

Native snails in an urban environment - conservation from the ground up

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ABSTRACT

The terrestrial molluscan fauna of Sydney and nearby areas is surprisingly diverse with over 80 species of native snails and slugs recorded. At least a third of them have not been formally described. In addition, at least 28 species of introduced snails and slugs have also been recorded from Sydney. Native snails are found in all vegetation types in and around Sydney, with some species, such as the Red Triangle Slug *Triboniophorus graeffei* commonly encountered in suburban gardens. Nearly all species are associated with specific vegetation or habitat types, such as the Cumberland Plain Woodland or limestone outcrops at Jenolan Caves. There is a number of species endemic to the Sydney region including the endangered Cumberland Plain Land Snail *Meridolum comeovirens*, which is only found in western Sydney. Most species have small ranges and can survive in small areas, therefore even small remnants of native vegetation can act as refugia. Thus from a native-snail conservation point of view, small patches of remnant vegetation are just as important as large ones for the conservation of Sydney's unique biodiversity.

Key words: Cumberland Plain land snail, endangered species, bushland remnant.

Introduction

As the urban areas of our cities and towns continue to increase, more and more areas of bushland are being removed, modified or isolated/fragmented. Since European settlement in Australia there has been a substantial reduction/modification of the original vegetation coverage and with this a corresponding loss of biodiversity in both the flora and fauna components of the Australian landscape. This is especially apparent in Australia's large cities, such as Sydney, Melbourne and Brisbane (New 2000).

However, all is not lost, many of the remaining bushland patches still contain a diverse array of plants and animals, especially invertebrates. This is particularly so in Sydney and surrounding areas (200 km radius of the GPO), where the diversity of plant species is world renowned (Benson and Howell 1990). It should then be no surprise that the invertebrate fauna of this region is also very diverse, especially among insects and terrestrial molluscs. However, invertebrates generally receive little public attention and when they do it is usually negative (eg. snail, slug and insect pests of gardens and agriculture).

Terrestrial molluscan fauna

The terrestrial molluscan fauna of the greater Sydney area is surprisingly diverse due to the wide range of vegetation communities present, with over 80 species of native snails and slugs recorded (Table 1). These include the endangered Cumberland Plain Land Snail *Meridolum comeovirens*, the Red Triangle Slug *Triboniophorus graeffei* and the Carnivorous (Killer) Snail *Austrothyrida capillacea*.

Approximately a third of the Sydney native snail fauna is yet to be formally described. Within New South Wales as a whole there are over 600 species while, Australia-wide, the figure grows to several thousand species with only about half formally described (based on the collections held by the Australian and Queensland Museums, John Stanisc *pers. comm.*). In addition, there are about 28 species of introduced snails and slugs, mainly of European origin that can be found in the Sydney area (Table 1). The total molluscan fauna of Sydney, including those species found in marine, estuarine and freshwater habitats, numbers well over a thousand species (based on the collections held by the Australian Museum).

The size range of the snails found in and around Sydney varies from about 1.0 mm tall and wide (*Iotula microcosmos*) to about 40 mm in diameter for *Meridolum marshalli*. However, the majority of species are under one centimetre, with only a handful over 15 mm in size, and most of these belong to the genus *Meridolum* (Camaenidae). The slugs, including the introduced species, can reach over 100 mm in length. Most species tend to be found in leaf litter, under bark, palm fronds, logs and rocks and a few live on the leaves and stems of shrubs and trees. They are also frequently found under non-natural debris, such as cardboard, bricks and metal (one noticeable exception seems to be car tyres) and several species have been recorded from suburban gardens, especially those near bushland. The species most commonly encountered in gardens are the Carnivorous Snail and the Red Triangle Slug (*pers. obs.*).

Table 1. A list of the native and introduced terrestrial snails and slugs recorded in the database of the Australian Museum from the greater Sydney region.

Family	Species	Family	Species
Achatinellidae	<i>Tomatellinops jacksonensis</i> (Cox, 1864)	Helicarionidae	<i>Coneuplecta calculosa</i> (Gould, 1852)
Achatinellidae	<i>Tomatellinops pressus</i> Iredale, 1940	Helicarionidae	<i>Fastosarion freycineti</i> (Férussac, 1821)
Athoracophoridae	<i>Triboniophorus graeffei</i> Humbert, 1863	Helicarionidae	<i>Helicarion leopardina</i> Iredale, 1941
Athoracophoridae	<i>Triboniophorus</i> species A	Helicarionidae	<i>Helicarion mastersi</i> (Cox, 1868)
Camaenidae	<i>Austrochloritis disjuncta</i> (Gude, 1906)	Helicarionidae	<i>Liardetia scandens</i> (Cox, 1872)
Camaenidae	<i>Austrochloritis metuenda</i> Iredale, 1938	Helicarionidae	<i>Melocystis circumcincta</i> (Cox, 1868)
Camaenidae	<i>Austrochloritis</i> species A	Helicarionidae	<i>Melocystis exclusus</i> (Iredale, 1941)
Camaenidae	<i>Austrochloritis</i> species B	Helicarionidae	<i>Melocystis jacksoniensis</i> (Gray, 1834)
Camaenidae	<i>Austrochloritis</i> species C	Helicarionidae	<i>Mysticarion porrectus</i> (Iredale, 1941)
Camaenidae	<i>Austrochloritis</i> species D	Helicarionidae	<i>Peloparion helenae</i> (Godwin-Austen, 1883)
Camaenidae	<i>Austrochloritis</i> species E	Helicarionidae	<i>Wilhelminaia mathildae</i> Preston, 1913
Camaenidae	<i>Austrochloritis</i> species F	Helicarionidae	new species A
Camaenidae	<i>Meridolum bowdenae</i> McLauchlan, 1951	Punctidae	<i>lotula microcosmos</i> (Cox, 1868)
Camaenidae	<i>Meridolum comeovirens</i> (Pfeiffer; 1851)	Punctidae	<i>Paralaoma caputspinulae</i> (Reeve, 1851)
Camaenidae	<i>Meridolum depressum</i> (Hedley, 1901)	Punctidae	new species A
Camaenidae	<i>Meridolum duralensis</i> (Cox, 1868)	Punctidae	new species B
Camaenidae	<i>Meridolum gulosa</i> (Gould, 1846)	Punctidae	new species C
Camaenidae	<i>Meridolum marshalli</i> McLauchlan, 1951	Pupillidae	<i>Cylindrovertilla kingi</i> (Cox, 1864)
Camaenidae	<i>Meridolum middenense</i> McLauchlan, 1951	Pupillidae	<i>Gastrocopta pediculus</i> (Shuttleworth, 1852)
Camaenidae	<i>Meridolum</i> species A	Pupillidae	<i>Gastrocopta strangeana</i> (Iredale, 1937)
Camaenidae	<i>Meridolum</i> species B	Pupillidae	<i>Pupilla australis</i> (Angas, 1864)
Camaenidae	<i>Meridolum</i> species C	Pupillidae	<i>Pupisoma circumlitum</i> Hedley, 1897
Camaenidae	<i>Meridolum</i> species D	Pupillidae	new species A
Camaenidae	<i>Meridolum</i> species E	Pupillidae	new species B
Camaenidae	<i>Meridolum</i> species F	Pupillidae	new species C
Camaenidae	<i>Meridolum</i> species G	Rhytididae	<i>Austrorhytida capillacea</i> (Férussac, 1832)
Camaenidae	<i>Meridolum</i> species H	Rhytididae	<i>Saladelos dulcis</i> Iredale, 1938
Charopidae	<i>Allocharopa brazieri</i> (Cox, 1868)	Rhytididae	<i>Strangesta</i> species A
Charopidae	<i>Coenocharopa multiradiata</i> Stanistic, 1990	Subulinidae	<i>Eremopeas tuckeri</i> (Pfeiffer, 1846)
Charopidae	<i>Cralopa stroudensis</i> (Cox, 1864)	Subulinidae	<i>Lamellaxis clavulinus</i> (Potiez and Michaud, 1838)
Charopidae	<i>Dentherona saturni</i> (Cox, 1864)	Succineidae	<i>Succinea australis</i> (Férussac, 1821)
Charopidae	<i>Discocharopa aperta</i> (Moellendorff, 1888)	Succineidae	<i>Succinea eucalypti</i> Cox, 1864
Charopidae	<i>Egilomen lirata</i> (Cox, 1864)	Succineidae	<i>Succinea macgillivrayi</i> Cox, 1864
Charopidae	<i>Egilomen pexa</i> (Cox, 1868)	Succineidae	<i>Succinea</i> species A
Charopidae	<i>Elsothera funerea</i> (Cox, 1868)	Succineidae	<i>Succinea</i> species B
Charopidae	<i>Elsothera sericatula</i> (Pfeiffer, 1849)	Succineidae	<i>Succinea</i> species C
Charopidae	<i>Gyrocochlea eurythma</i> Hedley, 1924	Truncatellidae	<i>Truncatella scalarina</i> Cox, 1867
Charopidae	<i>Gyrocochlea impressa</i> Hedley, 1924	Introduced species	
Charopidae	<i>Hedleyoconcha delta</i> (Pfeiffer, 1857)	Agriolimacidae	<i>Deroceras laeve</i> (Müller, 1774)
Charopidae	<i>Roblinella belli</i> (Cox, 1864)	Agriolimacidae	<i>Deroceras panormitanum</i> (Lessona and Pollonera, 1882)
Charopidae	<i>Setomedeia aculeata</i> (Hedley, 1899)	Agriolimacidae	<i>Deroceras reticulatum</i> (Müller, 1774)
Charopidae	new species A	Arionidae	<i>Arion hortensis</i> Férussac, 1819
Charopidae	new species B	Bradybaenidae	<i>Bradybaena similis</i> (Férussac, 1821)
Charopidae	new species C	Cionellidae	<i>Cochlicopa lubrica</i> (Müller, 1774)
Charopidae	new species D	Enidae	<i>Mastus cf pupa</i> (Linnaeus, 1758)
Charopidae	new species E	Helicarionidae	<i>Euconulus fulvus</i> (Müller, 1774)
Charopidae	new species F		
Charopidae	new species G		
Charopidae	new species H		
Charopidae	new species I		
Charopidae	new species J		
Charopidae	new species K		

Family	Species	Family	Species
Helicidae	<i>Cantareus aspersus</i> (Müller, 1774)	Milacidae	<i>Milax gagates</i> (Draparnaud, 1801)
Helicidae	<i>Cepaea nemoralis</i> (Linnaeus, 1758)	Pleurodiscidae	<i>Pleurodiscus balmei</i> (Potiez and Michaud, 1838)
Helicidae	<i>Eobania vermiculata</i> (Müller, 1774)		
Helicidae	<i>Theba pisana</i> (Müller, 1774)	Testacellidae	<i>Testacella haliotidea</i> Draparnaud, 1801
Hygromiidae	<i>Cernuella virgata</i> (Da Costa, 1778)	Valloniidae	<i>Vallonia pulchella</i> (Müller, 1774)
Hygromiidae	<i>Microxeromagna armillata</i> (Lowe, 1852)	Zonitidae	<i>Oxychilus allianus</i> (Miller, 1822)
Hygromiidae	<i>Prietocella barbara</i> (Linnaeus, 1758)	Zonitidae	<i>Oxychilus cellarius</i> (Müller, 1774)
Hygromiidae	<i>Xerocincta neglecta</i> (Draparnaud, 1805)	Zonitidae	<i>Oxychilus draparnaldi</i> (Beck, 1837)
Limacidae	<i>Lehmanna nyctelia</i> (Bourguignat, 1861)	Zonitidae	<i>Vitrea contracta</i> (Westerlund, 1873)
Limacidae	<i>Limacus flava</i> (Linnaeus, 1758)	Zonitidae	<i>Zonitoides arboreus</i> (Say, 1817)
Limacidae	<i>Limax maximus</i> Linnaeus, 1758		

All species of land snails and slugs found in and around Sydney are hermaphroditic. They are active mostly at night or on overcast days and feed predominately on fungus and decaying detritus. The exceptions are the Carnivorous Snails (Rhytididae) and the Red Triangle Slugs (Athoracophoridae). There are at least three species of rhytidids found in Sydney, which feed mainly on snails and worms. The Red Triangle Slugs feed on algae, which grows on various surfaces, such as garden paths or on the smooth barked Sydney Blue Gum *Eucalyptus saligna*, where their distinctive feeding trails can rise more than 10 m up the trunk of the trees (Beesley *et al.* 1998).

Most of the introduced species of snails and slugs are considered to be garden and/or agricultural pests as they feed mainly on living plant material and can reach very high densities if not controlled (eg. Brown Garden Snail *Cantareus aspersus*; Asian Snail *Bradybaena similaris*; Leopard Slug *Limax maximus*). It is these introduced pests that are responsible for the poor public perception that all snails have, even if they are listed under the New South Wales *Threatened Species Conservation Act 1995*. It is interesting to note that the Brown Garden Snail is also the most commonly farmed and eaten snail species in restaurants, in Australia and abroad (Beesley *et al.* 1998).

The number of species that can be found at any particular site varies according to a number of factors, including the vegetation type, the amount of available habitat, how isolated/fragmented the site is and how degraded it might be. On average, between four and six species can be found per site. Some have more than 10 species while limestone areas (rich source of calcium), such as Jenolan, Wombeyan and Bungonia Caves, have upwards of 20 species (Clark in prep; pers. obs.).

Most species are found associated only with specific habitats and typically have small ranges, for example there is a number of species of snails endemic to the limestone outcrops present at Jenolan (*Meridolum depressum*), Wombeyan (*Meridolum* species I) and Bungonia Caves (*Meridolum* species J). Species currently considered to be endemic to Sydney include the endangered Cumberland Plain Land Snail *Meridolum comeovirens*, *Austrochloritis* species E, *Peloparion helenae*, *Strangesta* species A, Charopidae new species B, Punctidae new species B and *Triboniophorus* species A. As more detailed studies are conducted using morphological, anatomical and genetic

data on species thought to be widespread, it is likely that a number of them will be found to consist of a number of narrow range species (Clark in prep.).

The endangered snail *M. comeovirens* is an example of a narrow range endemic species with specific habitat requirements. It is restricted to the Cumberland Plain and Castlereagh Woodlands of Western Sydney. Recent studies (Clark and Richardson 2002; Clark in prep) have indicated that *M. comeovirens* does not require large areas to maintain a viable population. Using spatial autocorrelation analysis and allozyme data, they demonstrated that populations of *M. comeovirens* are highly structured at very short distances (2 m) and after about 350 m the populations are random. From a conservation management point of view this means that individuals found within a radius of 350 m are more likely to be related than they would be if found more than this distance apart. Similar results have been reported for other species of land snail, all from Europe (eg. *Cantareus aspersus* Arnaud *et al.* 1999, 2001; *Pomatias elegans*, Pfenninger 2002). Populations there were also observed to be highly structured at small distances but the structure broke down at larger distances.

Small bushland patches and conservation

As more detailed surveys and taxonomic studies are conducted on Australia's endemic snails, it has become apparent that the actual number of species is much higher than previously considered (Hyman *et al.* in press). These species are, on the whole, restricted to small areas and/or to particular vegetation types and are generally small in size (less than 1 cm). Even small remnants of native vegetation can, therefore, act as refugia/conservation reserves for a number of species, especially invertebrates and small plants (Burgman and Lindenmayer 1998; New 2000). For example, suburban gardens can support a number of native species. With the growing trend in promoting the use of native plants endemic to the local area, the prospects of maintaining some of the unique biodiversity of the Sydney Region is enhanced. From a conservation perspective, small areas, such as those commonly encountered in large cities, take on added importance as these areas sometimes contain the only remaining populations of some species of native snails.

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