areas of southern Western Australia, South Australia and western New South Wales.

The species *Sinumelon vagente* is a Western Australian endemic species that is known to occur over a large area extending roughly in an ESE direction from Bindoo Hill (E of Geraldton at about 28°30'S, 115°14'E) at least to Paynes Find (29°16'S, 117°41'E) and, in a NS direction, from about Mount Meru (28°31'S) to Mount Jackson (30°12'S, 119°06'E). Like other species of the genus *Sinumelon*, it burrows into soft substrates, usually in the shade of rocks, shrubs or grasses. The various *Sinumelon* species tend to be widespread in the drier areas of inland and southern Australia.

Specimens of the species *Sinumelon vagente* were present in all the samples received.

Succinea sp.

This species is a member of the family Succineidae, a worldwide group that is represented in the land snail fauna of all Australian States and Territories. The Western Australian species of succineids have not been researched since Iredale's review of the land mollusca of the State in 1939. In that publication Iredale recognised seven WA species that he placed in two genera. However more recent workers have generally maintained that these taxa are so poorly differentiated that they should be regarded as being unsubstantiated (Solem, 1988) and so are currently placed provisionally in the genus *Succinea*, without any species designations.

In addition, the apparently brief periods of activity of this group of snails in Western Australia, together with their fragile and generally uncalcified shells, have resulted in only comparatively small collections (live- or dead-taken) from any population other than those of the southwest of the State. As a result there are comparatively few sources from which estimations of the distributional ranges of any of these populations can be obtained.

There are no succineid specimens recorded as having been taken in the Mount Gibson area before this survey. However this lack is more likely to be due to lack of collecting rather than an absence of the species.

Pupoides sp. c.f. *P. beltianus* (Tate, 1894)

This form of the genus *Pupoides* (Family Pupillidae) is common in the central coastal areas of WA and their hinterlands. However, its relationship with the "typical" *P. beltianus* of Central Australia and the drier parts of SA, NT and WA is uncertain, as there appears to be no evidence as yet of a conjunction of the geographic ranges of these two populations.

This form is not evenly spread over its geographic range but appears to have a mosaic distribution, perhaps related to some characteristic of the soil such as salinity.

Bothriembryon sp.

The molluscan family Bulimulidae is represented in Western Australia by the single genus *Bothriembryon*. This genus is represented in this State by a number of species, most of which are confined to the southwestern corner of the State, from the coastal areas around and south of the Shark Bay area, along the southern coast to the border with South Australia, and inland from those coasts. Away from the coastal higher-rainfall areas, the number of species lessens and the size of the populations also appears to diminish. However, this apparent paucity might be due to collecting bias, both because the areas are less frequented by collectors and because the periods of activity of these inland species would probably be shorter and more closely dependent on infrequent and unpredictable rainfall.

The Mount Gibson area lies on what appears to be the northeastern limit of the genus *Bothriembryon* in the southwest of the State. The Museum's collections do not contain any specimens of the genus *Bothriembryon* from that area or from any area nearby. Apart from the more coastal areas, very few specimens have been found from anywhere north of the Great Eastern Highway.

Snail species of this genus that inhabit such soft substrate areas generally burrow into the litter and soil beneath grasses, shrubs and small trees before the onset of hot weather. They can emerge only when the soil is moistened sufficiently to allow them to burrow up to the surface. They are then able to move across the soil surface, particularly in cool and/or humid weather and at night. In addition to being able to spread in this manner, soft substrate dwellers may also be transported to other areas during floods. By comparison, rock dwelling snails, though generally well protected from desiccation, many predators, bushfires and floods, may not be able to move to other rocky outcrops by crossing over areas of soft substrate.

The single specimen of the genus that was collected during this survey appears, on the basis of present records, to be a juvenile specimen of a species that has not previously been recorded.

Discussion

The 2005 short-range endemic invertebrate surveys at Mt Gibson were undertaken across a period of three months, during which there were rainfall events. The timing and conditions were therefore considered suitable for sampling snails. Of the four species of land snails that were collected (*Simumelon vagente*, *Succinea* sp., *Pupoides* sp.cf *P.beltianus* and *Bothriembryon* sp.), only the last species may be vulnerable to disturbance from the proposed

Mt Gibson Iron Ore project. The species *Bothriembryon* sp. was represented by a single juvenile individual collected from the survey station, Woodlands 1(A) impact area, a woodland area with soft substrates.

The collectors have reported that the type of woodland habitat in which this specimen was collected (i.e. Vegetation Association No. 142 – “Medium Woodland; York Gum and Salmon Gum” [Beeston *et al.*, 2002]) is widespread in the Mt Gibson area and that, in comparison to its total area, the area of this type of habitat which might be impacted during the proposed mining development would be small (about 0.2%).

Given the reported extent of the "woodland with soft substrate" habitat in the area, it is possible that the Mt Gibson Iron Ore Project might not adversely impact the distribution of this *Bothriembryon* species. However, due to the paucity of distributional or biological data concerning this taxon, it is difficult to make any definite comment on the degree of its vulnerability to any disturbance that might occur.

References

Beeston, G.R., Hopkins, A.J.M. and Shepherd, D.P. (2002) Land-Use and Vegetation in Western Australia. National Land and Water Resources Audit Report. Resource Management Technical Report 250.

Iredale, T., 1939, A review of the land Mollusca of Western Australia. *Records of the Western Australian Museum and Art Gallery* 2(1): 1-88

Solem, A., 1988, Non-camaenid snails of the Kimberley and Northern Territory, Australia. 1. Systematics, affinities and ranges. *Invertebrate Taxonomy* 2(4): 455- 604

Solem, A., 1997, Camaenid land snails of Western and central Australia (Mollusca: Pulmonata: Camaenidae). VII Taxa from Dampierland through the Nullarbor. *Records of the Western Australian Museum Supplement No 50*: 1461-1906

TABLE 1
SURVEY RESULTS - MOLLUSCS

Identification	Site	Area	Location	Method	Collectors	Co-ordinates
<i>Sinumelon vagente</i> Iredale, 1939	3	Banded Ironstone Range	Extension Hill east facing	Wet pitfall traps	S. Thompson 1-15 April 2005 30 April – 11 May 2005 M.S. Harvey & S. Thompson 31 May – 11 June 2005	29°34'27"S 117°09'39"E
<i>Sinumelon vagente</i> Iredale, 1939	8		Extension Hill west facing	Wet pitfall traps	M.S. Harvey & S. Thompson 30 April-11 May 2005 S. Thompson 31 May-11 June 2005	29°34'33"S 117°09'38"E
<i>Sinumelon vagente</i> Iredale, 1939 <i>Succinea</i> sp.	10	Banded Ironstone Range	Iron Hill east facing	Wet pitfall traps	S. Thompson 29 April – 11 May 2005 M.S. Harvey & S. Thompson 30 April-11 May 2005 1-11 June 2005	29°36'10"S 117°10'30"E
<i>Sinumelon vagente</i> Iredale, 1939	2,6	Banded Ironstone Range	Mount Gibson east facing	Wet pitfall traps	M.S. Harvey & S. Thompson 30 April-11 May 2005 S. Thompson 1-11 June 2005	29°35'38"S 117°11'16"E
<i>Sinumelon vagente</i> Iredale, 1939		Ironstone Slopes	Extension Hill east facing	Wet pitfall traps	S. Thompson 30 April-11 May 2005 1-11 June 2005	29°34'32"S 117°09'49"E
<i>Sinumelon vagente</i> Iredale, 1939			Extension Hill west facing	Wet pitfall traps	S. Thompson 30 April-11 May 2005	29°34'38"S 117°09'35"E

Report by Western Australian Museum - 8

					31 May-11 June 2005	
<i>Sinumelon vagente</i> Iredale, 1939		Ironstone Slopes	Iron Hill east facing	Wet pitfall traps	S. Thompson 31 May-11 June 2005 1-11 June 2005	29°36'08"S 117°10'27"E
<i>Sinumelon vagente</i> Iredale, 1939	1,4,9		Iron Hill west facing	Wet pitfall traps	M. S. Harvey & S. Thompson 30 April-11 May 2005	29°36'13"S 117°10'17"E
<i>Sinumelon vagente</i> Iredale, 1939		Ironstone Slopes	Mount Gibson east facing	Wet pitfall traps	S. Thompson 30 April-11 May 2005 31 May-11 June 2005	29°35'36"S 117°11'28"E
<i>Sinumelon vagente</i> Iredale, 1939			Mount Gibson west facing	Wet pitfall traps	S. Thompson 30 April-11 May 2005	29°35'36"S 117°10'55"E
<i>Sinumelon vagente</i> Iredale, 1939 <i>Bothriembryon</i> sp.		Woodlands 1 (A) impact			S. Thompson 30 April – 11 May 2005 30 May – 11 June 2005	29°34'09"S 117°10'36"E

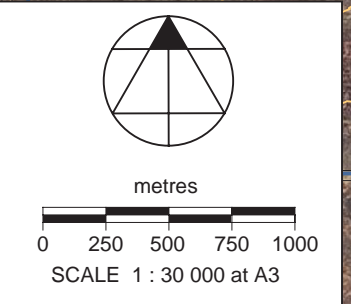
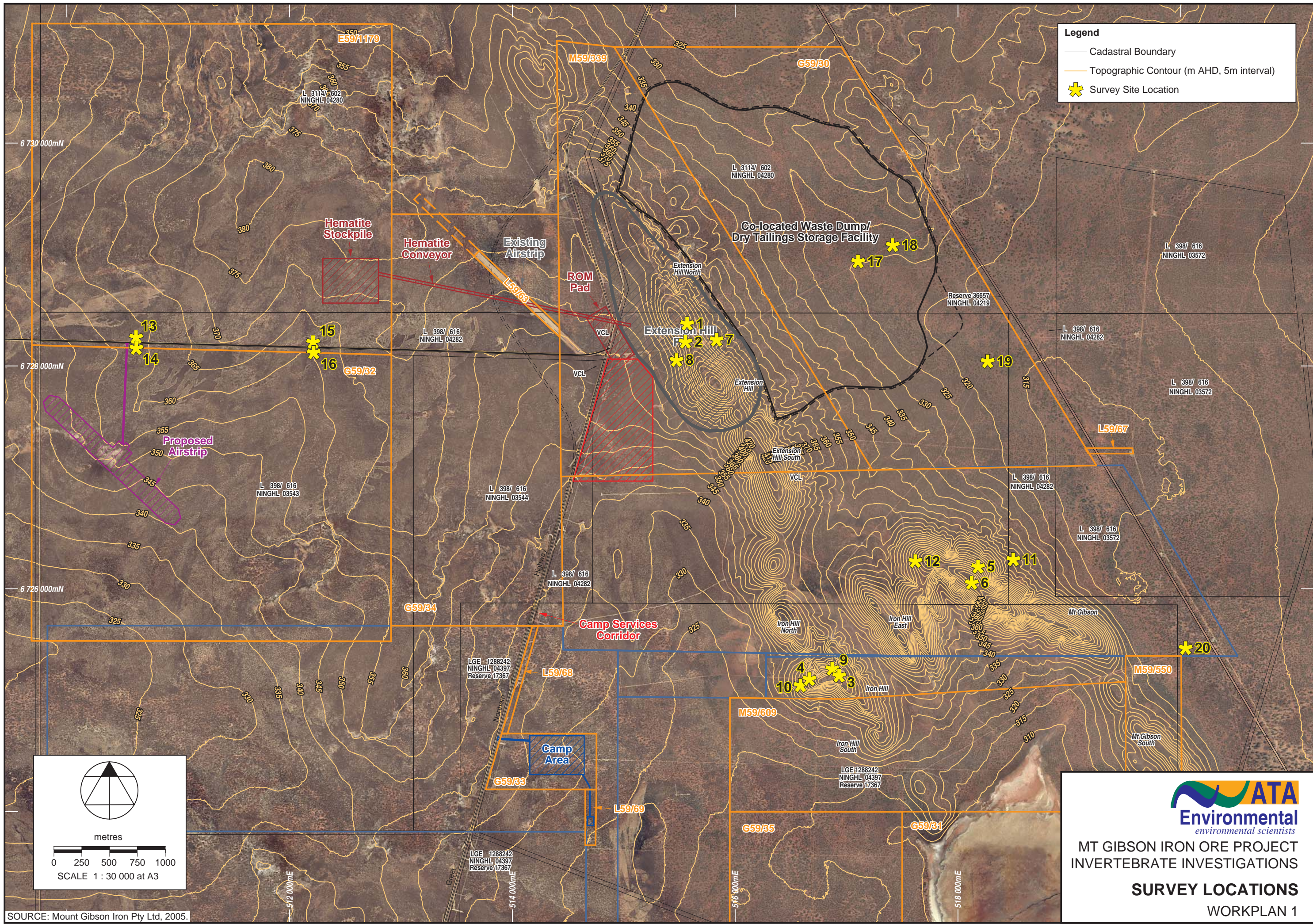
TABLE 2

Survey Design

			Within area to be disturbed	Outside area to be disturbed	Coordinates (MGA)	
1	Banded Ironstone Range	Extension Hill east facing	10 traps		50515569	6728377
2		Extension Hill west facing	10 traps		50515554	6728214
3	Banded Ironstone Range	Iron Hill east facing		10 traps	50516934	6725218
4		Iron Hill west facing		10 traps	50516666	6725188
5	Banded Ironstone Range	Mount Gibson east facing		10 traps	50518181	6726196
6		Mount Gibson west facing		10 traps	50518124	6726051
7	Ironstone Slopes	Extension Hill east facing	10 traps		50515833	6728233
8		Extension Hill west facing	10 traps		50515474	6728050
9	Ironstone Slopes	Iron Hill east facing		10 traps	50516872	6725280
10		Iron Hill west facing		10 traps	50516587	6725131
11	Ironstone Slopes	Mount Gibson east facing		10 traps	50518497	6726261
12		Mount Gibson west facing		10 traps	50517618	6726246
13	Sandplains 1 (A)			10 traps	50510622	6728207 south side of road
14	Sandplains 2 (B)			10 traps	50510622	6728207 north side of road
15	Sandplains 3 (C)			10 traps	50512211	6728162 south side of road
16	Sandplains 4 (D)			10 traps	50512211	6728162 north side of road
17	Woodlands 1 (A) impact		10 traps		50517104	6728936
18	Woodlands 2 (B) control		10 traps		50517415	6729082
19	Woodlands 3 (C) impact			10 traps	50518267	6728039
20	Woodlands 4 (D) control			10 traps	50520044	6725466

Legend

- Cadastral Boundary
- Topographic Contour (m AHD, 5m interval)
- ★ Survey Site Location



ATA
Environmental
environmental scientists

MT GIBSON IRON ORE PROJECT
INVERTEBRATE INVESTIGATIONS

SURVEY LOCATIONS
WORKPLAN 1