BIOGEOGRAPHY OF TASMANIAN NATIVE LAND SNAILS

by

KEVIN BONHAM, B.A., Grad.Dip.Env.St. (Hons)

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DECLARATIONS

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of the candidate's knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis.

Kevin Bonham
10 November 2003

ABSTRACT

The Australian island state of Tasmania has a well-sampled land snail fauna consisting mostly of endemic species, mostly confined to particular portions of the state. This thesis analyses the known distribution of different species within the state with the aims of: (i) describing and summarising these distributions, (ii) examining the applicability of models used for other Tasmanian taxa to land snail distributions, (iii) categorising and tentatively explaining snail distributions where possible, and (iv) assessing some ramifications of snail distributions for conservation planning.

One hundred and six species/morphospecies are discussed, of which approximately 39 were not formally or informally recognised before this project commenced. Undescribed species (and genuine species incorrectly synonymised) are here identified chiefly through qualitatively significant shell-feature distinctions, or through reliable quantitative differences. Species distribution is analysed primarily at a resolution of 10x10km grid squares, at which level 4272 records (including project-specific fieldwork aimed at improving the representativeness of sampling) are used. Discussion is chiefly inferential in the absence of adequate statistical models, but overall database statistics are used to comment on whether apparent gaps in species ranges are likely to be meaningful.

The single most significant pattern in the Tasmanian mainland snail fauna distributions separates the west and far south from the remainder, a pattern to which geology, rainfall, vegetation and substrate may all contribute. The manifestation of this pattern varies between different contributing species. This result is practically identical to results previously obtained for other invertebrates, but another broad-scale pattern, the influence of the face of the Great Western Tiers in the central north, is not. Congruence with bioregional models based on trees and vertebrates is only approximate and piecemeal, showing potential limitations for conservation planning of models that do not include poorly dispersing taxa (such as non-flying invertebrates) in their source data.

Known facets of local endemism such as island endemism, karst endemism, parapatric species mosaics, alpine endemism, "toeholding" and glacial refuge endemism are all reflected in the fauna to some degree. The value of these for predicting the likely locations of undescribed or as yet undifferentiated taxa is, however, undermined by the frequency of distributions not explicable by any known direct cause, and by the relatively small and spatially variable contribution of each specific known cause. The potential merits of limiting the spatial scale of comprehensive habitat loss, especially in poorly-surveyed areas, are therefore discussed.

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CONTENTS

1. INTRODUCTION

1.1 BACKGROUND

Conservation of cryptic invertebrates on a species-by-species scale is frequently considered impractical. In general, cryptic invertebrates are far more difficult and time-consuming to sample than either plants or vertebrates. Furthermore, distributional and taxonomic data on specific invertebrate species are often limited by a lack of existing interest or research. Invertebrate conservation therefore requires not only the management of species already considered threatened, but also "managing" species which are too poorly known to assess their level of risk, or which have not even been discovered.

Species with very small ranges are especially likely to be conservation concerns because they are at greater risk of having so much of their habitat cleared that they are unable to survive in what remains. Species with larger ranges are generally at much lower risk, especially in areas where there are extensive and well-dispersed reserve systems, provided there are no factors that are likely to cause extinction within reserves. If the factors causing species to have narrow ranges can be identified for a given region, then it becomes possible to identify areas likely to conceal such species in that region, and therefore to make these areas priority areas for searches for new species. This applies especially if the management future of these areas is unclear. On a time scale relevant to management, once a species is relatively well studied, its survival is likely, provided that the causes of its endangerment are human causes that can be halted or at least regulated. In this sense, formal mechanisms such as conservation lists often feature those invertebrates which are not in immediate danger of extinction but are actually at moderate to peripheral risk levels, or even not at significant risk at all. If common threatening processes affecting invertebrates do not apply inside reserve boundaries, then the species most at actual risk are likely to be undiscovered short-range species.

This thesis is intended both as an exploration of the kinds of distribution patterns present in Tasmanian snail species, and also as a contribution to debate about the effectiveness of models derived from other sources in predicting snail distribution patterns. Tasmanian land snails are well suited to such a study because they display a wide variation in range sizes, and because they are relatively well sampled from environments that have frequently experienced only low-level human disturbance. Snails also display a range of responses to habitat type. Some species are very indiscriminate. Others are confined to closed forest and some are even confined, or nearly so, to temperate rainforests. Furthermore, a wide range of diets is included in the group. The inclusion of the carnivorous Rhytididae, many species of which feed mainly on smaller snails, is especially important in this regard.

Although large portions of Tasmania have experienced little or no significant human disturbance, human agency is still a potential factor in expanding native snail distributions through translocation. Approximately a quarter of the state has been cleared. Forestry operations occur in many parts of the state with a potential for transportation of snails between forest coupes on machinery. Other sources of potential translocation include bushwalkers, offroad vehicles and construction equipment. While there are no proven cases of translocation, several suspected or possible examples are mentioned in this thesis. Translocation has been cited as a likely cause of apparent extralimital distributions in the Tasmanian millipede *Notodesmus scotius* Chamberlin, 1920. This species occurs widely in eastern Tasmania with a few isolated records in disturbed sites only in the west of the state (Mesibov, 2003).

Because the data for many invertebrate groups may never become sufficient to allow informed conservation to occur on a species-by-species basis, it is important to consider how well invertebrate distributions correlate to other biogeographical properties that influence land management. In Australia, the IBRA (Interim Bioregionalisation of Australia) is the most important such biogeographical classification scheme. IBRA bioregions are used to inform conservation priority assessments by a range of land managers in both the public and private sectors, and have been used to assess priority areas for national-level reserve system improvements (Department of Environment and Heritage, 2003). The process of the most recent redevelopment of these bioregions is reported by Environment Australia (2000); this latest update is version 5.1 of IBRA. The Tasmanian component of IBRA

5.1 (here generally referred to simply as "the IBRA bioregions") is reported by Peters and Thackway (1998).

1.2 GENERAL

The primary data used in this thesis are the records presented in Appendix 1 and mapped by species in Chapter 4. These appendices consist of "accepted records", i.e. records or reports of a Tasmanian native snail species that can be attributed with reasonable confidence to a specific 10x10km grid square (see Chapter 3). The arrangement of grid squares is shown on Fig 1.1. Each 10x10 km square is numbered with a unique four-digit number based on AMG grid references (latitude and longitude are not used). The first 5 is removed from the northing. For example, the full grid reference of Table Head is **35**8300 E 5**31**6300 N, so a snail record from this hill would be placed in the square 3531. Within this thesis, a four-digit number in brackets frequently follows a mention of a locality, and this number is the grid square number of that locality. For example: "No snails have been recorded from Table Head (3531)."

The other component of each record is the identity of the species recorded. The basis of the taxonomy used in this project is discussed in Section 3.4. Limitations of this taxonomy are also discussed in Section 1.4. These records are used to produce the maps given in Chapter 4. These maps (and sometimes more fine-scale records) form the basis of discussion by species in Chapter 4, which attempts to determine whether each species conforms to a known type of Tasmanian species boundary (eg "West of Tyler's Line") or a known type of local endemism (eg "karst endemic", "island endemic"). These comments, which are generally tentative because of insufficient information despite the large body of records, then form the source material for Section 5.1. This section discusses trends demonstrated by the species, and the extent to which they resemble or fail to resemble patterns that might be expected from (i) the informal Tasmanian invertebrate bioregionalisations of Mesibov (1996a) and some subsequent progress on this model, (ii) the largely computer-modelled Tasmanian IBRA bioregionalisation of Peters and Thackway (1998) based on data from trees and terrestrial vertebrates and (iii) the simulation of forest conditions during the last glaciation by Kirkpatrick and Fowler (1998). These comments form the basis of conclusions advanced in Chapter 6.

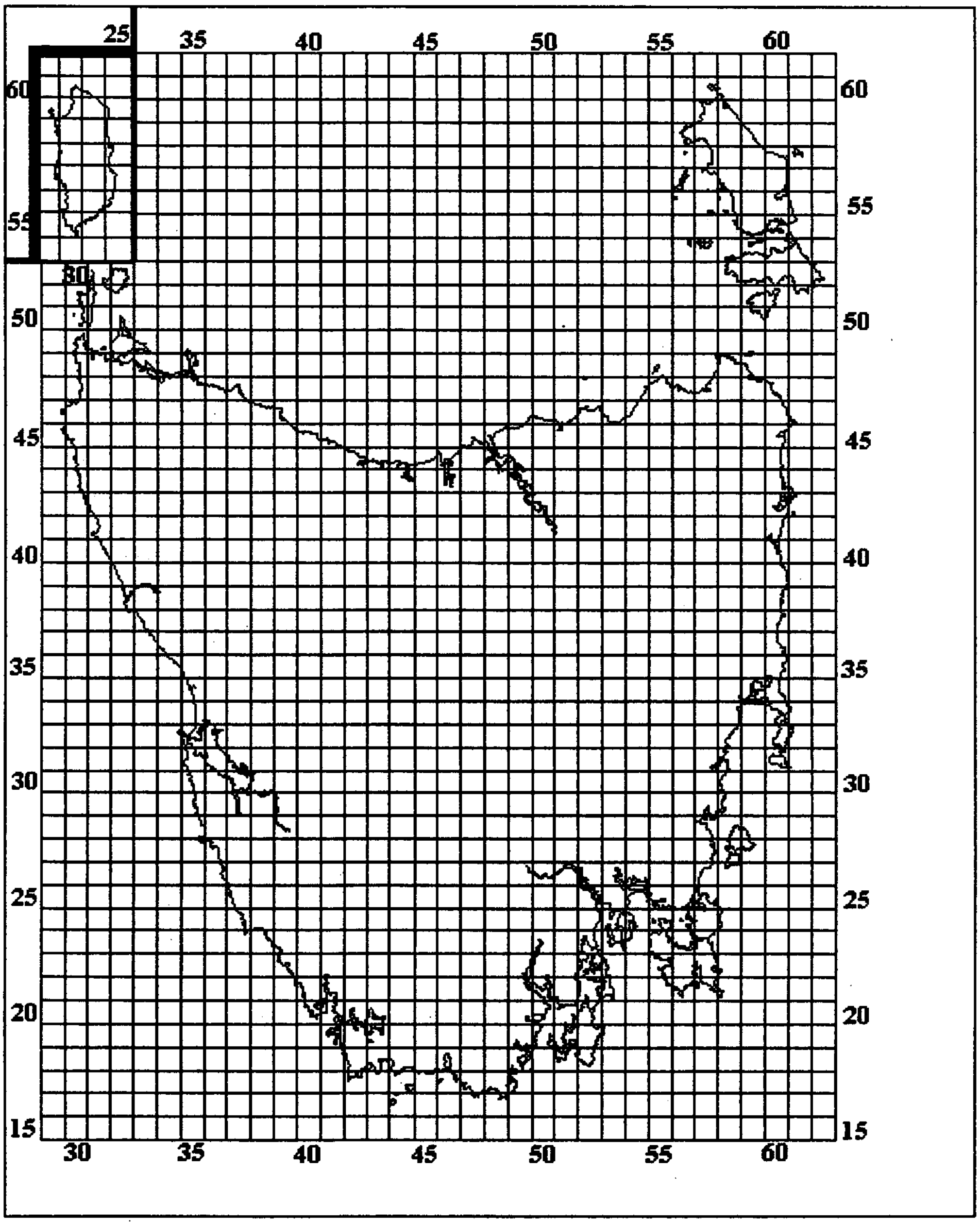


Fig 1.1 Grid square numbering system used in this thesis.

1.3 EXCLUSIONS

The thesis includes only species that fall into the classification of "native land snails". All species believed to have been introduced into Tasmania by humans or via human agency are excluded, the only debatable case among these exclusions being *Tornatellinops jacksonensis* (Cox, 1864) which is considered to have been probably carried to Australia by pre-European human agency (Cooke and Kondo, 1960). Snails strictly confined to saltmarsh, supra-littoral and marginal marine situations (including Assimineidae, Hydrococcidae, Truncatellidae, Amphibolidae, Ellobiidae) are excluded, but the Succineidae are included as these can occur in truly terrestrial situations.

Two geographic exclusions are also made. Macquarie Island is a subantarctic island that is politically Tasmanian but biogeographically more similar to the nearby New Zealand subantarctic islands. The Macquarie Island native land snail fauna (one punctid, one charopid and one or two athoracophorid slugs) is not considered here. Also, the northernmost Bass Strait islands, of which the most significant are the Kent Group, are not included in the main part of the thesis (mainly due to mapping difficulties) but are worth briefly noting. The known fauna of the near-Victorian Bass Strait islands consists of the four coastal species frequently encountered around the Tasmanian coastal fringe: *Paralaoma caputspinulae* (Reeve, 1851), *Laomavix collisi* (Brazier, 1877), *Magilaoma penolensis* (Cox, 1868) and *Pernagera officeri* (Legrand, 1871) as well as *Pupilla australis* (Angas, 1864), and the Furneaux Group species *Tasmaphena* sp. "Whinray" (recorded from Deal Island). *Pernagera officeri* is the most often recorded species from the northern Bass Strait islands, and is also recorded from the extremely isolated sea-stack Black Pyramid (5259). *Paralaoma halli* (Legrand, 1871) and *P. mucoides* (Tenison-Woods, 1879) may be found on some of the larger islands with more searching.

1.4 STATEMENT OF LIMITATIONS

The following limitations apply to the findings of this thesis.

Geographical information accompanying records in this thesis is of variable quality. In most cases the record is referable to a precise location via a grid reference, and in most of these cases there are also known specimens. In some cases records are derived from nineteenth-century publications where locality data are imprecise, or from records mapped only to a 10x10 km grid square by Smith and Kershaw (1981) for which no other source is known. More is gained by including such records than by omitting them all, but care has been taken in omitting those considered dubious. Similarly, several species have been frequently misidentified. Records considered likely to be misidentified have been dropped or reallocated, but it remains likely that some published records not matched to known specimens will prove to be incorrect.

The taxonomy used in this thesis should be considered generally conservative and only partial as in nearly all cases only shell data are used. Several of the "species" discussed require detailed anatomical and genetic studies to determine whether there are many more species than shell data indicate. A small number of species given here are merely inferred as likely species from a combination of shell form, ecological, geographical and other considerations, and require verification using anatomy and/or genetics before they should be considered definite species. This applies specifically to some species in the genera *Prolesophanta* and *Allocharopa.* Such studies are beyond the scope of this project. Before this project commenced it appeared that the snail fauna of Tasmania was well understood, with only a slow accumulation of undescribed species, these typically being radically different from anything previously recorded. Those anatomical studies that had been completed (published and unpublished) had generally not clarified several species that displayed suspiciously broad but apparently continuous shell feature variation. The same kind of variation appeared to occur in many species and was considered simply to be locality-based variation in the many species widespread across the state (eg see the introductory comments of Petterd (1879)).

It was only field discoveries during this project that prompted far closer study than previously attempted of shell features of some of these apparently variable species. This overhaul revealed that some of what were considered to be variable species, were actually mosaics or other patterns of conchologically discrete but similar forms. In some cases, these findings are tentative as discussed above. As the majority of species included in this thesis are either already accepted or very distinctive, these cases do not greatly affect the overall conclusions. Whether this will be the case when the remaining suspiciously variable taxa (eg *Paralaoma halli, Stenacapha hamiltoni* (Cox, 1868), *Helicarion cuvieri* Ferussac, 1821, *Caryodes dufresnii* (Leach, 1815), *Victaphanta lampra* (Reeve, 1854), *Roblinella gadensis* (Petterd, 1879) and

Roblinella curacoae (Brazier, 1871)) are examined for hidden taxa using full anatomical and genetic evidence, remains to be seen.

Computer modelling of species distributions has generally not been used in this thesis, owing to severe methodical reservations about the applicability of models such as CORTEX (Peters and Thackway, 1998) to invertebrates. These reservations arise primarily because such models do not take landscape history into account beyond its impact on present-day physical environments, but the impact of landscape history on the ability of invertebrates to disperse to suitable habitats is actually something questioned when invertebrate distributions are studied. When modelling distributions, subjective "expert editing" can be used to edit out areas that are predicted to be suitable by the model, but isolated from the main stock of a species by impassable barriers. Nonetheless, to use a model that makes assumptions about the relevance of different factors (including dispersal barriers), to assess a data set that was intended to assist in generating theoretical questions about the significance of these factors for the fauna being modelled, would be too circular. Despite the potential for "expert editing" on a larger scale, the final product would reinforce the biases of the model, except to the extent that expert editing (based on known failures to record a species) screened them out. Expert editing could only therefore be an effective curb on the weakenesses of any model on a macro scale.

The data set in general is not well suited to statistical modelling because of the heterogeneity of the landscape and its impact on the frequency of occurrence of species. A species can be genuinely abundant in one large area and rare in another, so that attempting to use records to predict species boundaries may not work because the species may be merely rare in the area where it is modelled as absent. This particularly applies to species with major variations in the spatial density of records in different parts of their range, such as *Roblinella gadensis* and *R. curacoae*. Figures of overall sampling coverage, such as the number of grid square records of all species within an area where a species has not been recorded, have been used in discussion of whether possible gaps are likely to be real, but ultimately, judgements about how restricted a species is likely to be are unavoidably subjective. This is difficult to avoid in a data set where the level of surveying across the state (both in terms of number of sites and time at each) is extremely variable. The author's field records include approximate measures of search time for each search, but data from other sources generally do not include this measure. Therefore, the only quantifiable indicator of search effort applicable to all the records used in this thesis is the number of species recorded in each grid square. Normally, a grid square with few species recorded in it has not been well searched. This generalisation is of very approximate value only, because some squares simply do have many more species than others.

A large recent fossil record would be very helpful in reconstructing the Tasmanian land snail picture. Unfortunately there are few known examples, and the taxonomy of some of the key Pleistocene fossils (e.g. from Bass Strait) is in doubt (Smith and Stanisic, 1998). The Pulbeena Swamp material from north-western Tasmania near Smithton (Queen Victoria Museum collections), is only marginally interesting because swamp environments are naturally poor for land snails in Tasmania. It is therefore not surprising that the diversity of this sample is low. The specimens closely resemble present-day *Victaphanta milligani* (Pfeiffer, 1853), *Succinea australis, Stenacapha hamiltoni* (Cox, 1868) and *Magilaoma penolensis.*

Comments in this thesis concerning possible contributing factors to the current distribution of species are often necessarily speculative. In such cases they are intended as an informed attempt to frame hypotheses for further study.

2. PAST RESEARCH

2.1 CRITICAL HISTORICAL OVERVIEW: PAST TASMANIAN SNAIL BIOGEOGRAPHY AND TAXONOMY

This section outlines the history of the understanding of Tasmanian snail biogeography, which is frequently connected to the history of snail taxonomy. Although the history of study of Tasmanian snails extends back to 1792, it is only since the 1870s that local snail distributions have been analysed in any detail. Precise locality recording did not commence until the 1950s, and even then has been limited, and attempts to theoretically summarise and explain snail distributions in Tasmania have been rare, generally rudimentary, and often not supported by the distributions presented here. Nevertheless, the body of existing work contains some useful preliminary ideas.

The Pre-Geographical Phase: 1792-1870

The first native land snail described and known to have been collected from Tasmania was *Caryodes dufresnii* (Leach, 1815). It was described with the type locality "New Holland", but historical research together with the figure of the type specimen (Kershaw 1987a) suggest it was collected near South Cape Bay (4817) on the 1792-3 expedition led by Admiral Bruni d'Entrecasteaux. Similarly, the second Tasmanian snail to be described, *Helicarion cuvieri* Ferussac, 1821, was recorded simply from "Terres Australis" and attempts to pinpoint the exact locality have been fruitless (Kershaw 1979).

Tasmanian snails were collected and described in small numbers through the first half of the nineteenth century. The first work to attempt a systematic list of species with descriptions was Cox (1868), which also stands as the only attempt at a species-level identification guide to the entire Australian land snail fauna ever published. This work included 21 'species' of Tasmanian land snail (the supralittoral *Truncatella* are not included in this count), but of these, two (*Helix bisulcata* Pfeiffer, 1852 and *Helix subangulata* Pfeiffer, 1854) are known to have been misrecorded from Tasmania (see

Petterd and Hedley, 1909). Furthermore, one synonym each of *Paralaoma caputspinulae, Tasmaphena sinclairi* (Pfeiffer, 1846) and *Stenacapha hamiltoni* were treated as species by Cox, so only 16 actual species were discussed. Of these, five are described as occurring simply in Tasmania (although *Caryodes dufresnii* is stated to be widespread.) Of those for which any locality data more precise than Tasmania are given, in most cases only a single locality is listed and localities are often vague (eg "northwest coast of Tasmania"). Only two records are sufficiently precise to identify the 10x10 km square in which they were made and there is no attempt to discuss the restriction of any species to any part of the state. None of this is surprising given the lack of development of infrastructure in Tasmania at the time, but it shows that the analysis of Tasmanian snail distributions had hardly commenced in 1868.

The Early Monographs: 1870-1910

This was a boom period for Tasmanian snail research. Both taxonomy and biogeography advanced enormously. More names were erected during the 1870s than during the entire remainder of Tasmanian snail research history to date.

Legrand (1871a,b) issued the first monograph of the Tasmanian snail fauna in two editions issued within months of each other. The second edition (Legrand 1871b) contained names for 81 native "species". However, at least 23 were not accepted by any subsequent author. It is difficult to allocate some of these names to actual species because no type material exists for many, and several are not illustrated. The 81 species listed by Legrand (1871b) (many of the descriptions were actually written by Cox for inclusion in Legrand's work) appear to represent about 37 actual species, with the large charopids *Mulathena fordei* (Brazier 1871), *Thryasona diemenensis* (Cox 1868) and *Stenacapha hamiltoni* earning especially long lists of Legrand synonyms. Indeed, the taxonomic views expressed in Legrand's work were implicitly, but strongly, rebuked by Petterd (1879) who wrote:

> "Further observations show that much confusion has occurred by the slight variations in form and colouration, in more or less favourable localities from which the specimens were collected, being recorded as distinct species. I am now enabled to show that in a great number

> of instances many of these variations are not of a constant specific character … I consider the correcting of one error far more praiseworthy than the creating of many new species without good reason and careful investigation. I quite agree with the learned botanist Sir J. D. Hooker, that the naturalist "who has the true interests of science at heart, not only feels that the thrusting of an uncalled for synonym into the nomenclature of science is an exposure of his own ignorance, and deserves censure …" [p. ii]

Petterd also commented that the principal difference between six forms of *Thryasona diemenensis* described as species by Cox in Legrand's work, "is that they came from different parts of the colony."

Legrand's monograph did however include the first published information about a fifth of the Tasmanian snail fauna, and greatly improved the standard of locality data in that species were no longer recorded simply as "Tasmania". Excluding duplicate records under different names that were later synonymised, the work contains about 160 locality records, with 24 species being recorded from multiple localities. The locality descriptions remain vague with a low proportion being identifiable to 10x10 km grid squares. Some (eg the record of the north-western *Tasmaphena lamproides* (Cox 1868) from "North-West Bay", which is near Margate in south-eastern Tasmania) are assumed to be errors because they are well outside the species' known range, are not based on any known specimen, and have not been replicated.

Legrand also made some attempts to comment on the biogeography of given species. He was the first to recognise that *Anoglypta launcestonensis* (Reeve, 1853) is confined to north-eastern Tasmania, and to note that *Bothriembryon tasmanicus* (Pfeiffer, 1853) is essentially coastal. However he also stated of *Tasmaphena sinclairi*:

> "The home of this species appears to be the South-west corner of the Island, as the North-east is that of *Launcestonensis* [*sic*] … I have never found it far north of Mt Wellington, or on the east side of the Derwent."

We now know that *T. sinclairi* is much more widespread than this.

Petterd (1879) wrote another monograph that greatly developed both the biogeography and taxonomy of the Tasmanian snail fauna. Petterd included 72 native species (including the final appearance of the errors *Helix bisulcata* and *H. subangulata*). Petterd's classification was much more robust than Legrand's, and represents about 50 distinct actual species. Several entities that were treated as forms below species level by Petterd, can also be recognised now as species (eg *Helix architectonica* Legrand, 1871 "var (a)" from Myrtle Bank is actually the first record of Charopidae sp. 'Skemps'.) Furthermore, the locality data provided by Petterd were far more extensive. These data appeared in two forms – notes in the text, and a table appended to the monograph and created by R.M. Johnston. This table listed all the species then considered valid and assigned them to twenty general localities around the state, with a letter indicating their frequency at each (a-common, b-uncommon, c-rare). Appendix 2 is a revised version of this table, translated into the nomenclature used in this thesis, showing that the original table contains about 250 records of about 60 genuine species. The text records are more detailed for many species, hence the monograph as a whole yields about 360 records, only about 15 of which are obviously unreliable. The spatial detail of these records varies. Those found only in the table are difficult to attribute to a 10x10km grid square, but in many cases (especially where a species was recorded from only one site) the descriptions are sufficient to locate where the record came from. The most recorded species according to the reconstructed table (Appendix 3) were *Helicarion cuvieri* (20 localities), *Caryodes dufresnii* (19), *Thryasona diemenensis* (16), *Stenacapha hamiltoni* (12), *Victaphanta lampra* (Reeve, 1854) (11), *Paralaoma halli* (10), *Tasmaphena sinclairi* and *Prolesophanta nelsonensis* (Brazier, 1871) (9) and *Pernagera officeri* (at least 8, with uncertainty about others). These species are also prominent among the species most recorded in this thesis. However, two frequently recorded species in this thesis were unknown to Petterd – *Roblinella* sp. "Tahune" (30 grid squares in this thesis) and *Pedicamista* sp. "Chisholm" (27 grid squares).

Petterd also made the first determined effort to describe the distributions of many Tasmanian species. He commented that most species present in Tasmania are not found on the Australian mainland, and listed ten that cross Bass Strait (although subsequent research has shown that only four of these actually do so - the rest are sister species or superficially similar). He considered about 20 species to be generally distributed in Tasmania, with the rest localised, but did not attempt to summarise the different distributions.

The next major manuscript was by Petterd and Hedley (1909). Although this work added some species (in particular the *Cystopelta* slugs, previously neglected in itemised lists) it was a conservative work that aimed mainly to reclassify snails above the species level, and did not add much biogeographical information. Fifty-six species were listed, only five of which now appear to be synonyms. Unfortunately some genuine species included in Petterd (1879) were synonymised in this work. There are several inconsistencies between Petterd and Hedley (1909) and Petterd (1879), suggesting that the former was largely Hedley's work with limited input from Petterd (who may have been in poor health as he died the following year).

First Attempts at Bioregionalisation: 1910-1960

Most of the first half of the twentieth century was a quiet period for Tasmanian snail research. May (1923, 1958) added a small number of records. The only major published contribution was that of Iredale (1937a, b, 1938) who revised the entire Australian native land snail fauna. Iredale's taxonomic views have been criticised heavily (eg Solem, 1959) for much the same reason as Legrand's (i.e. creating a proliferation of taxa without sufficient explanation). Iredale's view that the number of snail species had been severely underestimated by previous workers was, however, certainly correct. Iredale's biogeographical views of the Tasmanian fauna have not received the same amount of censure as his taxonomic views, but Iredale was apparently careless in his use of records by previous authors, and frequently stated that species were found only in a certain area of Tasmania when they were actually widespread. Examples include *Mulathena fordei* ("South Tasmania", ignoring Petterd (1879)'s record from Mt Bischoff), *Thryasona marchianae* (Legrand, 1871) ("South Tasmania", ignoring Petterd's records from Ben Lomond, Leven River and Corra Linn near Launceston), *Planilaoma luckmanii* (Brazier, 1877) ("South Tasmania", ignoring Petterd's records from Cataract Gorge and Distillery Creek near Launceston), *Paralaoma caputspinulae* [as *P. morti* (Cox, 1864) and *P. hobarti* (Cox, 1868)] ("South Tasmania", ignoring numerous northern records.), *Pedicamista coesus* (Legrand, 1871) ("South Tasmania", ignoring Petterd's records from The Nut, Stanley), and *Magilaoma penolensis* [as *M. participilis* Iredale, 1937] ("North-West Tasmania", ignoring Petterd's records from the Furneaux Group and Browns River).

Iredale (1937a) concluded that:

> "In Tasmania there are four districts which apparently show valid differences in these molluscs. The Southern, whence most of the species have been described; the Northern, where a number of local species are easily recognisable from their very different form, but where some are restricted to the North East, others to the North West; the Western, where again the mid-west appears to show somewhat different forms from the south-west; and the Central with its high altitudes which is the least known."

This may be the first published attempt to divide the state into faunal boundaries, but it is a poor one, even on the evidence available to Iredale. As discussed above, many of the species Iredale considered to underpin the South as a zone are not confined to the South. Furthermore, of those identified by Iredale as confined to the North, several are apparently synonyms of more widespread species, notably *Stenacapha hamiltoni*. Iredale's claim that the mid-west is distinct from the south-west is also not supported well by his species lists (unless the mid-west is considered to include the Waratah district (around grid square 3741)) and his claim of the Central as a distinct area is not supported by his evidence at all. The idea of broad Northern and Southern zones has retarded Tasmanian snail biogeographical and taxonomic understanding, and it is surprising that Iredale advanced it without considering that there were clear habitat and climatic reasons why these should not necessarily form distinctive zones.

It might be assumed that Iredale's reason for confining named forms to certain parts of the state was that he did not believe the forms available elsewhere in the state were the same species as the southern forms (and this may be correct in the case of *Thryasona marchianae*). However there is no published evidence that Iredale thought this, nor did Iredale create new names for any such forms. He was also happy to accept some species as generally distributed in Tasmania.

Iredale's taxonomic decisions also made understanding the fauna far more difficult, not because of the proliferation of names, but because of the often seemingly arbitrary nature of his genera. His creation of *Planilaoma*, into which he moved *P. luckmanii* but not the extremely similar *Helix sitiens* Legrand, 1871 (which he placed in *Laoma*), later led to the moving of *P. luckmanii* and *H. sitiens* into separate families whereas there is actually, as discussed in Chapter 4 under *Planilaoma luckmanii*, no evidence that they are even different species.

Systematic mapping: 1960-present

Kershaw (1975) presented a brief and mostly uncontentious overview of Tasmanian snail biogeography. Much of this discussion was devoted to Iredale's comments on the preference of the Punctidae for dry conditions and the Charopidae for wet conditions, and demonstrating exceptions to this. The most relevant comments are on Pleistocene migration:

> "There remains the similarity, perhaps not necessarily uniformity, of species between Tasmania and Victoria. Can this be due to Pleistocene migration? We have seen that this does not account for all the problems. In fact Tasmanian snails have adapted to a wide range of conditions which may be due to the glacial period. But the relationships seem to be much less easy to account for, much older than this. Species have been found over a wider range than originally thought. Hence the idea of isolated colonies of Tasmanian snails is not necessarily a valid one. The Pleistosene [sic] Epoch certainly saw variation in the range and nature of the habitat, which probably had a degree of associated snail migration. Conclusions on the significance of this are probably still premature."

Smith and Kershaw (1979) revised the Tasmanian fauna, and then the same authors (1981) produced the first work to attempt to atlas the fauna by 10x10 km grid squares. These works listed 47 native land snail species, but the selection of species was very conservative even based on existing described names; all except two of them are considered valid in this thesis. In the 1979 work several names previously considered valid by most or all authors, were synonymised without any stated reasons, including such distinctive species as *Pernagera architectonica* (Legrand, 1871), *Trocholaoma spiceri* (Petterd, 1879) and *Geminoropa antialba* (Petterd, 1879), sometimes under species that were not more than superficially similar. In some of these cases a lack of museum material probably contributed to the discarding of these species. As the early illustrations are rarely sufficient to identify a species, it is often necessary to find many specimens of an incorrectly discarded synonym before noticing its distinctiveness.

The maps produced by Smith and Kershaw (1981) represented an enormous advance in the level of recorded published distribution data for Tasmanian snails. A total of 1201 records on a 10x10 km square scale were contained within these maps, although some of these records (as with this thesis) were attempts to assign 19th-century records to 10x10km squares. As discussed in Section 3.2 and under various species in Section 4, identifications of some of the species were inaccurate. Museum holdings show that some specimens on which these maps were apparently based had been misidentified, especially specimens assigned to *Tasmaphena ruga* (Legrand 1871), *Prolesophanta dyeri* (Petterd, 1879) (more than 70% of museum specimens identified as this belong to other species), *Pedicamista coesus, Discocharopa vigens* (Legrand, 1871), *Allocharopa* spp., *Pernagera* spp., *Geminoropa* spp., *Bischoffena bischoffensis* (Petterd, 1870), and *Roblinella agnewi* (Petterd, 1879). In many cases the errors severely distort the distribution picture given. For instance, the division of *Allocharopa* into northern *A. kershawi* (Petterd, 1879) and southern *A. legrandi* (Cox, 1868) resulted in southern *A. kershawi* specimens from Sandford being assigned to *A. legrandi*, and *A. kershawi* hence being incorrectly mapped as exclusively northern.

The most recorded species at the time, based on the maps, were *Caryodes dufresnii* (120 squares), *Stenacapha hamiltoni* (111), *Helicarion cuvieri* (91), *Thryasona diemenensis* (66), *Pernagera officeri* (61, although six of these records are actually *P. kingstonensis* Legrand, 1870), *Tasmaphena sinclairi* (46), *Trocholaoma parvissima* (Legrand, 1871) (43), *Laomavix collisi* (42), *Pernagera kingstonensis* (36) and *Victaphanta lampra* (35). *Paralaoma caputspinulae* (56), *Prolesophanta dyeri* (41) and *Cystopelta petterdi* (Tate, 1881) (47) are omitted from this list because what Smith and Kershaw considered to be *P. caputspinulae* is actually several species (see comments under *Paralaoma* spp. in Chapter 4), because of numerous misidentifications of *Prolesophanta dyeri* and because of the subsequent reinstatement (Kershaw, 1987) of *Cystopelta bicolor* Petterd and Hedley 1909, which would have accounted for about half the recorded *Cystopelta*. Naturally, the list of most recorded species is proportionally quite similar to the list of most recorded species in this thesis. However, *Pernagera kingstonensis* (a very small species) was comparatively somewhat under-recorded in the Smith and Kershaw maps. Other species that were significantly under-recorded include *Discocharopa mimosa* (Petterd, 1879), *Allocharopa legrandi, Oreomava johnstoni* Iredale, 1930 and *Roblinella* *gadensis*. The number of records for each of these species has since increased more than tenfold. These snails are all small charopids and all were at the time affected by some degree of misidentification or taxonomic confusion.

Smith and Kershaw (1981) made brief comments on the peculiarities of the Tasmanian fauna, especially with respect to Bass Strait. For instance:

> "The land snails *Caryodes* and *Anoglypta* were able to adapt to Tasmania and survive. The super-humid Tasmanian rain forest may have been a factor in this. Bass Strait, as a barrier, allowed these snails to evolve as distinct genera. But curiously when the Bassian Rise was restored they did not migrate north, nor apparently did the Victorian *Pygmipanda* migrate south. Some snails did resume a continuous distribution across the Bassian Rise as traces remain on the islands … There are apparent anomalies such as *Bothriembryon* in eastern Tasmania and *Chloritobadistes* [*sic* – now *Austrochloritis*] on King Island."

This is a useful starting point, although whether snails found on the Bass Strait islands at some stage had populations solely on the Tasmanian and Victorian mainlands and hence "resumed" a continuous distribution using land bridges is not clear. The traces (eg on low-lying islands) could be a result of short-distance oceanic dispersal from the two mainlands and the taller (hence never inundated) Bass Strait islands; the rapid re-establishment of snails on Krakatoa after a volcanic eruption being the classic case of this kind of dispersal (Peake, 1981).

Two recent contributions attempt to divide the state into faunal zones of some relevance to snails. One of these, dealing exclusively with land snails, was by Smith (1996). This divided the state roughly into five biogeographic zones – 1. Bass Strait Islands, 2. West and southwest, 3. Dry east, 4. Central North 5. North-east, bounded by lines down the Tamar and Fingal Valleys. A distribution table for species occurring in the north-east zone was given. According to Smith, all but one of 24 described species in zone 5 also occur in zone 4, *Anoglypta launcestonensis* being the sole exception, but six of the 24 zone 5 species do not occur in zone 3. These species are *Victaphanta lampra*, *Dentherona subrugosa* (Brazier, 1871), *Elsothera limula* (Legrand, 1871), *Pernagera tamarensis* (Petterd, 1879), *Pernagera kingstonensis* and *Anoglypta launcestonensis*. Actually, *Pernagera kingstonensis* occurs but is rare in parts of Zone 3, and *P. tamarensis* has since been found not to be a valid species

(Bonham, 1997a). *Victaphanta lampra* had already been widely recorded from Zone 3 including several locations shown as dots by Smith and Kershaw (1981), and *Dentherona subrugosa* is also recorded from Zone 3. On this basis, the justification for separating Zone 5 from others almost reduces to a single species, of which Smith said:

> "Using the mollusc fauna as an indicator, can the Northeast be considered a faunal subregion of the State? In my opinion the answer to this question is 'Yes'. The presence of *Anoglypta launcestonensis* alone, as the representative of a genus endemic to the area, is sufficient to delineate the area as a faunal sub-region."

Tasmania has other very distinctive endemic genera confined to parts of the state, for example *Bischoffena*, although the significance of *Anoglypta* as a monotypic genus in a small family rather than a large one is higher. *Tasmaphena sinclairi* is indeed apparently absent from Zone 3, but to use just two species out of a fauna of several dozen to justify one of five subzones would be ambitious. Nevertheless this thesis will argue that strong differences between the north-east and the central east do exist. The placement of King and Flinders Island in one zone has since been proven incorrect given that less than half of the species found on each island occur on both, those that do usually being widespread and biogeographically uninformative species that extend to Victoria. The extension of the central north zone southwards to an area parallel with the south end of Macquarie Harbour is unmatched by any known species boundary.

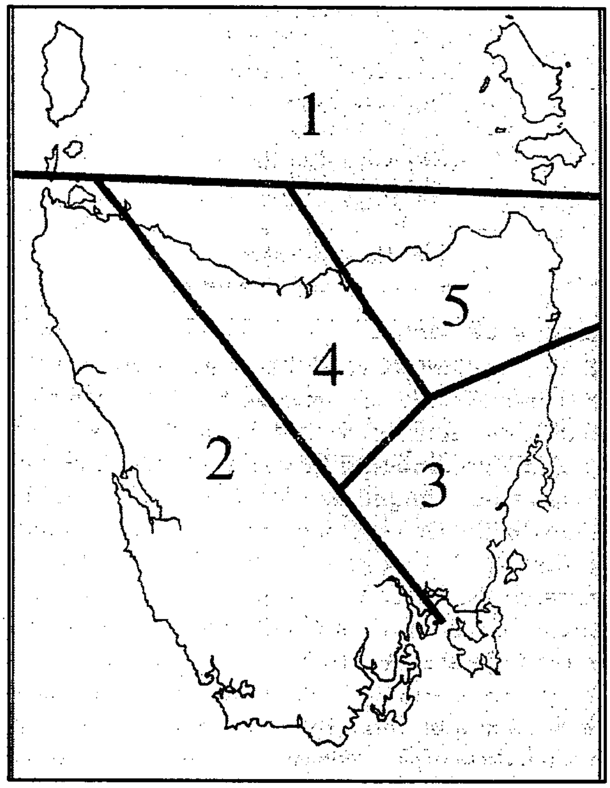


Fig 2.1. Biogeographic zones supported by Smith (1996).

The work of Mesibov (1994, 1996a) aimed to justify boundaries for faunal breaks and regions using a database of records for many different invertebrate groups. Here it will be discussed only in terms of results for land snails; for results for other groups see section 2.2. The following results were given for snails by Mesibov (1996a) (some may since have been refined); comments (if any) are in square brackets:

- *Anoglypta launcestonensis* is endemic to an inland northeast zone called 'Plomleys Island' and extends throughout it. *Tasmaphena* avoids Plomley's Island. [*T. ruga* has been recorded from Mt Stronach (5444) which is within the minimum-convex-polygon 'boundary' of Plomley's Island, but Mesibov (pers. comm.) clarifies that Mt Stronach is a dry forest 'inlet' into Plomley's Island which has more faunal similarities with adjacent out-of-Plomley's-Island areas.]

- *Bothriembryon tasmanicus* has a northern boundary just north of St Helens (6044). Various invertebrate species that have 'toehold' populations in far northeast Tasmania extend south to this boundary but no further. [*B. tasmanicus* has now been recorded north of this boundary at Little Musselroe Bay, as well as some early but dubious North Coast records, so this claim is no longer supported.]

- An undescribed *Flammulops* is endemic to a bioregion near St Marys (6039) [Regrettably, this snail is not included in this thesis – see Section 3.2]

- The absence of *Cystopelta petterdi* supports a possible bioregion on the east coast adjacent to Maria Island (5828). There are also curious absences for *Thryasona diemenensis* and *Stenacapha hamiltoni*.

- The presence of *Helicarion rubicundus* Dartnall and Kershaw, 1976 supports a bioregion of the Forestier and Tasman Peninsulas.

- *Victaphanta milligani* and *Cystopelta bicolor* are among many species endemic to a large Western super-bioregion and observing a break along "Tyler's line."

- *Tasmaphena lamproides* and *Miselaoma weldii* (Tenison-Woods, 1877) are confined to the smallest of several nested invertebrate distribution sets in north-west Tasmania. *Oreomava johnstoni* reaches to another such boundary, about midway across the north coast. [Finds of *O. johnstoni* in the southwest have since proved it is not a northwest endemic, but the comment that it reaches across to this boundary remains valid.]

- *Pernagera tamarensis* is a species endemic (within Tasmania) to the Tamar region. [*P. tamarensis* has since been found not to be a valid species, see Bonham (1997a).]

- The boundary between *Cystopelta petterdi* and *C. bicolor* runs south from Table Cape and is a break shared by other groups including *Tasmaphena lamproides*. [The inclusion of *T. lamproides* rests on an old Table Cape (3946) record that was later considered by Bonham and Taylor (1997) to be extremely dubious.]

- A break near the Don River (4644) may be the western boundary of *Victaphanta lampra*. [This species actually extends almost 100km further west than the break.]

Most of Mesibov's findings with respect to snails remain correct despite six years of additional data. Both the correct and incorrect results demonstrate the advantages and disadvantages of using databases confined to records defined to within 1 km. The disadvantage is that older data that are not this accurate, but which there is no reason to doubt apart from lack of precision, are omitted. In this case, the range of *Victaphanta lampra* was presented as far more restricted than it actually is. Nevertheless, Mesibov's work shows that land snails do sometimes obey patterns followed by other invertebrates and can be useful in assessing such patterns.

The author has also worked on the distribution of many species since 1985 and attempted to explain or classify some of them, but of those results published, only one paper (Bonham, 1997b) discussed the biogeography of any area systematically. This paper found that the fauna of King Island has many connections to south-eastern Victoria, but that of the adjacent Hunter Group is a depleted subset of the mainland north-west Tasmanian fauna – in contrast to the Furneaux Group fauna which is lacking the Victorian connection. The depleted subset conclusion is slightly outdated, as one species has since been found to be almost confined to the Hunter Group.

2.2 TASMANIAN BIOGEOGRAPHY GENERALLY

Tasmanian biogeographers are fortunate in that the state's intermittent linkages to the Victorian mainland during periods of low sea level through the land bridge known as the Bassian Rise, are uncontroversially accepted, as is the Gondwanan origin of many components of the state's flora and fauna. The flora, particularly the rainforest flora, experienced high rates of extinction at genus level up to as late as the mid-Pleistocene. These extinctions are speculated to be due to climatic history (particularly repeated glaciation events often coupled with aridity) and to have led to a depauperate flora compared with what would be expected given the state's present climate (Hill *et al.*, 1999). The composition of the flora during the last two million years is similar to that of the present fauna, but very different in distribution (Jackson, 1999). Between 24-16 ka there was a land bridge to the mainland through the Furneaux and Kent Groups to Wilsons Promontory, and through the Hunter Group and King Island to the Mornington Peninsula, with a lake occupying the present centre of Bass Strait (Blom, 1988, summarised in Jackson, 1999).

During the final glaciation, conditions were both colder and far more arid than at present. This was discussed by Kirkpatrick and Fowler (1998) who modelled the likely forest conditions at the time. A summary of their model is given in Figure 2.2. This shows that wet forest types were essentially confined to areas within c. 50km of the present coast. Scattered rainforest refuges occurred in the south-east, on the Tasman Peninsula, and in parts of the north-east, while rainforest would have occurred broadly along the central west coast. The impact of previous glaciations has not been modelled so precisely but is likely to have been broadly similar: much of the centre of Tasmania has been either covered in ice sheets or strictly alpine (rendering it either uninhabitable or marginal for snails) repeatedly through the Pleistocene, meaning that the fauna has had to repeatedly recolonise these areas.

Since the last glaciation, conditions have changed so dramatically that the distribution of vegetation no longer remotely resembles that during the last glaciation. In particular, rainforest and eucalypt forest are more extensive, and alpine vegetation less so.

The variation in vegetation types over the state, which resembles the variation in rainfall, has been an obvious starting point for internal Tasmanian biogeography, especially as cases of other species with distributions more or less correlated with this variation, have emerged. One of the most prominently discussed aspects is the existence of a notional line separating the wetter west and far south from the remainder of the state. This is widely known as Tyler's Line, not because Tyler was the first to notice its impact on specific groups of organisms, but because Tyler drew attention to its significance through both limnological studies (eg Tyler, 1992) and drawing together disparately published information by various workers on other taxa.

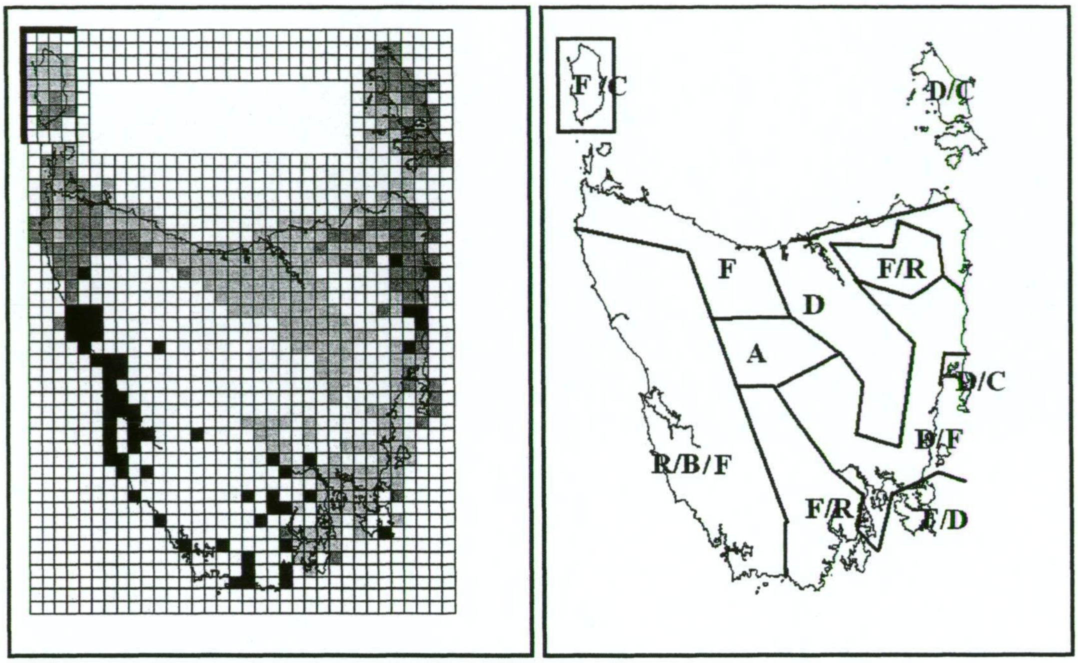


Fig 2.2. Modelled area of different habitat types 18 000 ya and summarised area of different habitat types at present, disregarding clearing (right) Left: Black = rainforest, dark grey = eucalypt forest, light grey = grassland/ woodland, white (land only) = alpine vegetation. Right: A=alpine, F= wet eucalypt forest, R= rainforest. B=buttongrass, D=dry forest, C=coastal vegetation. These are greatly simplified and other habitat types frequently occur or would have occurred within a given type. (Left after Kirkpatrick and Fowler, 1998; right after Kirkpatrick and Dickinson 1984).

One of the difficulties in understanding the significance of Tyler's Line is that there are many different factors that could lead to such a distribution for a species, so it is difficult to isolate any one of these as directly causative without extremely fine mapping, which has been impossible for most faunae. The line matches the boundary between rainforest-containing areas and those (largely) lacking rainforest, a sharp rainfall gradient in which annual precipitation drops from over 2000mm to under 1200mm in an east-west distance of less than 50km (Fig 2.3), the boundary between old sediments (Precambrian – Ordivician) and more recent (mostly Jurassic-Tertiary) and also the edge of the western podzolic and moor peat soil types (Tyler, 1992).

While Tyler's Line rapidly became a familiar concept for summarising various Tasmanian biota, it soon became clear that not every mapped group or species produced the same Tyler's Line. Indeed, Shiel *et al* (1989) in coining the term "Tyler's Line", had done so for a boundary in rotifer assemblages, which did not exactly match the transition zone described by Tyler himself. Tyler's own limnological divide concerned the properties of lakes, and the scarcity of significant lakes in the far north-west would have limited testing of the location of any divide. Mesibov (1994) showed that frog, grasshopper and landhopper boundaries occurred in the Tyler's Line zone.

Two attempts to systematise parts of the biogeography of Tasmania reach strikingly different conclusions about Tyler's Line. Mesibov (1996a) (also see Sections 2.1 and 5.1) considered Tyler's Line to be a real transition zone for invertebrates, a zone that in places is only about 10 km wide. Mesibov employed the terms "wotlian" (West Of Tyler's Line) and "eotlian" (East of Tyler's Line) for invertebrate species that appeared to have their range boundaries within this transition zone, listing 15 wotlian and five eotlian invertebrate species. However, the "line" is not so narrow at the ends, forming an hourglass-like transition zone (Fig 2.4). The narrowest portion of the transition zone was considered to be an example of a "faunal break". Faunal breaks occur "where species assemblages change over relatively short distances". Some faunal breaks occur along evident ecotones while others do not; therefore, it is not clear whether faunal breaks represent responses to present or past conditions.

Peters and Thackway (1998) used computer modelling of the distributions of trees, birds, frogs, reptiles and mammals to form a bioregionalisation of Tasmania, subsequently adopted as the Tasmanian component of the most recent Interim Bioregionalisation of Australia (IBRA 5). This produced a picture of Tasmanian biogeography (as applied to trees and terrestrial vertebrates) quite distinct from that discussed above. In particular, Tyler's Line was largely dispensed with, overlain by the King Bioregion in the north-west corner, a broad Central Highlands Bioregion, and a Southern Ranges Bioregion that it cuts across.

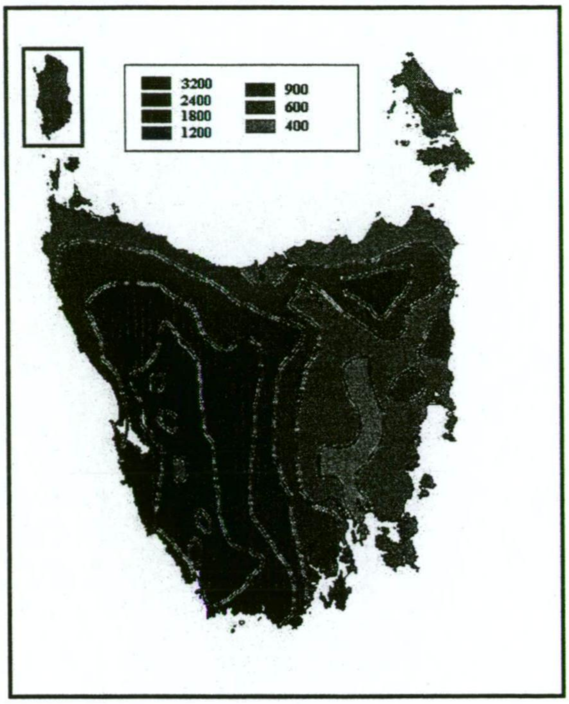


Fig 2.3 Annual rainfall in Tasmania (mm) (after Bureau of Meteorology, 2001)

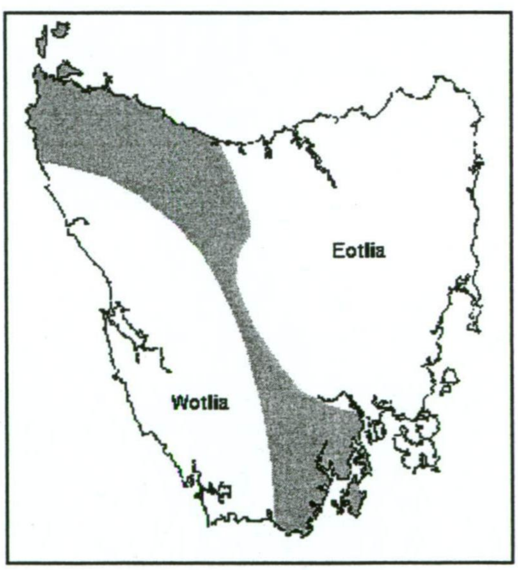


Fig 2.4 Tyler's Line as an hourglass-shaped interzone (map supplied by Dr R Mesibov for this project, adapted slightly from Mesibov, 1996a)

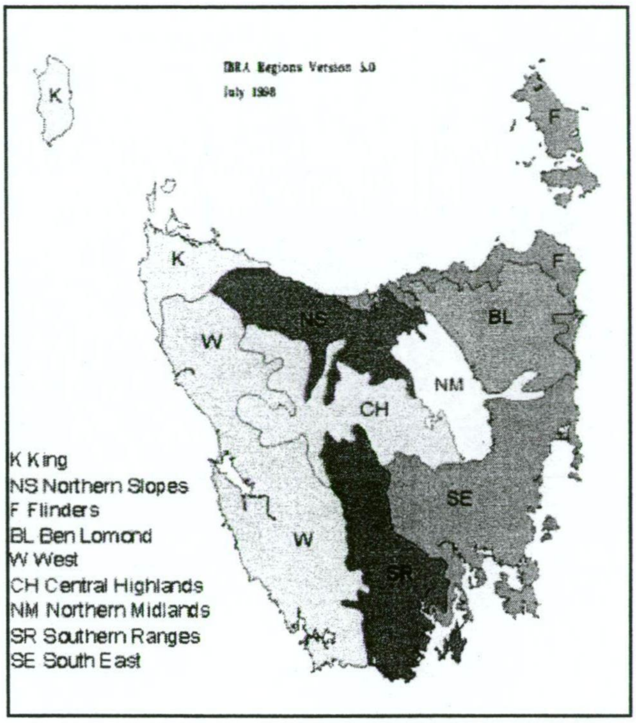


Fig 2.5 IBRA Bioregions from Peters and Thackway (1998)

Bioregionalisation as a method was criticised by Mesibov (1996b) who argued by analogy for a systematic rather than classificatory approach to the analysis of regions. Mesibov's view was that understanding the historical processes involved in determining endemism across different groups is a more constructive approach than mere classification which does not explain anything. On this basis, Mesibov argued that north-east Tasmania, for instance, is not a bioregion, but is a composite assemblage of historic landscape units, with toeholding, endemism to part of a region (which I will later argue is a probable result of glacial history in some cases), and links to the central north and central east all relevant in explaining present distributions. Some discussion of the term "toeholding" (as used by Mesibov) is necessary here. Many taxa occur on mainland Australia and on at least some Bass Strait islands, but on the Tasmanian mainland are restricted to one or both of the northern corners. Mesibov (1996b) suggested that north-eastern toeholds are the result of such species spreading into the present-day Tasmanian mainland during dry periods in the Quaternary.

To the extent that past processes are biogeographically informative, it might seem that this is simply a call for more detail, but it could also lead to unusual kinds of "bioregions" in a spatial sense: bioregions defined not necessarily by local endemism but by a combination of processes and boundaries (producing overlaps in widespread species but not otherwise distinctive), or areas with a common history (eg alpine areas or karsts) that are actually disjunct.

Mesibov (1996a), using range data for a range of invertebrate species and subjective analysis of "more-or-less-the-same-ness", produced a provisional map of invertebrate bioregions (see Section 5.1). Along with Tyler's Line, which might be more correctly called "Tyler's Interzone", there are several other major features.

"Plomley's Island" in the inland north-east was considered to be defined by nine locally endemic species (including the snail *Anoglypta launcestonensis*, which fills the entire "island"), and the absences of at least seven invertebrate species. One of these, the velvet worm *Tasmanipatus barretti* Ruhberg *et al.*, 1991, has since been found to extend inside Plomley's Island by several kilometres in places. Several other bioregions are suggested but these are generally supported by a few to not more than ten presences and/or absences. Mesibov (p. 19) notes that "geographically restricted east Tasmanian invertebrates range freely across the boundaries between [various IBRA 4.0 bioregional boundaries]"; this remains the case despite the subsequent redrawing of the IBRA boundaries. Mesibov also comments:

> "What is remarkable is that certain very obvious environmental boundaries, like the Mt Arthur / Mt Barrow line of foothills, act as faunal divides, while others equally obvious, like the Midlands face of the Great Western Tiers, do not. Conversely, faunal transition zones like the Leven Break ... occur in the landscape with no environmental corellates to satisfactorily explain them. ..."

Mesibov (1993, 1998) also provides a pair of matching studies that hint at the difficulty of applying essentially locationless modelling based on forest type to invertebrates. While 80% or more of the invertebrates present in oldgrowth rainforest in north-west Tasmania were also present in nearby eucalypt woodland and riparian tea-tree forest, only around half of the commonly-sampled species in these rainforests were also present in oldgrowth rainforest at a site in the north-east, 200km away.

Recent native millipede results (Mesibov, pers. comm.) also challenge bioregional assumptions. Many Tasmanian polytypic millipede genera occur in mosaic distributions of parapatric or sometimes allopatric species. The parapatric mosaics are characterised by sharp boundaries. It is not known whether the mosaics are produced by allopatric or parapatric (ecotonal) speciation or a combination of the two. It is also not known whether the firm boundaries are maintained by reduced hybrid fitness, by competition, or by other factors such as reproductive interference. Mosaics are not congruent between different genera, but where boundaries between two species-pairs in distinct genera coincide, this frequently occurs on a known faunal break respected by other invertebrates. Similar mosaics occur in several other invertebrate groups in the state. This suggests for millipedes, that broad-scale bioregionalisation is futile as a conservation tool, because there are actually an extremely large number of very small regions, each with discrete fauna lists.

Presumably advocates of bioregionalism as a conservation tool would be less concerned about invertebrate fauna displaying this kind of radical independence from bioregions than they would if an invertebrate group arranged itself in broad bioregions that strongly contradicted theirs. Nonetheless, if local endemics within a group can occur literally anywhere within the state, there is still a need for locally-based habitat protection to reinforce bioregionally-determined reserve allocations.

2.3 TASMANIAN LAND SNAILS IN REGIONAL CONTEXT

Solem (1979) gave an account of the earliest known fossil records of land snail families and discussed their distribution through time. Proven fossils for most families now present in Tasmania are available from the Miocene or earlier, back to the Cretaceous in the case of the Helicarionidae. No fossil record was given for the Caryodidae and Solem does not discuss the Cystopeltidae. Kershaw (1988) considers a probably Pleistocene fossil from the Kent Group in Bass Strait to be a likely caryodid.

Solem considered land snails to have primarily evolved in what is now the northern hemisphere (particularly Europe), and noted that "There is an amazing lack of

Gondwanaland taxa, in terms of origin and radiation", however some of the few groups Solem considered potentially Gondwanan (Charopidae, Rhytididae and Caryodidae) are relevant to Tasmania. *Planilaoma* as a possible descendant of transitional early charopids, is potentially significant here. Solem considered the Bulimulidae to be a North American group that had spread to South America and thence through Gondwanaland. The remaining elements (punctids, succineids, camaenids, helicarionids at least) are all likely to have entered Australia from what is now the north, and the low diversity and restricted distribution of both the Pupillidae and the Camaenidae in Tasmania may be seen as further evidence of this.

The most recent analyses of biogeography of snails in eastern and south-eastern Australia (particularly those published in the last twenty years) have focussed on the impact of palaeoclimatic processes. In particular, Stanisic (1990, 1994) analyses the impact of extremely dry Quaternary conditions, which would have confined rainforest to isolated refugia. This is supported by the overwhelming present-day dependence of land snails in eastern New South Wales and Queensland on rainforest. Stanisic mentions that over 90% of species occur in this habitat type and identifies several conditions under which high diversity occurs in the region: dissected topography, presence of diverse rainforest communities, and limestone areas. Limestone is effective in maintaining diversity because of calcium abundance but also because limestone rocks retain moisture and support wet-forest-adapted vegetation. "Endemicity and specialisation in these limestone snail communities indicate long-term isolation" (Stanisic, 1994: 209). Examples of the impact of limestone cited by Stanisic include Chillagoe, north-east Queensland, where "more than 25 species have been recorded on limestone in otherwise snail depauperate countryside" and Yessabah (Macleay River valley, north-east NSW) where 36 species were recorded. In this area, limestone sites are at least five times more diverse even than other rainforest sites, and ten times more diverse than eucalypt forest sites. Such extreme differences are not seen in the Tasmanian fauna.

Other areas inland from the coast in north-east Queensland have high regional diversity but low site diversity, interpreted by Stanisic as due to allopatric speciation. The same effect was also encountered by Solem (eg 1981a, 1981b, 1984a, 1985) who found the Kimberley and nearby areas of north-western Australia to contain enormous radiations of ultra-short-range parapatric endemic camaenids, a phenomenon analysed by Cameron (1992) as due to allopatric speciation during conditions of habitat shrinkage, caused by aridity during colder periods in the past ten million years. Yet intrageneric sympatry also occurs in some eastern Australian charopids, whereas other genera occur in mosaics. Stanisic (1990) suggests that the parapatric mosaics of short-range species represent relatively recent radiations, whereas more widespread species displaying sympatry result from "a long period of environmental sifting" (p. 232). (I am following Bull (1991) in accepting parapatry as fundamentally distinct from allopatry, even if parapatric distributions may most commonly arrive from allopatric speciation.)

In noting the dependence of most charopids on moist closed forest (typically rainforest in the eastern Australian context), Stanisic (1990) considers the significance of dry corridors that have separated bodies of forests since probably the late Miocene. These barriers are possibly even more potentially significant than Bass Strait, which has been bridged several times during this period, but not always with vegetation suitable for most snails. Stanisic treats the Miocene aridity (and the existence of dry corridors ever since) as essentially a vicariant event in terms of its impact on the generic arrangement of the Charopidae, the implication being that wet-forest charopids are so incapable of rapid acclimatisation to dry environments that a process of dispersal through a hostile environment to another suitably moist environment where diversity could then increase, is more or less impossible. Species that could adapt successfully to arid conditions could then become widespread in arid areas.

Island biogeography has not been a major area of study in Australian land snail research, but the key findings for the Pacific of Solem (1973, 1990) remain pertinent. Topographical dissection of islands, and altitudinal variation on them, can lead to *in situ* speciation on a large scale, often arising from relatively rare colonisation events. This can lead to very high species diversities on small islands, an extreme case being Rapa Island (36 km^2) with over 100 extant species on an island where 70% of the native vegetation was destroyed before collections commenced. Statistical evidence was considered by Solem to refute the equilibrium theory of MacArthur and Wilson (1967): environmental diversity on an island is often more important than an island's size. Island faunas can also be richer than predicted by the equilibrium model if their faunas are relictual (Welter-Schultes and Williams, 1999). The Kimberley camaenids, although continental, provide an example of why: the natural range of a land snail species can be extremely small. Unlike in other areas of biogeography, where the value of habitat diversity versus habitat stability is often debated, for land snails there appears to be a consensus that environmental diversity and topographic dissection lead to higher snail diversity.

The extremely high local diversities of snails encountered in New Zealand also form a useful counterpart to this study (Solem, Climo and Roscoe, 1981). Solem (1984b, 1990) attributed local species diversities of up to 72 species per site to stable moderate precipitation, topographic dissection, trees which provide curled dead leaves and deep litter, a history of limited disturbance since the early Miocene, limited predation, and repeated *small scale* (my emphasis) fragmentation then reunion of forest during the Pleistocene and Holocene. This is part of a massive diversity of native land snails in the islands that make up New Zealand, recently estimated to total 1350 species (Barker, 1999).

Tasmanian land snail diversity is unremarkable by world standards. Diversities of around 100 species per square kilometre, comparable to the entire Tasmanian fauna, are recorded from continental tropical rainforest in Cameroon (Winter and Gittenberger 1998). Substantial near-continental islands of Gondwanan origin are typically far more diverse than Tasmania. Sri Lanka is of comparable size but is tropically situated and has at least 247 native land snail species (Raheem, 1998), a number expected to continue growing. The much larger Madagascar is spectacularly diverse with 627 recorded species (Fahy, 2001) including several very diverse genera. Nearly 40% of these species are operculates, a lineage absent from Tasmanian terrestrial situations. Vertebrate and plant distributions in Madagascar are known to differ from those of land snails (Pearce, 1995). Both Madagascar and Sri Lanka resemble Tasmania in having a very high proportion of endemic species (92%, 83% and 90% respectively) despite proximity to continents.

3. METHODS AND GENERAL CONSIDERATIONS

Sections 3.1 and 3.2 discuss the sources and acceptance decisions for the records included in Appendix 1, which form the source of the maps in Chapter 4 and which are therefore the basic data for this project. Further discussion of identification issues affecting acceptance decisions can be found in the Identification section under each species in Chapter 4. Section 3.3 discusses general properties of the project database. Section 3.4 gives general comments on taxonomic considerations relevant to this project and covers terminology used to describe shell features, and Section 3.5 discusses project-specific definitions used in the Discussion section under each species in Chapter 4.

3.1 AUTHOR'S RECORDS

This project includes the author's records of Tasmanian land snails between 1985 and the present, with a cut-off date of 23 October 2003 for inclusion. During this period I made a total of 996 collecting trips on which at least one snail was recorded, to a total of 532 localities. Collecting trips on which no native snails were recorded, which were rare, were not recorded. A locality is loosely defined here to include an area of similar habitat continuously sampled over, so some localities cover a linear distance of several kilometres (typically in the form of walking tracks) while others are very small. A consequence of this loose definition is that some localities cover more than one grid square, an extreme case being Mount Dromedary where a large sample was taken covering an area that included the corners of four 10x10km grid squares (5027, 5127, 5026, 5126). The mean time period of searches (sometimes including searching by one or more assistant searchers) was 85 minutes, but these ranged from the turning of a single piece of shelter such as a log, through to all-day searches. A total of 3430 species-locality records were obtained, an average of 6.45 per locality. These include 2701 10x10km grid square records, or 63.2% of the total of all such records in Appendix 1, but in some cases these duplicate pre-existing 10x10km square records.

The author's records have been given in the Appendix in these cases solely because they can be most reliably attached to grid references, dates and above all confident identification.

During the thesis period (from 31 March 1998 onwards) a much higher proportion of trips than previously were directed specifically at resolving distribution questions and filling gaps in the overall species coverage of snail surveying in Tasmania. In particular, 39 previously unsampled localities were sampled specifically to attempt to reduce the number of "very poorly sampled" grid squares or at least increase the amount of sampling in such areas. Other trips were directed at areas likely to shed light on species boundary questions, such as Flinders Island, North Bruny Island, Arm River and the northern side of the Fingal Valley, or at areas which that although not very poorly sampled had still received limited attention, such as the Arthur-Pieman (Tarkine) region.

The method of identifying very poorly sampled areas was similar to that used by Mesibov (1996a): a square should have very few records within the square, and few records in the surrounding squares, to qualify as very poorly sampled. In this case, I decided to use a single formula that assessed search thoroughness, giving some weighting to the surrounding squares while still emphasising the central square most significantly. The formula used was:

T(square) = 2*(number of species recorded from square) + (number of species recorded from all surrounding squares) + w

Where w = amount of water present in central square on a scale from 0 (less than 10% of surface area is water) to 10 (no land in square). Diagonally touching squares were included as "surrounding squares" as well as orthogonally touching squares.

Those squares with a T (thoroughness) value less than 10 were considered to be very poorly sampled and were rated the highest priority for surveying. The highest T value for any square in the state at 23 October 2003 was 206, for the square 5224 (which includes the urban Hobart suburbs of Sandy Bay, Mount Nelson, Taroona, and the foothills of Mount Wellington). The lowest was 0, for the squares 4229 and 4230, which include the remote Algonkian Mountain area north of Lake Gordon, one of the most isolated areas of the state in terms of access by road, air or sea.

At the start of the project, there were 105 squares classified as being in very poorly surveyed areas. At the cutoff date of 23 October 2003, 35 such squares remained. Those that remained are mostly because of remoteness (eg the south-west and the eastern side of Cape Barren Island) or an extremely high proportion of private property in the accessible land (eg the northern midlands and far north-east). Permission to access private property is sometimes refused (including due to concerns about possible finds of threatened species) and private property in some areas, especially the northern midlands, tends to be severely degraded.

Because of the range of purposes involved in surveys prior to commencement of this project, there is definitely not systematic evenness of surveying in the author's records. The most densely covered areas are the Hobart region (where the author lived throughout the period 1985-2003), and the far north-west and inland north-east (mostly incidental finds during professional surveys of snail species considered threatened.) These biases are therefore strongly reflected in the project database as a whole.

Every attempt was made to avoid deliberately sampling near the edges of squares. 36% of grid references would be expected to be within 1 km of the edge of their ten-kilometre square, but in a random sample of 200 grid references in the final database, 41% were within 1 km. This does not reflect deliberate sampling around the edges of squares where an alternative was available, but reflects a practical reality that some squares are largely inaccessible and there is no alternative to sampling near the edge.

Specimens recorded were identified in the field but were not always collected. Frequently, common large species such as *Caryodes dufresnii* were not taken. In cases where common taxa have subsequently been determined to be multiple species, the lack of reference specimens from some sites has sometimes meant that assignments of records to species have had to be based on field notes, memory and overwhelming probabilities based on confirmed records in the area. Where it was not possible to reach a confident conclusion about the identity of a record, it was dropped.

In particular, sight records outside the species' known range and unsupported by a specimen (eg *Dentherona dispar* from Lake Nicholls, Mt Field (4627) or *Stenacapha hamiltoni* from Sandspit River (5627)) were dropped if there was any doubt about the identification. Species likely to be under-represented in the database as a result include *Stenacapha hamiltoni* and *Thryasona marchianae.* In wet forests in far north-western Tasmania, *Stenacapha hamiltoni* is generally scarce, with *S. ducani* far commoner. In cases where only *S. ducani* has been recorded at a site on the basis that all specimens retained were that species, *S. hamiltoni* may have been present as well. Similarly, *Thryasona marchianae* was frequently mistaken for juvenile *T. diemenensis* in areas where the two occur together (as often happens), and so the disproportionate collection of larger, "adult" specimens of the supposed single species would have resulted in *T. diemenensis* being collected more often than *T. marchianae* under such circumstances.

The most frequently recorded species in the author's records to 23 October 2003 (532 localities) are *Caryodes dufresnii* (272 localities), *Helicarion cuvieri* (264), *Stenacapha hamiltoni* (175), *Thryasona diemenensis* (174), *Pernagera kingstonensis* (164), *Paralaoma halli* (128), *Paralaoma caputspinulae* (122), *Trocholaoma parvissima* (118), *Laomavix collisi* (100) and *Victaphanta lampra* (86).

Among the commoner species, those that are seldom included in the author's records in comparison to the records made by others, include primarily south-western (*Dentherona dispar, Victaphanta milligani*) or northern (*Elsothera limula*) species, some coastal species (*Succinea australis* especially), and also *Pedicamista sp.* "Chisholm", which is most effectively captured by methods other than hand-collecting. *Prolesophanta dyeri* is also underrepresented, but records of this species by others include a large proportion of previously published records for which there are no specimens. If the rate of misidentification of these is similar to that of museum specimens claimed to be *P. dyeri* then the difference is explained. Species that are very well represented comparatively are, naturally, those most reliably found in parts of the state the author has most surveyed.

The locality with the most species recorded from the authors' records is "Mount Wellington Central" which includes the Springs – Ferntree – Strickland Falls- Upper

Lenah Valley Track area on the midslopes of Mt Wellington near Hobart. 25 species are recorded at this locality. To a large degree this is a product of search effort (over 55 hours) but this is not the sole explanation for the high total. An even more thoroughly searched site, the Old Chum Dam area near Pioneer in the north-east (5845), yielded only 15 species in 91 hours' sampling despite also having an extensive range of forest types.

No other locality has more than 18 species in the author's records. The distribution of all localities with 15 or more species recorded up until 23 October 2003 is shown in Figure 3.1. In general, the distribution of such localities reflects the author's geographical sampling biases.

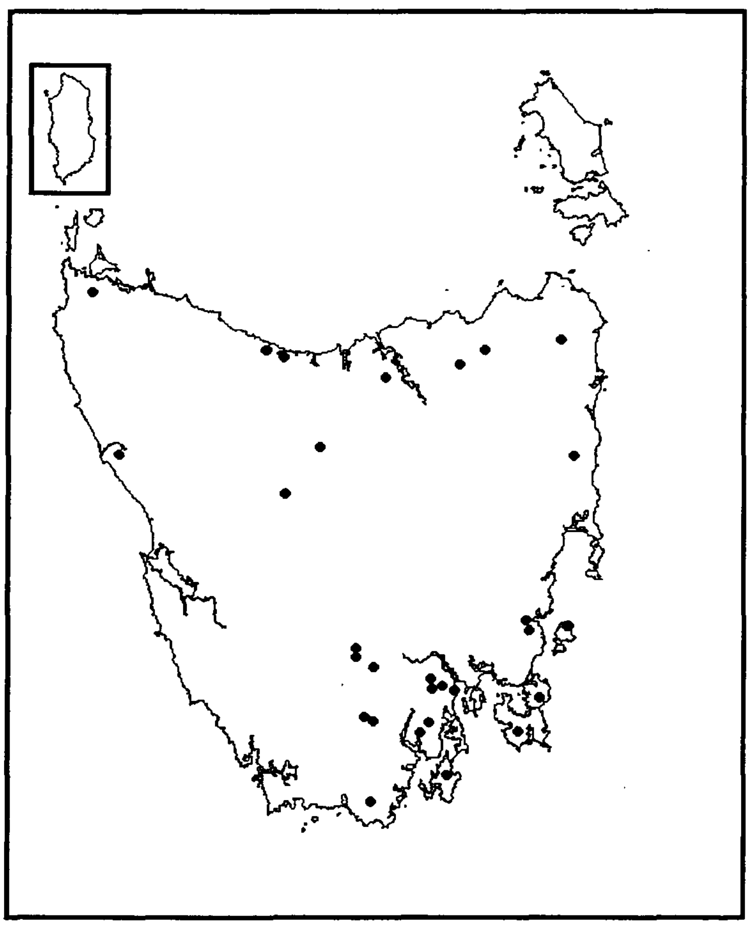


Fig 3.1 Distribution of localities with 15 or more species in the author's searches.

Collecting techniques used were generally standard hand-sampling methods, including searching logs, rocks and leaf litter primarily, but also minor snail microhabitats such as bark piles, bark on trees or logs, moss on trees, litter in forks of trees, treefern crowns, moss piles, low shrubs, cave or rock-overhang rubble, soil, under or on fungi, and under artificial objects (such as rubbish, signs or track planks). Snails were quite frequently found inside the dead shells of larger snail species, and were sometimes found under unnatural calcium sources such as cement lumps, discarded marine shells, and farm animal bones.

Target species varied by search. In most searches, the aim was to find as many species as possible in the time available, however a substantial proportion of searches had the aim of attempting to find as many specimens as possible of a given species in a certain amount of time, trying to collect a certain number of specimens of a certain species, or of trying to find out whether a certain species was in an area. A third type of search (typically not directly related to this project) was the surveying of a very restricted area with the aim of finding as many individual specimens of one or more species as possible in that area. There is a degree of overlap between these types of searches. The most significant influence of search type on the results concerns *Anoglypta launcestonensis*. The existence of records in all 28 squares of this species' known range is not matched by any other species with records in more than seven squares. Although *A. launcestonensis* can be quite reliably found in suitable habitat with sufficient search effort, the solidity of records compared to other species is largely a result of the author's survey of the species (Bonham 1996a), which not only surveyed its range intensively but also targeted its preferred habitat (areas containing mature rainforest trees) almost exclusively.

Examples of the use of unit-area style searching are documented in Bonham (1996a), Bonham and Taylor (1997), Bonham (1999a) and Bonham, Mesibov and Bashford (2002). In these surveys a unit area (eg 10x10 m square, 15m radius circle) was searched for a specific time (eg 1 hour) or until considered completely searched (within the limits of practicality – some shelters are too large to move and some snails are so small, cryptic or arboreal that no method will retrieve all specimens) for a target species. Such methods have been used to obtain population density and growth stage data for particular species, or to obtain population densities for a range of species for experimental purposes (eg the comparison of invertebrate faunae between plantations and adjacent native forests). As well as contributing to the general bulk of records, especially for listed threatened species, intensive searches for listed threatened species also contribute a large "bycatch" of records of other species.

3.2 RECORDS FROM OTHER SOURCES

Other records used in this project come from both previously published and unpublished sources, including museum collections, specimens sent to the author for identification, and written and verbal reports (where considered reliable). Accepting records from other sources, especially those for which no specimen is presently available, caused many difficulties in assembling the project database. This particularly applies to those records published in the major works of Petterd (1879) and Smith and Kershaw (1981). As Petterd was the author of many of the species descriptions and had an excellent understanding of the fauna by the taxonomic standards of the day, very few of his records are dubious from an identification perspective. The difficulty with Petterd is attempting to locate records to a grid square adequately, when many are attributed to landmarks that sprawl over several grid squares, for instance "Mount Wellington", "Launceston" or "Surrey Hills". Some of Petterd's material was collected by other collectors on expeditions where collecting appears to have occurred continuously across distances of 20km or more. In these cases, a most probable square for the record has been selected. Another problem in mapping Petterd's records is the presence of archaic locality names. Leven (now Ulverstone) and Torquay (now East Devonport) are well-known changes but others, such as "Inyforth Creek, Surrey Hills" (the type locality of *Geminoropa hookeriana*) appear to be permanently obscure. Subsequent proliferation of locality names used by Petterd (eg there are now several places called Single Hill) is also a problem.

The records published by Smith and Kershaw, while having the advantage of being recorded as specific 10x10 km grid squares, are also prone to problems that caused many not to be included in this database. Many are not backed by any other known record or known museum specimen. The majority of these are assumed to be from Kershaw's private records. Existing museum specimens that appear to be the source of Smith and Kershaw records have a high misidentification rate for some taxa, and therefore records not matched to known specimens have been discarded if the species is prone to be misidentified and the location appears unlikely. Finally, some of the Smith and Kershaw records appear to be slightly incorrect interpretations of historical records such as those by Petterd or Legrand (something which is extremely difficult to avoid and will probably have occurred in several cases in this thesis as well). Records given as being from "Browns River" (now Kingston) by Legrand were mapped in the 5223 square, for instance, whereas Browns River actually meets the sea 1.5 km to the north of the 5223 square, and at no stage flows below the 24N grid line.

Records reallocated or rejected due to identification or taxonomic concerns involving the species included in this thesis are discussed in the Identification section under each species in Chapter 4. Several records have also been made of species that are not included in this thesis or necessarily considered to be synonyms of anything that is included. These are:

Flammulops sp.: This species was collected by Mesibov at a single site during a land snail survey of the area which is now the Douglas-Apsley National Park. Unfortunately, the specimens do not appear to be present in the large amount of Douglas-Apsley material held in the Queen Victoria Museum, and it was not possible to obtain a photograph that is said to exist. Furthermore, verbal descriptions of the species by those who have seen the specimens vary. Without having seen the species and therefore without being in a position to determine if it is native or introduced, and whether it is the same as any species recorded elsewhere, I have chosen not to include it. It is most likely that it is native and a very localised endemic.

Hedleyella falconeri and *Sphaerospira* sp. : In some cases, shells of tropical or sub-tropical mainland Australian snails have been reported from Tasmania. The former was found in a cave near Loongana by a local resident. The latter was found on the Overland Track by David de Little. As these species are native to areas far from Tasmania and very distinct from it in climate, it has been assumed that the specimens were dropped by bushwalkers or otherwise imported.

Strangesta sp.: A number of museum specimens identified as the Australian mainland rhytidid genus *Strangesta* are held from various localities, mostly in the south-west. The specimens are invariably *Stenacapha hamiltoni* (a charopid bearing no similarity to *Strangesta* beyond general shell shape, size and colour) or yellow specimens of *Tasmaphena sinclairi.*

Pillomena sp.: Material from the Lower Gordon Survey has been referred to this genus. Without seeing the material (which is lost) it is difficult to say what it may have been but it was probably a spiral-protoconch charopid such as *Geminoropa antialba, Elsothera* sp. "Needles" or *Oreomava johnstoni.*

Excellaoma and *Turbolaoma* spp.: These genera are sometimes mentioned as being present in Tasmania but there are no known specimens that cannot be assigned to species listed here. *Turbolaoma* records are very likely to be based on *Trocholaoma spiceri.*

"Primapiculus tasmanicus": This formally unpublished name was used by Climo (1983). Climo's discussion of it is insufficient to differentiate it from *Paralaoma halli* (see Taxonomy under *Paralaoma halli* in chapter 4).

"Magilaoma tasmanica": This formally unpublished name was used by Climo (1983) to refer to an undescribed species said to differ from *M. penolensis* in anatomical features only, including animal colour differences. This claim requires verification based on a larger sample of specimens than those used by Climo. (see Taxonomy under *Magilaoma penolensis* in chapter 4).

3.3 PROPERTIES OF THE DATABASE OVERALL

The main project database includes 4272 records of a species within a 10x10km grid square. The species with the most records are *Caryodes dufresnii* (331), *Helicarion cuvieri* (318), *Stenacapha hamiltoni* (249), *Thryasona diemenensis* (209), *Pernagera kingstonensis* (175), *Trocholaoma parvissima* (166), *Pernagera officeri* (136), *Paralaoma halli* (136), *Cystopelta bicolor* (122) and *Tasmaphena sinclairi* (121).

The distribution of database records around the state is shown in Figure 3.2 below. This figure gives a misleading indication of the true disparity between areas in terms of search effort, partly because the relationship between effort and number of species found at a specific locality is not linear (author's records). For instance, as mentioned above, 91 hours of searching at Old Chum Dam near Pioneer yielded 15 species, but ten of these had already been found after four hours.
Also there are differences in the rate at which species can be found between particular areas, particularly because some grid squares are within the known ranges of more species than others. The large Bass Strait islands, King and Flinders, have only 14 and 15 species recorded from them respectively despite substantial searching, so it is extremely unlikely that any grid square on those islands will reach the totals obtained for some grid squares on the Tasmanian mainland. Nonetheless, assuming that between 20 and 35 species inhabit most grid squares on the Tasmanian mainland, some conclusions about search effort can still be drawn from Fig 3.2. The south-east, the north-east, the western north coast and the Mt Field – Southern Forest areas are indicated as the best searched areas. The northern west coast and Bass Strait islands have a good geographic spread of searching but few squares with large species lists (as discussed, in the Bass Strait case this reflects low total diversity). There are large areas in the south-west wilderness, the northern midlands, the Bothwell/Ouse district and the far north-east, where inaccessibility, lack of public property or past habitat damage have resulted in very low numbers of records.

Due to this incompleteness of sampling, Fig 3.2 would be almost useless in generating anything more than very rough estimates of the relative species diversity of different parts of the state. While the authors' records include measurements of search time that might be used to try to compare species diversity / search time relationships in different parts of the state, records from other sources are almost invariably presence-only records with no evidence of the amount of search time.

A map showing the number of records for each square was continually updated during the project and used as a basis for the allocation of priority squares for searching (see section 3.1). At the start of the project, there were 105 squares classified as being in very poorly surveyed areas. At the end of the project, 35 such squares remained, mostly for reasons described above.

Figure 3.3 shows the distribution of two classes of under-surveyed squares: very poorly sampled areas as defined above and localised patches with no sampling. Although (as will be discussed later) there is not necessarily any relationship between under-sampling and the potential for locally endemic species, these areas might reasonably be targeted by further Tasmanian native land snail surveying.

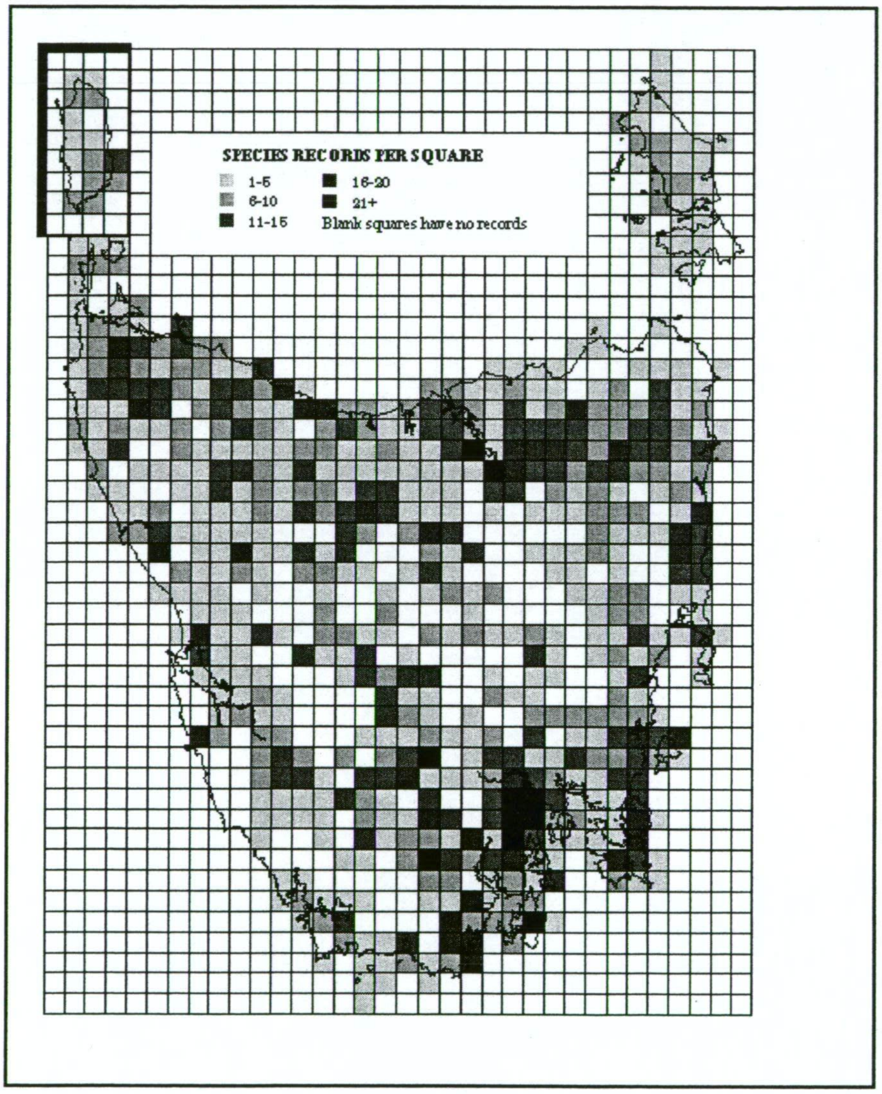


Fig 3.2 Number of species recorded in each 10x10 km square in the main project database (to 30 Sep 2001). Darker squares indicate larger numbers of species recorded.

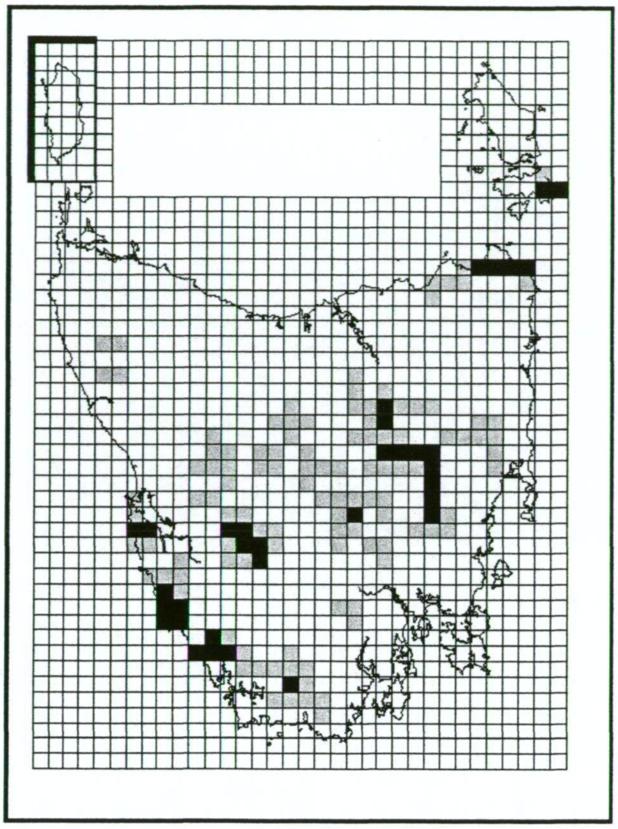


Fig 3.3 Location of under-sampled squares. Black squares are squares in very poorly sampled areas (T<10 as defined above). Grey squares are squares which are not in poorly sampled areas, but which have no records, are more than half land, and are adjacent to another such square.

3.4 GENERAL COMMENTS ON TAXONOMY AND TAXONOMIC METHODS

Taxonomy at the genus level is generally outside the scope of this work. The genus-level taxonomy of Tasmanian snails is extremely outdated and has often been based on arbitrary or minor shell feature aspects, with other more important shell feature differences (particularly the protoconch) being ignored. It is extremely likely that anatomical and genetic work will illustrate a need for even more changes. Appendix 3 offers a tentative generic allocation of the 106 species of Tasmanian native land snail included in this thesis. It is provided because dubious and incorrect genus names (whether formal allocations or informal allocations for undescribed species) are used frequently without comment later in the text for reasons of convenience. In some cases (eg *Elsothera* and *Allocharopa*) it is not clear whether the species assigned to these genera in Tasmania are the same genus as the type species on the Australian mainland.

Undescribed species are usually referred to here with a tentative or closest available genus name, followed by a locality name (hence *Geminoropa* sp. "Hastings"). In general, the locality name was the first locality at which the species was known to have been recorded at the time it was first diagnosed. In many cases, earlier records of the same species have since come to light, but the locality label has not been changed. Sometimes, the initial generic allocation was incorrect, but generally this has been retained rather than cause confusion with other publications and reports referring to the same undescribed species. An exception to the locality system is *Tasmaphena* sp. "Whinray", where the label used honours John Whinray who collected specimens that led to the recognition of the species. This is done because an unpublished name honouring Whinray already appears with several museum specimens, but that name is not used here to reduce risks of inadvertent description.

While there are many areas of uncertainty and a classification based largely on shell features is bound to be conservative, one important aspect of the likely true classification at genus level in the Tasmanian snail fauna is the high diversity of suspected genera for the number of suspected species. According to the classification in Appendix 3, there are between 48 and 58 genera, or between 1.8-2.2 species per genera. This may partly reflect insufficient division of "problem species" like *Helicarion cuvieri* and *Stenacapha hamiltoni,* however the proportion of monospecific genera is likely to remain high.

Another significant feature of the Tasmanian snail fauna is endemism at genus level. Only the following Tasmanian genera are known to occur on the Australian mainland: *Succinea, Pupilla, Victaphanta, Austrorhytida, Prolesophanta, Bothriembryon, Paralaoma, Laomavix, Magilaoma, Miselaoma, Trocholaoma, Elsothera, Allocharopa, Pernagera, Dentherona, Pillomena, Roblinella* (questionably), *Oreomava, Cystopelta, Helicarion, Austrochloritis.* More than half of the Tasmanian genera are likely to be endemic to the state. This tendency is especially strong in the

Charopidae, with at most one-quarter of genera known to occur elsewhere, and all the larger forms traditionally assigned to the genera *Thryasona, Mulathena* and *Stenacapha* (the first two of which have been sometimes used for Victorian species) being apparently endemic to Tasmania at genus as well as species level.

The last formally published taxonomy of the Tasmanian fauna, Smith (1992), included 48 native snail species names for Tasmania. These are the 47 species recognised by Smith and Kershaw (1981) plus the slug *Cystopelta bicolor.* The following changes to this species list are considered necessary in this thesis:

Species recognised as valid by Smith (1992)	48
Species to be relegated to synonymy	-2
Species recorded from Tasmania subsequently	2
Names considered synonyms but actually genuine species	12
New species	46
TOTAL SPECIES	106

Only the three largest families show any change in species numbers compared to Smith (1992): the Rhytididae (8 added), the Punctidae (9 added) and most significantly the Charopidae (43 added and two relegated).

This is likely to be a very conservative estimate of the total number of species in the state, as it is almost inevitable that anatomical and genetic research will result in many more species being added. In the absence of this, species have been distinguished here on the basis of shell morphology and other differences that are known and that are considered sufficient (and consistent enough) to make it very likely that two forms are not the same biological species. In this process, location itself can sometimes be a useful variable. Large but not innately conclusive differences between specimen sets are more likely to be meaningful where the differences occur between nearby populations in similar habitat without clear ecological explanation, and if the sharp disjunction in morphology over a short distance is not matched in the same group of snails over far larger distances. However, the plasticity in land snail shell morphology sometimes produces extremely variable species. With this in mind, different populations have not been treated as distinct species for now where:

(i) There is a minor difference, such as size, that can be potentially correlated to habitat differences such as different rainfall levels, habitat types or ecological factors (especially geology and diet) as well as to geography. (e.g. large and small *Caryodes dufresnii*, small *Tasmaphena lamproides* on Three Hummock Island(3252)).

(ii) There is a difference in a single variable that seems so great as to suggest different species, but the distance between the two populations is large and one or more of the two populations is so scarce that the discovery of intermediate forms in the spatial gap cannot be ruled out. (e.g. *Roblinella curacoae* in the south compared to the few north-eastern specimens)

(iii) There is an apparent difference but one not consistently supported by all specimens in either area (e.g. small *Stenacapha hamiltoni* with more elevated spires in the north-east compared to elsewhere.)

(iv) There is a geographically consistent difference but it is too minor to be considered likely to merit distinct species status (e.g. *Roblinella gadensis* striped form in south-east).

(v) There is massive variation between populations but it is apparently continuous, either as an apparent cline or without geographic sorting (e.g. *Planilaoma luckmanii*). Shell form variation of this type between populations and not necessarily reflecting habitat differences has been documented in land snails elsewhere (eg Johnson *et al*, 1993).

Where morphological differences are innately conclusive (such as gross protoconch differences), forms have been recognised as distinct species without needing to consider the above. Protoconch differences are considered important because the protoconch is an embryonal character that is not readily subject to selective pressure and hence major differences between specimens are likely to be ancestral, whereas many features of the adult (teleoconch) sculpture are more prone to variation through natural selection.

The Taxonomy section under each species in Chapter 4 discusses issues potentially relevant to the recognition and taxonomy of each of the 106 listed species. This section is not intended to be equivalent to a formal taxonomic review but is intended to provide the minimum information necessary to explain the inclusion or exclusion of species from this thesis.

Where limited material (less than ten specimens) has been seen, this has been indicated. Material examined is held by the author, by the Queen Victoria Museum and Art Gallery, by the Tasmanian Museum and Art Gallery, or in rare cases by other Tasmanian or Australian mainland institutions. Where figures given in original texts were quoted as fractions, these have been rendered here as decimals without comment.

Terminology in taxonomy sections

Most species discussed in this thesis have a spiral shell with a number of turns of the shell (whorls). The specimen shown in Fig 3.4 has approximately 3.6 whorls. The diameter of the shell is the main method of measuring shell size, and is indicated by the abbreviation D. The height of the shell is sometimes relevant and is indicated by the abbreviation H. Note that in very high-spired shells (eg *Caryodes dufresnii*), H substantially exceeds D and is the main measurement of shell size used. Many species have an umbilicus (a gap on the shell's undersurface where previous whorls can be seen). The width of this gap (see Fig 3.4 for method of measurement) is the umbilicus width, indicated by the symbol U. The ratios of shell height to diameter (H/D) and umbilicus width to diameter (U/D) are frequently useful.

Many species have a sculpture of rib-like structures on the shell surface. The density of this ribbing is sometimes useful in differentiating species, but can also vary greatly within some particular species. Many (but not all) charopids have a regular sculpture with higher, clearly distinct radial ribs and lower riblets and spiral traces between the higher ribs. In these cases the higher ribs are called "primary" ribbing and the smaller ribs are called interstices or "secondary" ribbing. The first approximately 1.5-2 whorls of the shell often feature a different kind of sculpture to the rest of the shell.

This is the protoconch, formed before the snail hatches from its egg. The remaining sculpture is the adult, or teleoconch, sculpture.

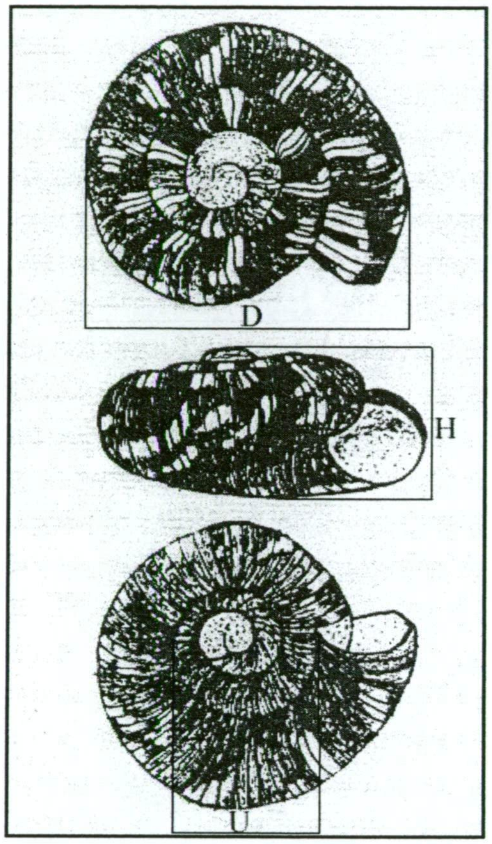


Fig 3.4 A charopid snail shell showing some common measurements used in this thesis (*Discocharopa mimosa,* adapted from Bonham (1995)).

3.5 PROJECT-SPECIFIC DEFINITIONS

Some definitions specific to this project are used through the Discussion sections in Chapter 4, and in Chapters 5 and 6:

A "local endemic" has, or is likely to have, a range of less than 100x100 km; that is, not more than 100km either east-west or north-south. A "local endemic" may also occur on the Australian mainland; in this case its range on the mainland is disregarded as it is not necessarily the same species.

A "wotlian" species must be widespread in western Tasmania with an eastern boundary that runs from the north-western quarter of the state to some part of the southern or south-eastern coast. It must be generally absent from eastern Tasmania, possibly excepting the south-east. It need not be confined to "Wotlia".

An "eotlian" species must be widespread in northern and/or eastern Tasmania with a western boundary that generally runs in a direction between southwards and eastwards, and must be generally absent from western Tasmania possibly excepting the north-west. It need not be confined to "Eotlia".

A "toehold" species must occur on mainland Australia, but in Tasmania be confined to Bass Strait Islands or the far north-west, far north-east or north coast. Any species that extends 100km south of the northernmost tips of the Tasmanian mainland north coast is excluded. Toehold species are widely recognised in both northern corners of the state (see Mesibov 1996b) and are sometimes interpreted as representing generally localised incursions of mainland or Bassian Plain biota through past land bridges.

An "island endemic" occurs exclusively or almost exclusively on one or more smaller islands off the Tasmanian coast.

A "karst endemic" is recorded solely from karst/limestone areas and is considered to occur only in these.

A "scree endemic" is recorded solely from dolerite scree and is considered likely to occur only in dolerite scree, although in many cases data on species considered to fit this category are limited and they may be found to occur outside dolerite scree with more searching.

A "mosaic" species is a species that has an apparent parapatric boundary with another species considered to be in the same genus.

4. RESULTS AND DISCUSSION BY SPECIES

4.1 TAXONOMY, IDENTIFICATION, DISTRIBUTION MAPS AND DISCUSSION BY SPECIES

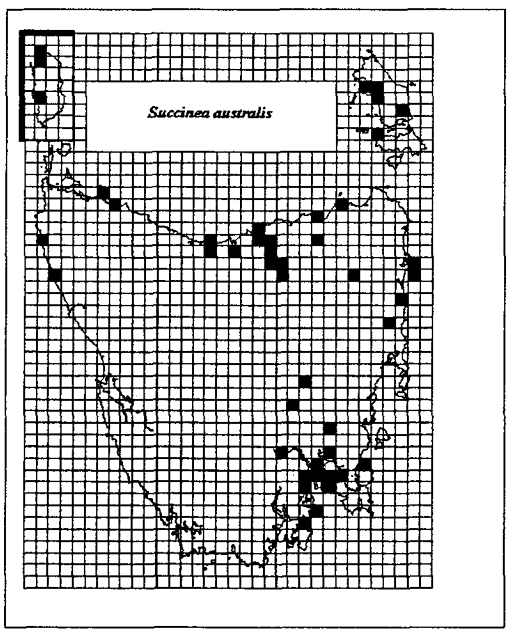
Family Succineidae

Succinea australis (Ferussac, 1821) (Plate 1a)

Taxonomy: No issues identified.

Identification: No issues identified.

Distribution Map:



Discussion:

This species is widespread in south-eastern Australia generally (Smith and Kershaw, 1979) In this project, it is recorded from 45 grid squares. These are overwhelmingly coastal squares or squares along large rivers, reflecting the species' preference for saltmarshes, swamps and damp coastal situations. Six squares occur well inland, demonstrating that the species is capable of occurring away from coastal influences in Tasmania, as it does on the Australian mainland (Smith and Kershaw, 1979). Five of these records carry no habitat data or grid reference so it is difficult to comment on what inland habitats the species may occur in. The sole reliably located inland record is from tea-tree swampland in the Douglas-Apsley region on the central east coast (grid square 5938).

The records for *S. australis* display a significant gap covering most of the west coast and the extreme south of the state, extending from Sandy Cape to Lutregala Marsh on Bruny Island. Within its known coastal range on the Tasmanian mainland *S. australis* is responsible for 31 (3.3%) of 942 grid square records for all species, and the figure for Bass Strait islands (8 of 229, 3.5%) is very similar. Therefore the lack of a single record from the gap mentioned (0 of 264 records compared to a statistically expected 8.7 records if as common as in the rest of its mainland Tasmanian range) might support the view that the species is absent from much of the west coast. However, the lack of records of the species could also be because of lack of searching in suitable habitat. The west coast generally consists of high-energy coasts with comparatively few saltmarshes suitable for this species. Those that exist have not been surveyed for this species to any great extent, although there has been a little sampling in the far north end of the apparent gap during Mesibov's Arthur-Pieman surveys, and also some during the surveys documented by Richardson *et al* (1997). The environments this species occurs in generally contain few if any other land snail species, and therefore it can easily be missed unless these areas are subject to systematic surveying across all habitat types.

The range of this species is therefore treated as insufficiently understood although it is clearly a primarily coastal species, preferring low-energy environments and sometimes occurring inland in marshy habitats.

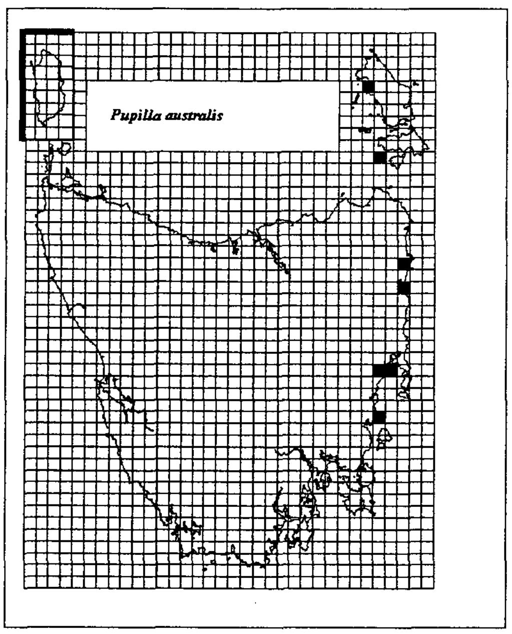
Pupillidae

Pupilla australis (Angas, 1864) (Plate 1b)

Taxonomy: No issues identified.

Identification: No issues identified.

Distribution map:



Discussion:

This species is widespread on the southern Australian mainland generally, extending to New South Wales and Western Australia although in the past it has been considered (across its full Australian range) to represent several different species (Smith and Kershaw, 1979; Smith, 1992). In this project, it was a rarely recorded species with only 7 grid squares, all of them coastal, although the species is not exclusively coastal on mainland Australia. The seven grid-square-records extend down the east coast from Wybalena on Flinders Island to Plain Place Beach near Triabunna, a distance of almost 300 km.

Where this species does occur in Tasmania, it is generally abundant - at Wybalena approximately 160 specimens were seen in 40 minutes' searching. It also tolerates a range of vegetation types including grasses on sand dunes, coastal shrubs and a range of woodier shrubs including *Leptospermum* spp, *Acacia* spp. and *Cyathodes* spp. Despite this, most searches in apparently suitable environments fail. Just south of the southernmost known record there has been substantial searching at several seemingly extremely suitable sites, such as Orford, Whalers Lookout, Marion Bay and Lagoon Bay, all without success.

The distribution of this species is distinctive from any other Tasmanian land snail. The combination of few localities and abundance at recorded localities is unusual and it is conjectured here that this reflects dispersal (possibly even anthropogenic dispersal, although unlike the case of *Tornatellinops jacksonensis*, there is no evidence for this) rather than climatic factors.

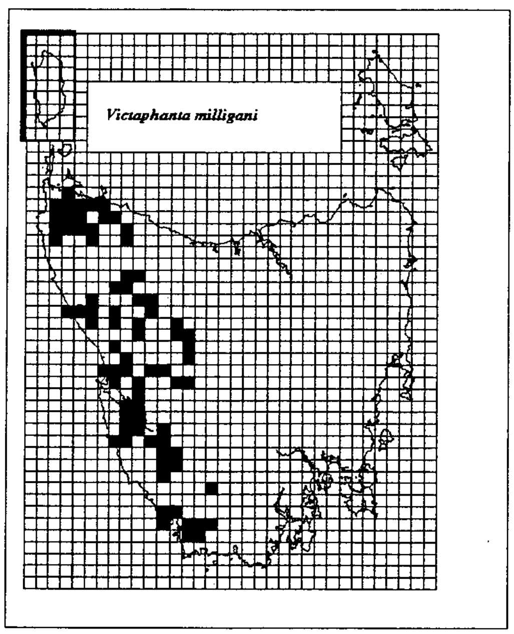
Family Rhytididae

Victaphanta milligani (Pfeiffer, 1853) (Plate 1e)

Taxonomy: No issues identified.

Identification: No issues identified.

Distribution map:



Discussion: This endemic snail is very common with 75 recorded grid squares, a figure that actually underestimates how common it is, because the intensity of searching through its range has been low compared to the rest of the state. Indeed this species is responsible for 9.4% of grid square species records from within its known range. This is a very high proportion, comparable to that recorded for the very common *Caryodes dufresnii* across the whole state.

This species displays a wotlian pattern, but differs from several other widespread wotlian species in the south of its range, in failing to extend across the full interzone area between Wotlia and Eotlia to the Derwent River. This is demonstrated by its absence from squares with a total of 693 grid-square species records between its known range and the Derwent River and D'Entrecasteaux Channel. The exact boundary has not been established in the south-west, particularly in areas between Lake King William and Lake Gordon, near Strathgordon and between Lake Pedder and Melaleuca. However, well-searched areas in the Florentine Valley and Huon Valley have yielded no records, which (for such an otherwise very common species) strongly suggests a boundary well to the west of the Derwent and south-eastern coast. The pattern is complicated by the presence of *Victaphanta* sp. "W Arthurs" in an area bordering on the range of *V. milligani* but there has not been enough surveying to determine whether *V. milligani* occupies lowland habitats within this range and is only replaced by its undescribed relative at high altitudes, or whether the species are genuinely parapatric.

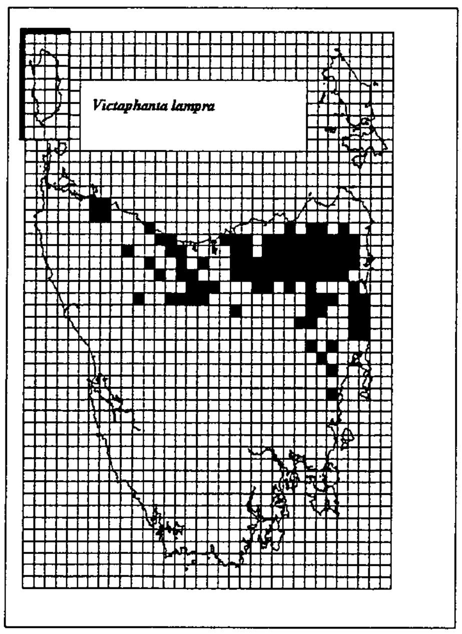
In the north, the species apparently has a parapatric boundary with *V. lampra*. Only one site where the two species occur alive together is known, that being at Crayfish Creek (grid square 3646). At this site *V. lampra* was found to be common but *V. milligani* relatively rare. The latter species occurred solely at the bottom of a gully at this site with the former occurring on the hillslopes, which appeared to have been subject to hot fires in the past. The distance between specimens of the two species was in some cases less than 5 metres. There was no evidence of hybridisation or unusual variation in either.

Victaphanta lampra (Reeve, 1854) (Plate 1c-d)

Taxonomy: There is some geographical variation in this species. Specimens in the far west of the species' range tend to be more globose while specimens in the far south (the Eastern Tiers area, line 35S and further south) are typically paler – usually an olive green to dark yellow colour all over – and more flat-spired; often the sculpture is slightly more rugose. The species is rare in the Douglas-Apsley (c.5937) forests immediately to the north of these populations so it has not been possible to establish whether there is any intergrading between the pale specimens and the normal ones. Also the differences mentioned are not sufficient alone to justify considering the Eastern Tiers population to be a distinct species. Two particular notes of caution apply here: (i) the Eastern Tiers is a low rainfall area (ii) the species is believed to feed primarily on worms, Tasmanian species of which frequently have very localised distributions (T. Kingston, *pers comm*) and thus the species may be prone to variations caused by regional differences in prey.

Identification: Occasionally, all-yellow specimens of *Tasmaphena sinclairi* from southern Tasmania have been misidentified as this species, for instance by Dartnall and Kershaw (1974). All such records have been rejected. The yellow form of *Tasmaphena sinclairi* is frequently misidentified as other species.

Distribution map:



Discussion: Like *V. milligani* this is a common and very frequently recorded endemic snail with records from 101 grid squares. As discussed above, this species has an apparently parapatric boundary with *V. milligani* in the north-west of the state. Aside from this, it occupies the entire north coast, extending south to the face of the Great Western Tiers (approximately the 40 N grid line). Its distribution in the midlands is difficult to establish exactly because of the lack of records through much of the northern midlands, but it is not recorded from well-surveyed areas such as the upper Forth River Valley (squares 4338, 4337), the Central Plateau around Great Lake (around square 4736) and the Tunbridge area (squares 5233 and 5232). In the far east, its distribution dips southwards by about 70km into the Little Swanport area (square 5731) but no further south. This coincides with a likely faunal break in the region (Mesibov, pers comm)

This species therefore displays some aspects of an eotlian distribution pattern, but is also absent from much of the area generally occupied by such species.

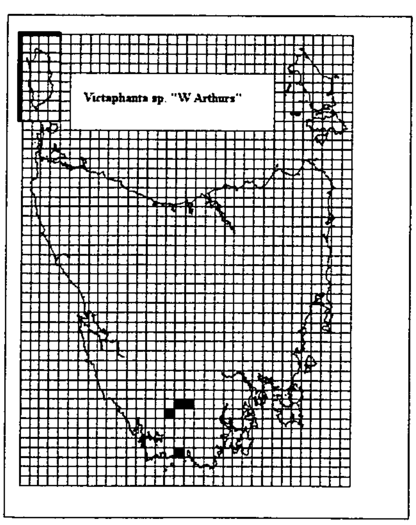
Victaphanta sp. "W Arthurs" (Plates 1f, 2a-b)

Taxonomy: **Brief diagnosis:** (limited material – author has seen one specimen and photo of a second) Flat-spired, uniformly (except protoconch which is paler) glossy dark brown to black rhytidid, c. 18 mm wide at 4-4.5 whorls, with smooth adult sculpture (as in *V. milligani*) but differing from *V. milligani* by being prominently and steeply umbilicated (D/U=5.5-6.5), by having a thicker shell, and a smaller aperture to shell width ratio (c. 45% compared with c. 65%) and more whorls (*V. milligani* adults 3.2-3.6)

This new species is distinguished from *V. lampra* fundamentally on sculptural grounds; whereas *V. lampra* has an adult sculpture of low rough irregular ribs, the adult sculpture of *V.* "W Arthurs" is smooth, as is that of *V. milligani*. It differs from both species by being prominently and steeply umbilicated (compare *V. lampra* D/U=8-14, *V. milligani* umbilicus closed) and from *V. milligani* in general gross shell morphology as described above. It also lacks the bitonal shell colouration of most *V. lampra,* and seems more similar to *V. milligani* in shell construction.

Identification: No issues identified.

Distribution map:



Discussion: This species is known from 4 grid squares. All known localities are at high altitudes (800-1200m) in montane scrub. The species is assumed to be a local endemic but it is not known whether it is an alpine endemic. It occurs close to *V. milligani* but it is not clear whether the two species are sympatric or parapatric (the latter either geographically or ecologically).

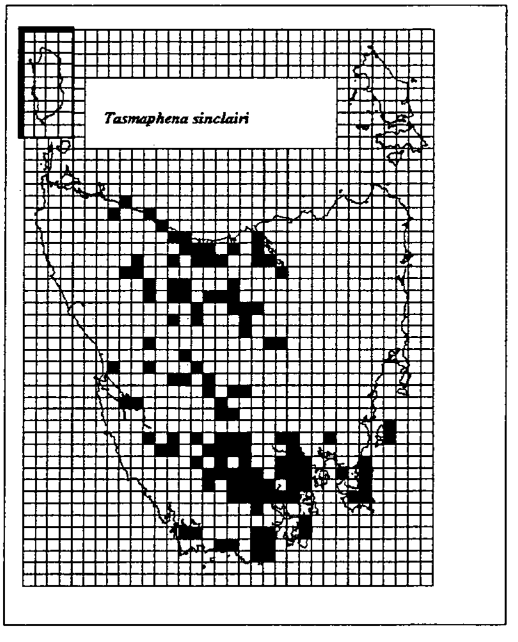
Tasmaphena sinclairi (Pfeiffer, 1846) (Plate 2c-f)

Taxonomy: This species is very variable in shell colour. The typical colour form has a wide area of solid yellow around the umbilicus, marked by a clear thin red line approximately at a distance from the umbilicus of 50-70% of the radius of the base. Many areas have a small proportion of atypical specimens. Principally, these are entirely yellow to yellow-green (the incidence of all-yellow specimens varies by locality – in some localities as many as 20% are all-yellow, but in others none are known) but some will have traces of colour pattern or a disrupted version of the normal colour pattern. However, some areas feature entirely atypical colour-forms. These have red colour pattern continuing right into the umbilicus, either as bands or, often, as rays similar to those which occur in *T. ruga* and *T. quaestiosa*. These atypical colour forms are known from three different areas of the state – Wilsons Ridge in the south-east near the boundary with *T. quaestiosa* (square 5427), the Glenmark/Victoria Valley area (squares 4631-4731) and the Penguin/Ulverstone area in the north-west (at least including squares 4144, 4244, 4243, and 4343). These areas have nothing in common except that they are all near different boundaries of the range of *T. sinclairi*. A single colour difference without any other significant differences is not considered to be taxonomically meaningful, especially as there is some colour pattern variation in all populations of this species.

Another unusual population of the species occurs in the far south-west (square 4126). Specimens here are 25% smaller for the same number of whorls (10.5-11.5 mm for 4.0 whorls) compared to any other known population. However, size is not considered significant in the case of only a few specimens from an area where the species is not well respresented in collections. There are many possible ecological causes for small shell size in this region, including high rainfall causing lack of moisture stress (a factor for some snails (eg Goodfriend, 1986)) or low calcium levels in the region.

Identification: East coast records have been referred to *T. quaestiosa* except in the case of Maria Island where there is a definite *T. sinclairi* specimen. Flinders Island records have been removed as the species clearly does not occur there. These may be referrable to *Tasmaphena* sp. "Whinray" but may also have been misidentifications of *"Stenacapha"* sp. "Flinders."

Distribution map:



Discussion: This endemic snail is widespread and frequently recorded with a total of 121 grid square records from most of the state, excepting the east and northern west. In the east it is apparently replaced by *T. quaestiosa*. The closest the two species are known to occur to each other is in the Mt Morrison forest block near Sorell (squares 5427 and 5527) where the species were recorded within 7 km of each other in a brief survey of this difficult-to-access area. A surprising aspect of this boundary is that *T. sinclairi* and not *T. quaestiosa* occurs on Maria Island. Despite the apparent boundary with *quaestiosa,* there are also areas of the east where both species are absent, including almost the entire north-east and Fingal Valley (its range in the midlands is unclear due to insufficient evidence). The only *Tasmaphena* found much west of the Tamar in the north-east is *Tasmaphena ruga*, a dry forest species. *T. sinclairi* is also apparently absent from the far north-west (north of Strahan and west of Stanley). It does not appear to reach the range of *T. lamproides.*

Tasmaphena species are carnivores which feed predominantly on other snails (based on field observations). Essentially any smaller snail may be a prey item although cannibalism has not been observed in the field, and predation on very much smaller species, except by juveniles, is rare. The two most preferred prey genera, however, are *Stenacapha* and *Helicarion.* In the north-east the latter is relatively uncommon while the former is represented by a small form only. However prey availability does not explain the distribution of this species fully, as it is also unrecorded from the gap between Strahan and Arthur River, in which *Helicarion cuvieri* and a large prey species *Stenacapha ducani* are both very common.

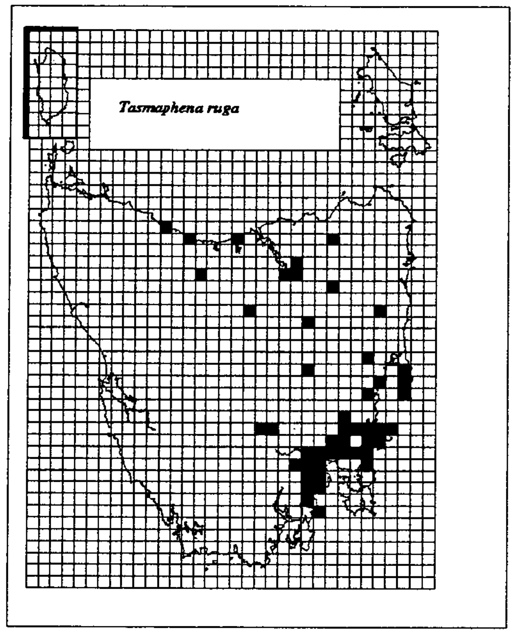
The range of this snail is distinct from the ranges of all other species except for the apparent boundary with *T. quaestiosa.*

Tasmaphena ruga (Legrand, 1871) (Plate 2g-h)

Taxonomy: No issues identified.

Identification: The original record of *T. quaestiosa* was removed as that species is not a synonym of *ruga*. Records from the south-west (west of Lake Gordon) on the Lower Gordon survey were removed as, although the collection material is lost, the habitat is significantly different from that where *T. ruga* has been recorded. Furthermore a dwarf form of *T. sinclairi*, which could have caused confusion, exists in the area. Misidentification of the yellow form of *T. sinclairi* as *T. ruga* is very common – *T. ruga* records from wet forest sites where *T. sinclairi* occurs have been transferred to *T. sinclairi.* Small specimens of *Victaphanta lampra*, especially from Cataract Gorge, have sometimes been misidentified as *T. ruga.* Where known, such records have been transferred. Records from King Island are treated as *Austrorhytida* sp. "Raffertys" and records from the Furneaux Group as *Tasmaphena* sp. "Whinray". Records from Circular Head are treated as *Tasmaphena lamproides,* as a small form of that species occurs there. Finally, a record from Georges Bay by Petterd (1879) has been discarded as it is impossible to determine whether it was *T. ruga* or *T. quaestiosa* (if either) and there are no recent records of either in the area.

Distribution map:



Discussion: This snail is apparently endemic to Tasmania. Although it has been recorded from Victoria (eg Smith and Kershaw 1979) Australian Museum specimens held under this name are clearly *Austrorhytida,* though whether they belong under the formally recognised name *A. capillacea* is unclear. Despite being widespread across about half of the state, this species has been relatively seldom recorded with only 47 grid square records, these being concentrated in the south-east corner of the state.

This species displays a clearly eotlian distribution. This is not surprising as it is found predominantly in fairly dry areas, although it can occur in very wet forests in some situations. Generally it is not sympatric with either *T. sinclairi* or *T. quaestiosa*, and occurs in the drier forests, with the larger species in the adjacent wetter forests. There are several records of *T. ruga* within 500 metres of one of the other *Tasmaphena* species, but no known cases of actual sympatry. "Islands" of *T. sinclairi* in wet forest areas within the range of *T. ruga* prevent the two species from being considered normally parapatric.

There appears to be a gap in records of this species in the north-east with no records north-east of a line connecting Mt Stronarch near Scottsdale (square 5444) and Fingal (5838). The area covered by this gap includes squares with a total of 276 grid square records. However, the reliability of records within its known range is not high (only responsible for 3.3% of grid square records), the surveying within the gap area has been mainly in habitats unsuitable for *T. ruga* (chiefly rainforests and coastal shrubbery habitats), and the species is probably naturally rare in the north of its range. It may have become rarer in the north (or some early records were identification errors), with only three northern grid square records backed by post-19th-century records. Thus, although it may seem there is a strong case for assuming this species to be entirely absent from the north-east corner, the evidence is not fully convincing. This is especially so as it is possible for widely distributed invertebrates to avoid "Plomley's Island", the wet forests of inland north-east Tasmania, while still occurring in the extreme north-east.

Tasmaphena quaestiosa (Legrand, 1871) (Plate 3a-b)

Taxonomy: **(Elevation from synonymy)**

> "Helix (Videna) quaestiosa. Cox. Shell with a large open umbilicus; thin, depressed, dull above, shining below, coarsely and regularly striately ribbed, more prominent above than below, yellow-brown above, gradually shading off to yellow below; whorls 4.5 to 5, convex, rapidly increasing in size; the last dilated outwardly; not descending in front; apex scarcely raised; aperture elongately, ovately-lunar; margins simple, approached, columellar margin slightly dilated. Diameter, greatest 0.55; least 0.40; height 0.22 of an inch [14, 10, 5.5mm]. Habitat. Oatlands – Stephens. This species seems to form a link between *Sinclairi* [sic], *ruga* and *lampra*" – Cox in Legrand (1871: sp. 59)

This species is very similar to *T. sinclairi,* but is considered to be distinct from it primarily on the basis of advice (Brian Smith, *pers comm,* based on dissection of specimens from the Douglas-Apsley area (c. 5937)) that it is anatomically more similar to the much smaller *T. ruga* than to *T. sinclairi*. But for this, it might be regarded as merely a variant of *T. sinclairi*. It is a similarly large snail, adults of 4.3-4.9 whorls being 12.5-18 mm wide. In general it is marginally flatter, and the umbilicus is slightly wider than *T. sinclairi* (D/U c. 5 compared to c. 6.5) but some *T.*

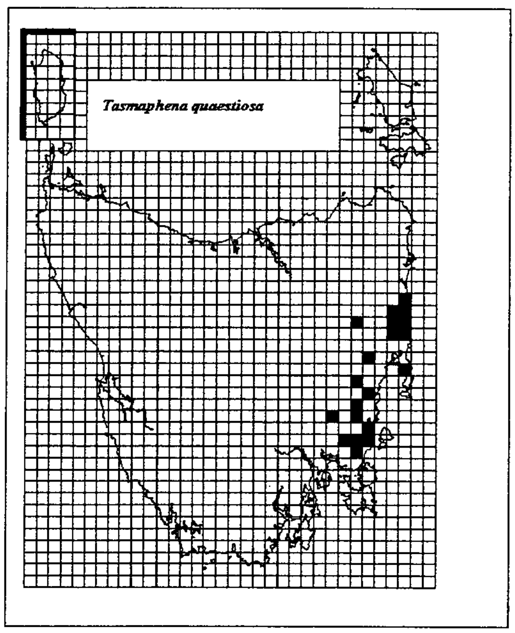
sinclairi specimens have equally wide umbilici. Although the umbilicus in *T. sinclairi* is usually steeper in these circumstances, some populations (especially in central northern Tasmania) are indistinguishable from *T. quaestiosa* on this criterion. Aside from anatomy, which has not been studied in detail across the species' range, the only reliable difference is shell colour. Unlike *T. sinclairi* in which the majority of specimens at any location are marked with a complex pattern of yellow bands and flecks on a red background, *T. quaestiosa* is not marked in this way. Specimens are a rich brownish red to dark honey yellow above, grading generally indistinctly to yellow below, with the only markings sometimes being weak rays similar to those seen on juvenile (especially) *T. ruga*. Specimens have a bronzed appearance and are shinier than the comparatively dull *sinclairi* and *ruga*.

T. quaestiosa is distinguished from *T. ruga* most reliably by usually being massively larger for a given number of whorls. Adults of *T. ruga* are typically 7-11.5mm wide at 3.7-4.4 whorls. In areas where the two species occur very close together, such as Wielangta (5727), The Thumbs (5728) and Mt Morrison (5429-5529) (all towards the southern end of the range of *T. quaestiosa*) adults can usually be separated by *T. quaestiosa* being much larger than the size range given for *T. ruga*, having more whorls, or both. (Width/whorl count) ratios can help to distinguish slightly juvenile *T. quaestiosa* from adult *T. ruga* here; for specimens of 3.5 whorls and over, *T. ruga* typically has a ratio of 2.0-2.7 mm/wh while *T. quaestiosa* is in the range 2.9mm/wh to 4.2 mm/wh. Note that using width/whorl count ratios for more juvenile specimens gives misleading results because the rate of increase is not linear. Specimens near the lower end of the *T. quaestiosa* range on this figure are typically unusually high-spired specimens with close to 5.0 whorls, at least half a whorl more than nearby *T. ruga*. However, some overlap in shell size ranges occurs. Very small *T. quaestiosa* at some sites in the extreme south of the species' range can be distinguished from *T. ruga* by the different shell colour pattern (reddish above and yellow below, whereas *T. ruga* rarely if ever displays colour differences between dorsal and ventral surfaces) and by the paler and more colourful animal. A single gigantic *T. ruga* from Chimney Pot Hill in the foothills of Mt Wellington (5224) is 13.0 mm wide at 4.8 whorls, but this is not consistent with other *ruga* from nearby areas. Finally Petterd (1879) claimed that *ruga* from near Launceston are "fully as large as [*T. quaestiosa* as described by Cox]" but what specimens are available from the Launceston area do not support this.

There is considerable variation in spire height, gross shell size, and animal colour in observed *T. quaestiosa,* and this merits further investigation.

<u>Identification:</u> The type locality is Oatlands but there is no suitable habitat left in the Oatlands district, nor any sign that such habitat once existed. It is therefore likely that this record was not actually at Oatlands and could have been anywhere within a substantial distance of it. It is so difficult to even guess where this might have been that that this record has been discarded.

<u>Distribution map:</u>



<u>Discussion:</u> As noted above, this species replaces the ecologically and morphologically similar *T. sinclairi* on the east coast, with the exception of Maria Island where *T. sinclairi* occurs and *T. quaestiosa* has not yet been recorded. However, *T. quaestiosa* is not found in the inland north-east forests, its distribution appearing to extend only as far north as the St Marys area (6039 grid square). Within its known range it is reasonably well recorded, with 20 grid square species records, or 6.3% of records for this area, but it is impossible to determine how far west that range extends on the available data. A record at St Pauls Dome (grid square 5637), suggests it extends at least to the western edge of the Eastern Tiers. The eastern and central midlands are both under-surveyed and generally lacking in good-condition wet forest habitats suitable to this species. In theory, it could extend across most of the midlands

up to 50km further westward of where it has been recorded, but there is no evidence to support this. There is also therefore not enough evidence to determine if *T. sinclairi* and *T. quaestiosa* have a lengthy parapatric boundary, or a localised one with a gap covering much of the midlands.

The range of this species is not considered to fit any defined distributional pattern, however there are very close similarities with other Eastern Tiers species such as *Pernagera* sp. "Paradise" and *Allocharopa* sp. "Douglas".

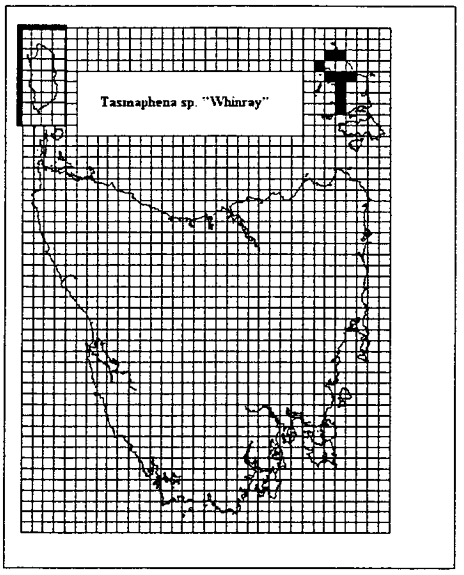
Tasmaphena sp. "Whinray" (Plate 3c-d)

Taxonomy: **Brief diagnosis:** Small rhytidid, adults of 3.3-3.7 whorls 6-7.5 mm wide, dull yellow, adult sculpture of bold blunt radial ribs similar to *Tasmaphena ruga*, but protoconch differing in displaying radial ribbing prominently around the apex compared to *T. ruga* where typically smooth (compare Plates 2h and 3d), umbilicus medium (D/U c.5), in other shell-feature respects similar to *T. ruga*. Animal pale orange-yellow, unlike *T. ruga* animal which is black to dark grey, fading to pale grey on the foot.

This was mistaken for a form of *T. ruga* by Petterd (1879), who commented: "The examples from Flinders Island, Bass Strait, are small, not quite so high as the typical, and of a pale greenish-yellow colour throughout." Petterd failed to notice the difference in protoconch sculpture, which is consistent on all available specimens of both species. This difference alone is definitely significant at species level and, in the author's view, at genus level as well.

Identification: No issues identified.

Distribution map:



Discussion: This species is recorded from the Furneaux Group, where it is common in dry forest and coastal scrub on Flinders Island, and from similar situations on Deal Island in Bass Strait. It has never been recorded on either the Tasmanian or Victorian mainlands. This species is therefore considered to be an island endemic.

Austrorhytida sp. "Raffertys" (Plate 3e-f)

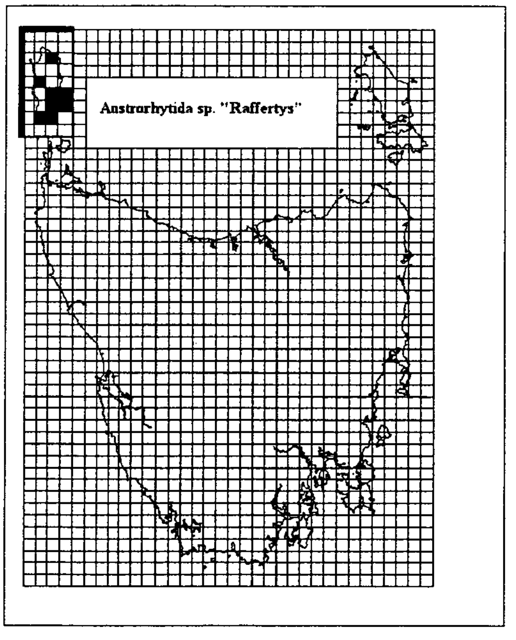
Taxonomy: **Brief diagnosis:** (shell measurements based on four specimens) Rhytidid shell, c. 11 mm wide at 4.2-4.5 whorls, resembling *Tasmaphena ruga* but with lower and more irregular ribbing, shell shape similar except tending more towards subglobose because of to clearly elevated spire and deeper body whorl, almost keeled, shell height c. 7mm compared to *T. ruga* (4.5-6 mm), shell colour similar to *T. ruga* but bands (where present) much narrower, animal thin and long-necked, brightly coloured (mostly grey) with bright yellow stripe down back of head; animal closely resembling *T. lamproides* in these respects. Protoconch similar to *Tasmaphena* but radial sculpture clearly evident after around 1.7 whorls, slightly earlier than in *T. ruga* (see Plate 3f).

This was mistaken for a form of *T. ruga* by Johnston (1888) who noted *T. ruga,* without comment, as being present on King Island. As the comments about the animal show, this species is likely to be more closely related to *T. lamproides* and it is probable that Johnston based his identification on the shell only.

Identification: No issues identified.

Discussion: This species is common and widespread on King Island but has never been recorded on either the Tasmanian or Victorian mainland. This species is therefore considered to be an island endemic. It is obviously closely related to *Tasmaphena lamproides* and its much smaller size may represent an adaptation to King Island's comparative lack of large prey snails, depending upon its diet.

Distribution map:



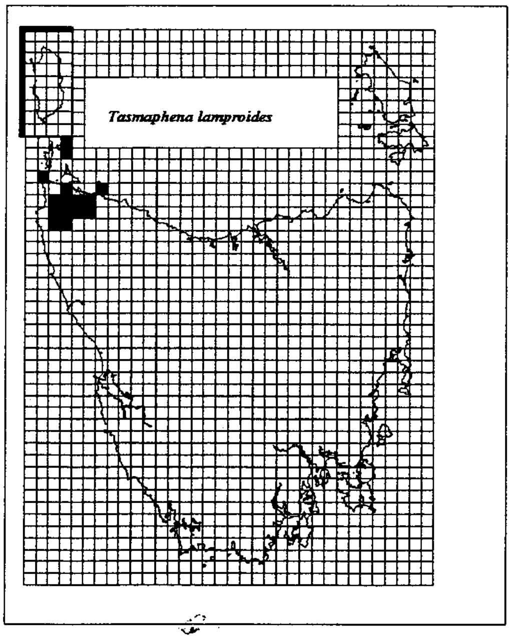
Tasmaphena lamproides (Cox, 1868) (Plate 3g-h)

Taxonomy: No species-level issues identified. The current generic placement of this species is clearly incorrect, the appearance of the animal (as for *Austrorhytida* sp.

"Raffertys") in particular suggesting that it is an *Austrorhytida* or at least closer to that genus than to *Tasmaphena*. There is substantial variation in shell size in this species but this is broadly correlated with the presence of prey species in different size ranges at any given locality, populations of small specimens occurring at localities where *Stenacapha ducani* is absent. The most extreme case is the Nut, Stanley (3548), where a population reaching c.12 mm at c. 4.0 whorls (compare c. 20 mm at c. 5.1 whorls elsewhere) occurs; at this site, no other native land snail exceeding 6mm is recorded. Small forms (c.17 mm at c. 4.6 whorls) of *T. lamproides* are also known from Woolnorth (3049) and Three Hummock Island (3251) where some or all of *Stenacapha* sp. "Hunter", *Helicarion cuvieri* and *Thryasona diemenensis* are present but *S. ducani* is not.

Identification: A record from Table Cape by Legrand (1871) and not substantiated by any later source has been rejected (see Bonham and Taylor, 1997).

Distribution map:



Discussion: This species is recorded from Wilsons Promontory and some other locations in far southern Victoria (Australian Museum collections, S.A. Clark (pers comm.)). It is not confirmed whether the Victorian specimens represent the same species or not but they are conchologically identical apart from some Victorian specimens being slightly larger. In Tasmania the species occurs solely in the far north-west corner, with 15 10x10 km grid square records. It is fairly common in a range of predominantly wet forests but occurs most reliably in areas with well-developed leaf litter and good soil quality. The distribution of this species has been very closely studied because of its presence on Tasmania's Threatened Species List:

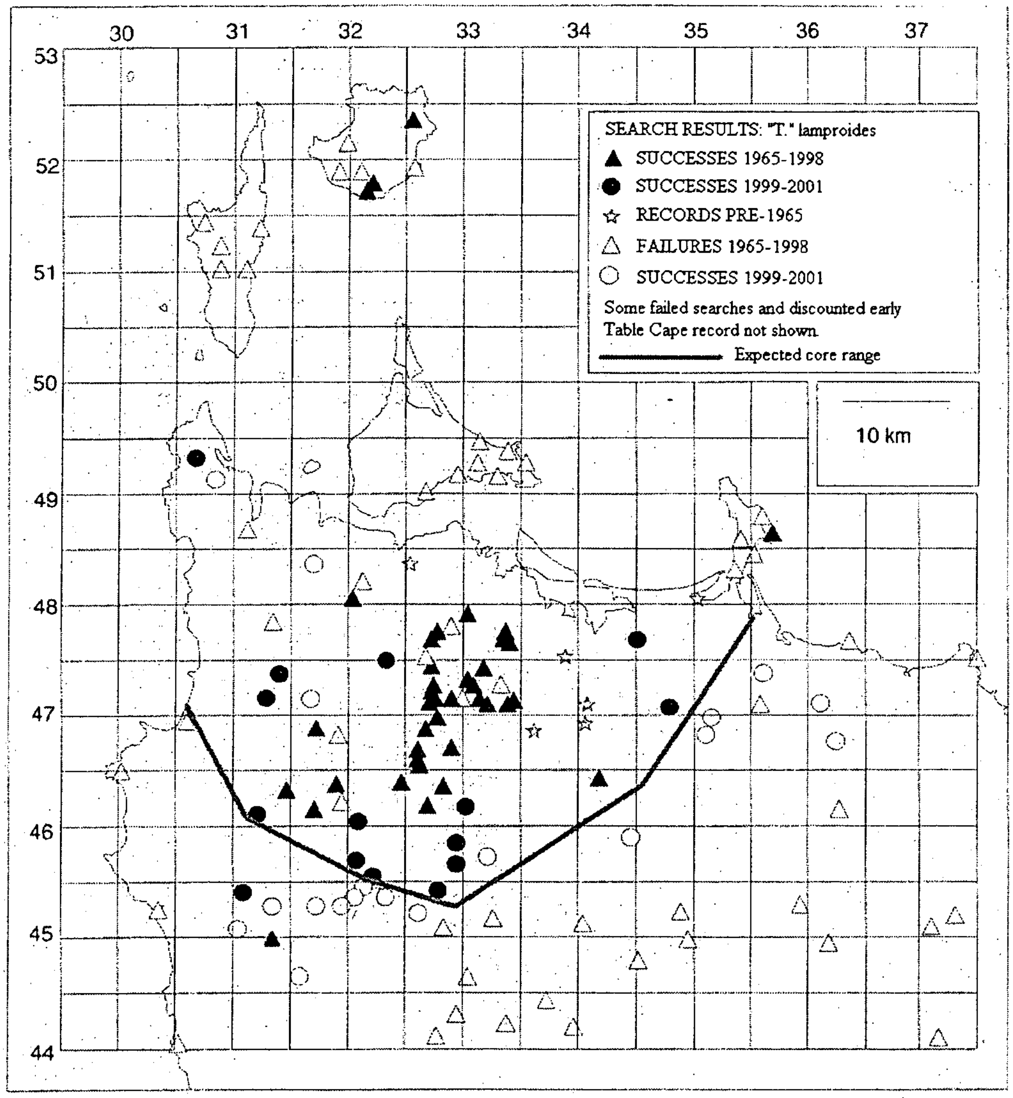


Fig 4.1 Search results for Tasmaphena lamproides in north-west Tasmania (adapted from Bonham 1999b). (N.B. Records are divided into three time phases because records pre-1965 lack precise geographic data, while 1999 marks the start of range focussed surveying aimed at systematically determining the species' exact Tasmanian range.)

These studies (see Fig 4.1) have shown that this species displays some abrupt breaks between areas where it has been quite reliably recorded and areas of numerous failed searches. However, there are some populations outside the species' main range (two of the records are not separated from the main body of the population by large areas of clearly unsuitable habitat or by areas where searches have persistently failed.) The southern and south-eastern boundary sections lie largely along the slopes of ridges that are higher (200+ metres) than ridges present in the rest of the snail's mainland Tasmanian range (on Three Hummock Island, further north, it occurs at 210 metres). It is possible that these ridges are too cold for the species. The eastern boundary separates areas of fertile basaltic soil from areas in which either soil quality is lower or habitat has been mostly cleared. Substrate is potentially important to this species as it preys both upon other snails and worms. A corellation between prey species and the abundance of *T. lamproides* was demonstrated by Bonham and Taylor (1997) but at some sites, such as Woolnorth Point on the far north-west tip of the Tasmanian mainland, its frequency is far greater than expected based on that corellation. The Woolnorth Point area was noted by early settlers for rich soils with an abundance of worms (Mesibov, pers. comm.)

The distribution of *T. lamproides* corresponds extremely strongly with a gap in the distribution of the widespread western Tasmanian millipede *Reginaterreuma tarkinensis* (Shear and Mesibov, 1995), as shown in Fig 6.2. There is no direct or plausible indirect ecological relationship between these two species that would cause them to avoid each other. There is no known reason why the snail should not be present just east of the eastern range boundary, but surveying of this area during this project revealed no *T. lamproides*. Instead, the idea that this may be another faunal break was further strengthened by finds of *Reginaterreuma* in this region. However, unlike several other invertebrate boundaries in Tasmania, this break is so far supported by only these two species, and evidence for it (rather than alternative explanations such as coincidence) is not yet strong enough.

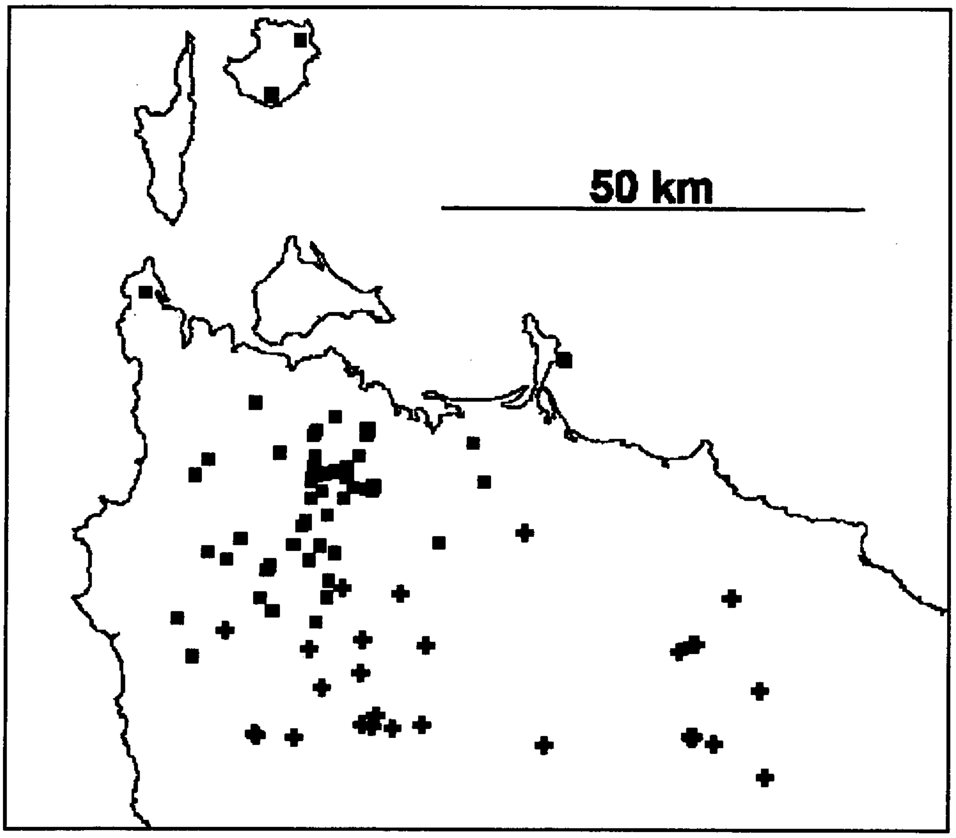


Fig 4.2 Distributions of Tasmaphena lamproides (squares) and the millipede Reginaterreuma tarkinensis (plus signs) in far northwest Tasmania. Map supplied by Dr. R. Mesibov, some T. lamproides records added.

An explanation for the distribution of *T. lamproides* in Tasmania is therefore still not established. Despite this, the species falls into the category of a "toehold" species. The presence of a probably closely related species, *Austrorhytida* sp. "Raffertys", on King Island, further strengthens the case that this species (or its ancestors) once occurred across the Bassian Plain.

Prolesophanta nelsonensis (Brazier, 1871)(Plate 4 a-b)

Taxonomy: Historically, small smooth-shelled Tasmanian rhytidids have been divided into two species, *P. dyeri* for specimens with a closed umbilicus and *P. nelsonensis* for those with an open umbilicus. This is despite a large amount of noted variation in the open-umbilicus forms and virtually none in the closed forms. Petterd (1879) referred to a "variety a.- striated with red or chestnut" of *P. nelsonensis* and a "variety b. - Shell exactly double the dimensions of typical". Petterd gave a shell width of 0.15 inches (3.8 mm) so his "exactly double" remark does not make sense unless this is intended as an average width for the "species" as a whole; a specimen double or half this size would lie outside the recorded size limits for adult specimens of open-umbilicus *Prolesophanta* (2.3-5.7 mm). Petterd commented that southern specimens are generally smaller than those in the area of Launceston (5041), and said that colour-rayed forms are "often met with".

The open-umbilicus *Prolesophanta* can be divided into five groups (four of them probably forming a parapatric mosaic) and are here treated as likely to be five distinct species. The smooth sculpture of *Prolesophanta* (irregular radial ridges sometimes occur but there is sometimes variation in this trait between otherwise similar specimens at the same site) does not allow for easy separation of species on shell characters, and the differences are minor. These differences are very geographically consistent and have therefore been viewed as likely evidence of distinction at species level, but these species are regarded as tentative and pending anatomical confirmation.

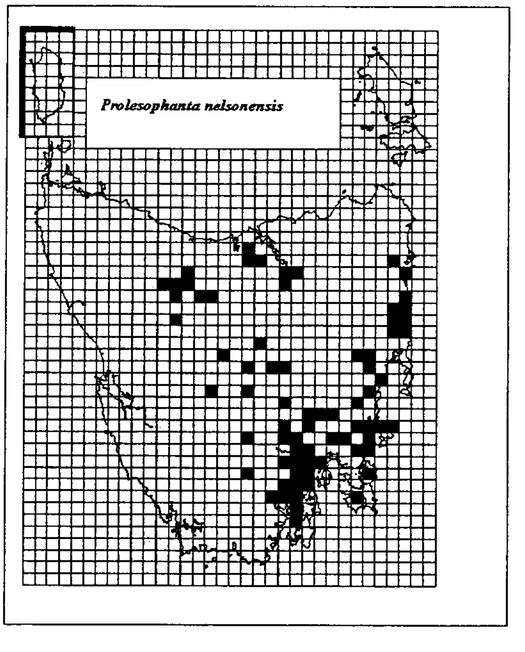
Prolesophanta nelsonensis is therefore reinterpreted to include those *Prolesophanta* that have an open umbilicus, and that do not have red or brown colour rays, and that are adult typically at 3.0-3.6 whorls with a width typically of 2.3-3.8 mm, the width increasing linearly in proportion to the number of whorls. The parameters of 90 measured specimens from 42 localities all satisfied the following equation:

$-0.7 < (\text{width (mm)} - \text{whorls}) < 0.4$

with the exception of one outlier from Ninepins Point (5120) which was 4.05 mm wide at 3.45 whorls. For the relevance of this equation compare *P.* sp. "Strzelecki" below.

Identification: Records from the extremity of this species' range, frequently refer to one of *P.* "Strzelecki", *P.* sp. "Francistown", and *P.* sp. "Togari", and have therefore been excluded. Only records from the verified range of the species have been accepted. A record of a striped form from Port Davey (Petterd, 1879) has been removed as colour stripes do not occur on true *P. nelsonensis* and it is impossible to tell without a specimen whether this was *P.* sp. "Marriotts", *P.* sp. "Francistown" or something else.

Distribution map:



Discussion: (This discussion also includes the next three species) The four species *P. nelsonensis, P.* sp. "Togari", *P.* sp. "Francistown" *and P.* sp. "Strzeleecki" are all apparently endemic, with 72, 10, 6 and 28 grid square records in the main database respectively. They appear to form a parapatric mosaic covering most or all of the eotlian half of the state, including the interzone. The known ranges of the species that appear to form the mosaic are shown in Fig 4.3. There are some gaps that have not yet been filled in this mosaic. The largest of these occurs in the northern midlands where there is a gap measuring about 80x50 km between the ranges of *P. nelsonensis* and *P.* "Strzelecki", two species which in other places occur very close to each other. This is an extremely poorly sampled area with only 30 grid-square species records for all species in the project, so this gap is not meaningful, especially as there are few areas of habitat suitable for *Prolesophanta* left in the area. The small gaps between the ranges of *P. nelsonensis* and both *P.* "Togari" and *P.* "Francistown" are also meaningless as the latter two are naturally scarce species responsible for only 2.1% and 3.0% of grid-square records in their well-surveyed ranges respectively.

The closest known convergence between two species in the mosaic is near St Helens on the north-east coast where *P. nelsonensis* occurs at Ericksons Road (grid square 5942) and *P.* "Strzelecki" occurs at Rayners Hill (grid square 5842), a gap of 6.5km. With more surveying it is likely this could be reduced still further.

Within its range *P. nelsonensis* is most reliably recorded in wet eucalypt forests and is also reasonably successful in dry sclerophyll (author's data). It is much rarer in rainforests and mixed forests. Such forests predominate to the south and west of the range of *P. nelsonensis* and this may be a factor in its replacement by *P.* sp. "Francistown" and *P.* sp. "Togari", the scarcity and small size of which may be due to the relative sparseness of small snails in such forests. *Prolesophanta* feed mainly on punctids and very small charopids up to their own shell size (author's data). However, there is no essential difference between the habitat types present in the range of *P.* sp. "Strzelecki" and those present in that of *P. nelsonensis.* There is, however, a massive difference in the range of smaller prey available. Within the range of *P. nelsonensis* the prevailing prey species present in the same environment as that species are mostly punctids (*Paralaoma* spp, *Laomavix collisi, Trocholaoma parvissima*) and small charopids such as *Allocharopa* spp. and *Planilaoma luckmanii.* Only *Elsothera ricei* and *Pernagera* spp. are in a slightly larger size bracket, so most of the prey is below 3mm shell width. In the north-east, however, all the punctids are scarce (except as coastal species) and smaller charopids like *Allocharopa* and *Planilaoma* are either localised or scarce in the area. The prevailing prey items therefore are the two *Elsothera* spp., *Dentherona subrugosa* and *Pernagera* spp. Such prey size differences may be relevant in determining the present-day location of the boundary between *P. nelsonensis* and *P.* sp. "Strzelecki" but direct assessment of this is needed.

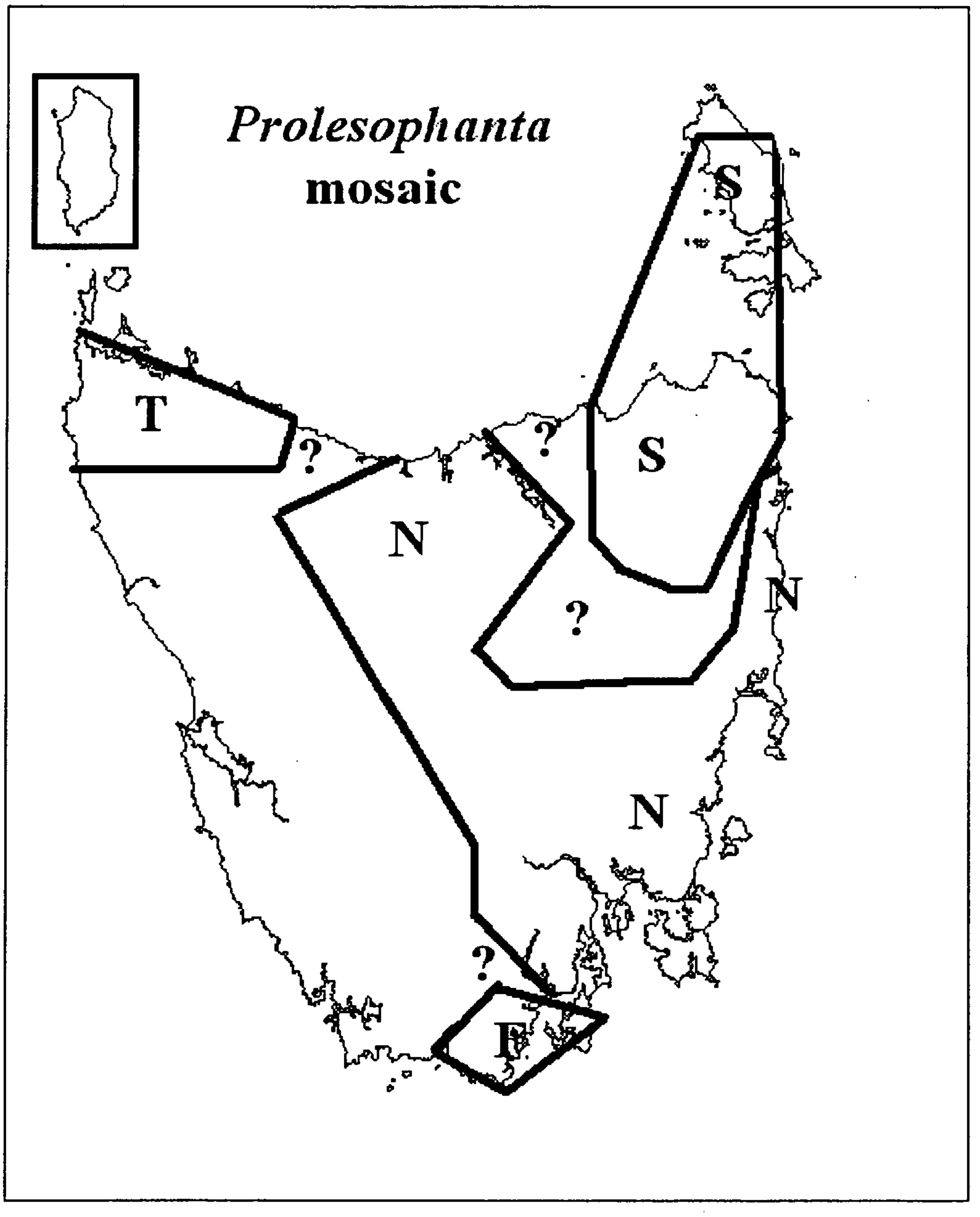


Fig 4.3 Prolesophanta mosaic in Tasmania showing verified ranges of species. Key to species: N= P. nelsonensis, F=P. sp. "Francistown", S= P. sp. "Strzelecki", T= P. sp. "Togari". ? = area expected to be possibly covered by mosaic but no records of species involved yet.

Prolesophanta sp. "Strzelecki" (Plate 4 g-h)

Taxonomy: **Brief diagnosis:** Medium-small rhytidid, adults 3.7-5.7 mm wide at 3.3-3.8 whorls. No reliable shell-feature difference except generally very much larger (mean c.40%) for a given number of whorls than *P. nelsonensis*. The parameters of 41 measured adult specimens from 14 localities generally fell within the following range:

$0.5 < (\text{width(mm)} - \text{whorls}) < 1.4$

but there were four larger and one smaller outliers. The largest specimen recorded, from Mathinna Falls, was 5.7 mm wide at 3.55 whorls. The smaller outlier was a specimen from Old Chum Dam, 3.7 mm wide at 3.5 whorls, but all other specimens from this locality (at which by far the most specimens of this species have been collected) were within the size range above. There is therefore only a very rare overlap in recorded adult shell dimensions between *P. nelsonensis* and this species.

The issue of prey size and shell size in *Prolesophanta* requires a lengthy discussion at this point. Numerous field observations of various *Prolesophanta* spp. feeding (author's data) show that species in this genus frequently kill and eat other snails up to their own size, but not significantly larger. Given the small (<3 mm) snail species are not common within the range of *P.* sp. "Strzelecki", it could be assumed that this is simply a form of *P. nelsonensis* which has evolved to a larger size in order to overpower larger prey. It might also be assumed that there is some other habitat-based reason for the size difference, as a wide range of habitat factors can influence snail shell size (Goodfriend, 1986). However the size difference in this case takes the form of a sharp increase in average shell size over a small distance (at most 6.5 km in one case) and without any obvious habitat-based reason. Within the range of each species there is no apparent relationship between geography and shell size (author's data), nor is there any suggestion that rapid large changes in average shell size at a given site can occur in response to different prey size profiles.

Indeed, where there is a lack of available prey, *P. nelsonensis* typically responds by becoming scarcer or absent rather than increasing shell size. Data from localities where the author has found 20 or more snail specimens (of whatever species) within the range of *P. nelsonensis* were classified into those where the prey profile was considered likely to be "supportive" of *P. nelsonensis* (at least 10% of specimens recorded were of species with maximum sizes smaller than 3.5 mm) and those where the prey profile was not "supportive" in this way. *P. nelsonensis* was recorded at 61 of 86 sites considered "supportive" but only recorded at 11 of 31 sites considered "not supportive" (significant, P=0.0013, Fischer's exact test, two-tailed). Only at Ninepins Point (5120) where the available prey consists almost entirely of *Magilaoma penolensis* and *Pernagera officeri*, was there a case of unusually large *P. nelsonensis* in an area with larger prey.

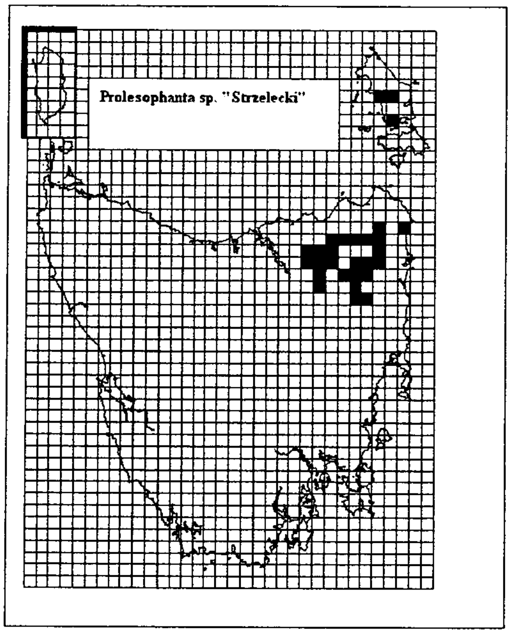
With all these factors taken into account, it is difficult to account for the difference in sizes between *P. nelsonensis* and *P.* "Strzelecki" without assuming them to be distinct. Differences in the appearance of the animal (eg entirely orange/yellow animals are fairly common in *P.* "Strzelecki" whereas *P. nelsonensis* is invariably pale yellow-white and green) further suggest that anatomical work on these forms would be likely to find conclusive evidence that *P.* "Strzelecki" is a distinct species.

Iredale (1938) also believed that the much larger north-eastern specimens were distinctive and described them under the name *Tasmadelos nelsonensis abitens*. Iredale made Launceston the type locality of this subspecies, but Launceston specimens are actually within the *P. nelsonensis* size range and are only larger than most *P. nelsonensis* because they have slightly more whorls. Hence Iredale's putative subspecies actually includes both some *P. nelsonensis* and all *P.* sp. "Strzelecki".

Identification: No issues identified.

Discussion: See *P. nelsonensis.*

Distribution map:



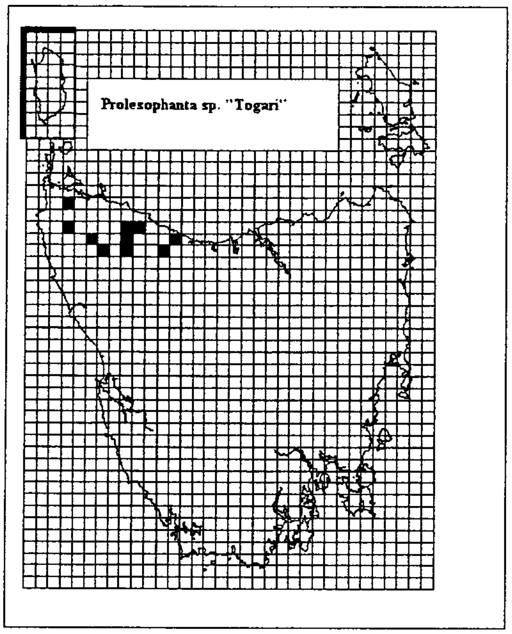
Prolesophanta sp. "Togari" (Plate 4 c-d)

Taxonomy: **Brief diagnosis:** Very small rhytidid, very shiny, smoothly with some irregular radial corrugations but these typically very low, adults 2.3-2.8mm wide at 3.3-3.8 whorls, similar to *P. nelsonensis* but paler yellow to translucent with irregularly spaced thin pale red-brown rays (typically around 7-10 rays on body whorl but occasionally more, as in Plate 4c). Very flat-spired and spire more tightly coiled (hence body whorl typically more rounded) than other open-umbilicus *Prolesophanta,* sutures very prominently covered by next whorl.

This species is distinguished from *P. nelsonensis* by being slightly smaller for a given number of whorls, by the colour rays, and most significantly by the tightly coiled spire which gives the sutures an appearance as if sealed with translucent glue; this is sometimes seen in other open-umbilicus *Prolesophanta* but is prominent on all specimens of this species seen.

Identification: No issues identified.

Distribution map:



Discussion: See *P. nelsonensis.*

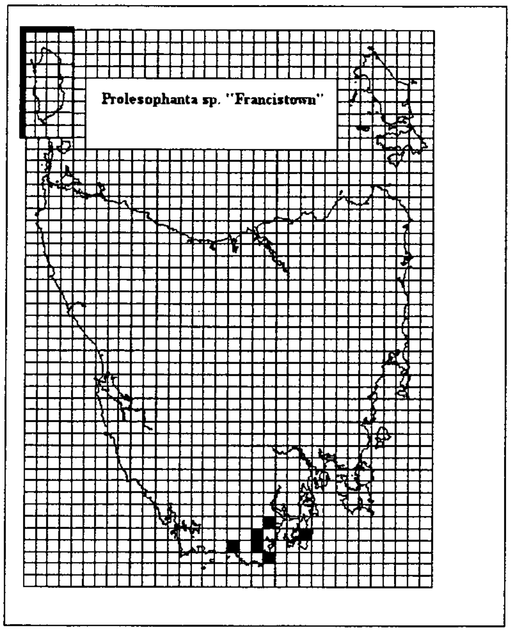
Prolesophanta sp. "Francistown" (Plate 4 e-f)

Taxonomy: **Brief diagnosis:** Very small rhytidid, adults 2.7-3.5 mm wide at 2.9-3.5 whorls, very similar to *P. nelsonensis* but prominently rayed with numerous thin dark orange-red rays, and prominently corrugated, with the radial corrugations often regular in appearance on at least the last half-whorl.

This species falls in the same size range as *P. nelsonensis* and is very tentatively considered distinct based on only geography, shell colour and a sculptural feature (strength of corrugation) that varies in *P. nelsonensis*. Caution is required especially as the last two factors could be influenced by climate and habitat factors dictated by the first. However the differences between this presumed species and nearby *P. nelsonensis* are very reliable with no known intergrades. More study of the two forms in the Geeveston-Dover area is required as the gap between records is currently 17km.

Identification: No issues identified.

Distribution map:



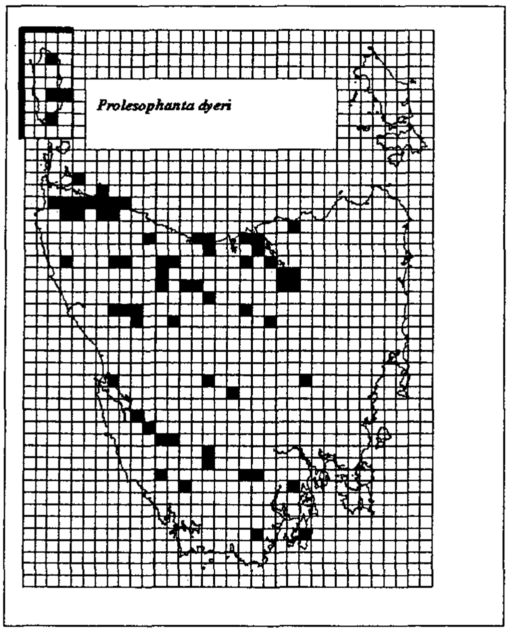
Discussion: See *P. nelsonensis.*

Prolesophanta dyeri (Petterd, 1879) (Plate 5a-b)

Taxonomy: Specimens from Blackman River near Tunbridge (5232), the most isolated confirmed record of this species, are slightly larger and more corrugated than specimens elsewhere but this is not treated as significant because of the gap between records (nearest record to this single record is 60 km away), the potential for undocumented variation over such a large distance and the small number of Blackman River specimens (two).

Identification: Although this species is distinctive, museum specimens attributed to this species are nearly always something else, and include specimens that are several times too large to be it (*Victaphanta lampra* from near Campbell Town) as well as clearly umbilicated *Prolesophanta* such as *P.* "Marriotts". Records from the north-east and Douglas-Apsley have been transferred to *P. nelsonensis* or *P.* "Strzelecki" as there is no specimen evidence to support the presence of this species in these areas.

Distribution map:



Discussion: This species occurs in southern Victoria (Smith and Kershaw 1979), although very similar forms (here assumed not to be the same species) have been found as far north as the Blue Mountains near Sydney, NSW (Shea 1983). Within Tasmania it is widely recorded with 65 grid-square records despite being very scarce. Typically only a few specimens are found at any site, and in the author's records it accounts for an average of only 4.6% of the total number of snail specimens found at sites at which it is present, one of the lowest averages for any species with more than 10 records.

This snail is ecologically unique in the Tasmanian fauna. Although it is carnivorous and is sometimes found eating very small snails like *Paralaoma halli* and *P. mucoides*, it is also a scavenger that can feed on the decaying remains of much larger snails that have died. This often results in specimens of *P. dyeri* being found inside shells of larger snails some time after the latter were collected. Species on which scavenging has been observed include *Stenacapha ducani, Victaphanta lampra* and *Flammulops* cf. *excelsior*. This should be distinguished from the commoner phenomenon of small snails using large snails for shelter alone and from snails rasping calcium from the shells of other snails – in this case the snail actually eats rotting snail flesh.

The distribution of *P. dyeri* in Tasmania is difficult to determine because of the frequency of misidentification of other species as this species and the natural scarcity of the species. The records shown represent a likely minimum range for the species as a number of unsupported records have been removed. It is possible that the species occurs statewide but there are no firm records from the area east of the 52E grid line to support this.

This snail is normally found in very wet forests including rainforests, wet eucalypt and mixed forests. It can, however, sometimes be found in slightly less wet situations such as well-developed teatree scrub on sand dunes on King Island, and open wet scrub at Quamby Bluff (grid square 4738). There is no shortage of wet forest habitat in the eastern part of the state from which there are no reliable records of this species. Furthermore, the "insufficient small prey" explanation used to account for the absence of *P. nelsonensis* from the north-east does not apply to the whole of eastern Tasmania, and is not sufficient for a species capable of scavenging as well as eating live prey. However, it is possible that the species would itself become prey for *Prolesophanta* sp. "Strzelecki" if they occurred together.

Another possible explanation for the apparent absence of *P. dyeri* from the east coast is the generally low rainfall in the area, but this does not explain the isolated record at Blackman River (5232), which is well within the low-rainfall zone.

Assuming that the species really is absent from the east of the state, it displays a pattern not clearly similar to any other species.

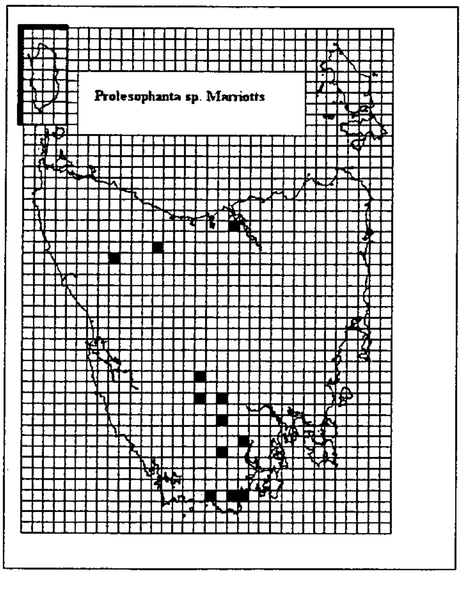
Prolesophanta sp. "Marriotts" (Plate 5c-d)

Taxonomy: **Brief diagnosis:** Medium-small rhytidid, adults 3.9-5.3 mm at 3.2-3.6 whorls, differing from all other open-umbilicus *Prolesophanta* in having a far more inflated body whorl, so that the aperture is in the plane of the shell despite being relatively rounded, shell yellow-horn usually with irregularly spaced and often indistinct pale red flares, calcareous matter reduced and fragile such that in poor-condition dead shells, a thin layer of translucent-yellow chitinous material often stretches across holes in the calcareous shell. Umbilicus generally steeper and slightly narrower (D/U c. 6.5-8) than *P. nelsonensis* (D/U typically c. 4-5).

The inflated body whorl, colour flares and size make this an easily recognisable species and a very consistent one despite its scarcity. Some care needs to be taken with *P.* sp. "Francistown", with which it co-exists and which is also flared, but the size of the shell and the lack of strong corrugations (corrugations are usually present in *P.* sp. "Marriotts", but weakly and irregularly) enable the species to be differentiated.

Identification: No issues raised.

Distribution map:



Discussion: This endemic species displays one of the strangest patterns of all species examined in this project. Records are extremely rare, yet are scattered through about half of the state. Considering the minimum convex polygon of the known records as the species' range, the snail is responsible for an extremely low 1.3% of all grid square records and is recorded from only 7.4% of grid squares within its range – both among the lowest figures for any species in this study. (Its known range is reasonably surveyed with a mean 5.4 species records per square).

There is an apparent concentration of this species within the tall eucalypt forest belt of the Florentine and Southern Forests in central southern Tasmania, with 9 of the 12 grid-square records being in this area. This is, however, one of the best surveyed parts of the species' range, including 42% of all grid square species records within the species' known range.

Information is insufficient to determine the exact range of this scarce species. It may occur more or less statewide or may be more restricted. The sparseness of records would be consistent with a species confined to several disjunct remnants of a wider range. It is also possible that it represents a complex of scarce species. More material from the north of the state in particular is needed to examine this possibility.

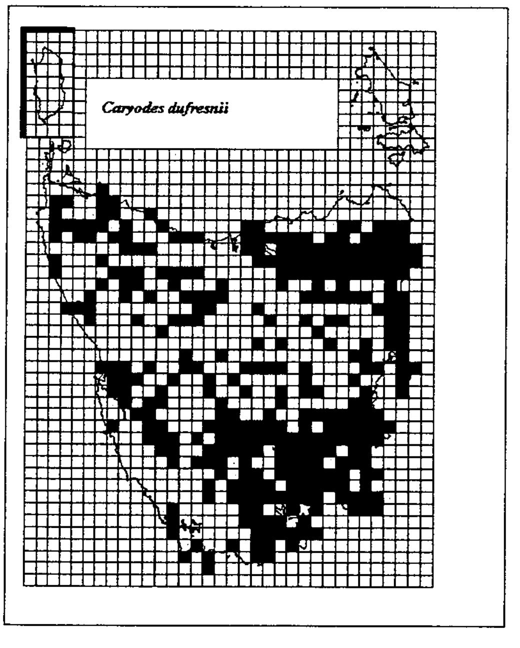
Family Caryodidae

Caryodes dufresnii (Leach, 1815) (Plate 5e-g)

Taxonomy: This species is extremely variable, with adult sizes for given populations varying from 20 mm to over 50 mm shell height, and variation also in the extent of corrugation, in shell colour and patterning, and in minor anatomical factors as documented by Kershaw (1989). Shell variation is largely habitat-based whereas Kershaw found anatomical variation to be influenced by geography independent of habitat. Wetter areas generally support larger forms, and cases of small forms in wet areas usually coincide with low-calcium substrates or limited forest cover (author's data). Corrugated forms, which are usually smaller, are almost invariably found in drier conditions than smooth forms. The habitat basis for colour variation between dry forest forms from different locations (eg compare Plates 5g and 5h) is not known, and without more dry-forest material from northern and central Tasmania it would be premature to draw further conclusions from this. The level of observed morphological variation is so high that genetic studies to check for cryptic or morphologically similar taxa within *C. dufresnii* would be highly desirable; here it is treated simply as one widespread and variable species.

Identification: Although this is an obviously distinctive species, an early record by RM Johnston in his table in Petterd (1879) from "Bass Strait Islands" is unsubstantiated and unconfirmed and regarded as a printing error. In any case, with the species unrecorded from any of several searched islands in Bass Strait, it would be impossible to know which island the record came from.

Distribution map:



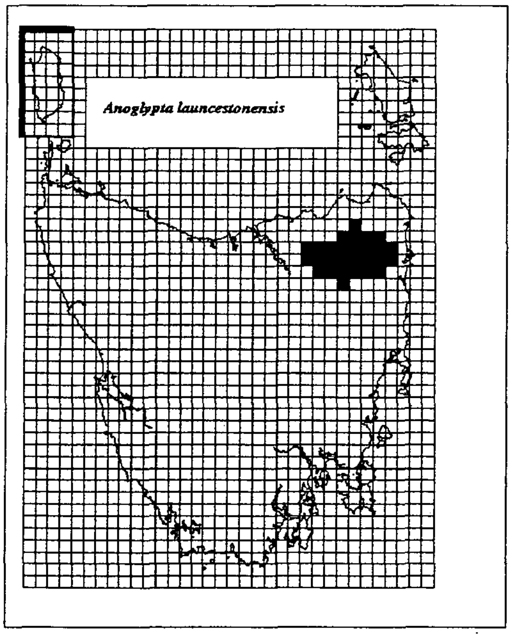
Discussion: This is the most frequently recorded snail in the state (assuming that it really does represent a single species) with 340 grid square records. It is endemic, but present more or less statewide in suitable habitat. The only absences of this species likely to be real are from the various Bass Strait islands including the Hunter Group. Despite the species' absence from the Hunter Group (where habitat appears suitable) it is recorded from many sizeable islands on the east and south coasts of the state, including Maria, Schouten, Tasman, Bruny and de Witt Islands. This makes its absence from Robbins Island, the closest of the Hunter Group islands to shore, more perplexing. Dry forest *C. dufresnii* forms, as found widely in the drier regions of the eastern half of the state, are absent from the north-west, where *C. dufresnii* is exclusively a wet forest snail (and a scarce one at that, compared to elsewhere in its range). It may be that there is simply not enough sufficiently wet forest in the Hunter Group for *C. dufresnii* to have maintained a viable population there.

Anoglypta launcestonensis (Reeve, 1853) (Plate 6a-g)

Taxonomy: No issues identified. Plate 6 shows the typical form of the species with three of the four localised forms that occur clustered near the eastern end of the species' range, where the species is believed to have been confined to a glacial refuge, as discussed by Bonham (1996b).

Identification: No issues identified.

Distribution map:



Discussion: This endemic species is one of the most thoroughly studied in Tasmanian snail biogeography. This species is found exclusively in the inland north-east of the state, where it has been recorded from 28 contiguous grid squares. It not only exactly matches the biogeographical feature known as Plomley's Island (Mesibov, 1996a) but is also the only known invertebrate to be distributed throughout Plomley's Island but nowhere else. The distribution very closely matches the distribution of rainforest trees *Atherosperma moschatum* (sassafras) and *Nothofagus cunninghamii* (myrtle) in inland north-east Tasmania, except for some small outlying rainforest patches where *A. launcestonensis* seems to be absent (Bonham, 1996a). Indeed, approximately 98% of all records of this species that can be attributed to specific habitat types, are from rainforests or mixed forests with mature rainforest trees. There is a centre of various different types of shell-morphological and colour variation in the species around the Blue Tier area (grid square 5844) which is unrelated to known habitat factors (Bonham, 1996b) but coincides with local distributions of several other invertebrate species (Mesibov, pers. comm.) and with the modelled location of a rainforest refuge during the last interglacial (Kirkpatrick and Fowler, 1998), the only one within the species' present range. Kirkpatrick and Fowler suggest that the Blue Tier refuge "was almost certainly the source for recolonization of the north-eastern highlands" by rainforest (p.178). *A. launcestonensis* is therefore overwhelmingly likely to be a species that was restricted to a single small glacial refuge by its habitat requirements (assuming they were the same then as now), and expanded outwards from there to fill all the habitat available to it, either as that habitat expanded or later, some variety-level lineages of *A. launcestonensis* spreading while others remained localised or developed later. *A. launcestonensis* qualifies for local endemic status for the purposes of this work as its range is approximately 70x45 km, but unlike most of the local endemics in this work, its distribution seems very easy to explain. What is less easy to explain is why this snail became restricted to a single refuge, when it has a demonstrated ability to expand through suitable habitat, and when there was at least one other modelled rainforest refuge in the north-east as well.

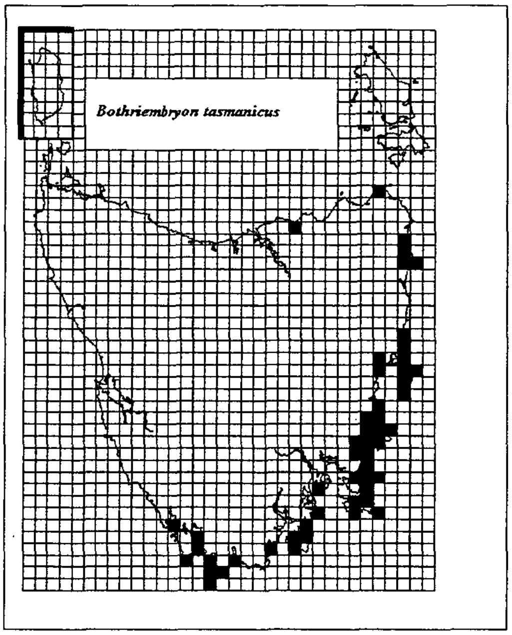
Family Bulimulidae

Bothriembryon tasmanicus (Pfeiffer, 1853) (Plate 6h)

Taxonomy: No issues identified. There is some variation in shell size and shell and animal colour but there are no obvious determinants of this.

Identification: This is a very distinctive species. There are a small number of records from well outside the species' main range, as documented by Kershaw (1985). These include records from Macquarie Harbour, Port Davey, Pipers River, Blue Tier and Forth River. It is possible that records from the former convict settlement at Macquarie Harbour arose from the transportation of wood and other building materials. As this record is both unrepeated since and possibly an introduction, it has not been included, but further searches should be conducted in this area. The isolated Forth River record has been excluded for the same reasons although the case for it being a potential translocation is weaker. The Blue Tier record is excluded here, as in Kershaw (1985), because it is unconfirmed and from an area of unsuitable habitat. However the Pipers River record is here accepted as it is only around 60km from a recent substantiated record, it is substantiated with specimens, and the locality data supplied by the recorder, T.M. Stephens, has never been found questionable in other cases. The early Port Davey records are also accepted as there have since been two sight records of the species at different sites in the area, one substantiated with an accurate colour drawing by the recorder, Janet Fenton.

Distribution map:



Discussion: This endemic species is one of the most perplexing. Its range includes most of the eastern and southern coasts of the state, although there are possible gaps, particularly around low-energy coasts. Within its range the species is well-recorded with 50 grid square records, and often extremely abundant. At sites where it is found, it accounts for an average of around 40% of all snail specimens recorded from each site, one of the highest figures for any species. It also has a very wide habitat tolerance, being found in sand dunes, dry woodland, dry eucalypt forest and wetter forest types through to pure rainforest on Mt Mangana (Bruny Island, grid square 5219). It is also apparently unlimited by altitude within its range, being found from just above the high-water mark to the tops of several 600-700 m peaks, and is unaffected by variation in substrate. It occupies a wide range of microhabitats, being commonly found arboreally in a range of trees (especially eucalypts) but also living under rocks in areas where there are no trees to climb on. Furthermore, it is quite disturbance-tolerant, most notably at Darlington, Maria Island (grid square 5828), where it occurs abundantly in old exotic pine trees growing within the former convict settlement – a highly modified landscape.

Despite all these indications of hardiness and environmental tolerance, the snail is found only within a limited distance of the sea. Nearly all records are within 3 km of the coastline and the furthest inland the species has been reliably recorded is 6 km inland, at Sandspit River (grid square 5627). No obvious reason for this limitation has been suggested. The species' distribution is also unusual, including some of the driest and warmest, but also some of the coldest and wettest, portions of the Tasmanian coast. Unless proximity to the sea itself is important, the distribution could be a dynamic product of the species' history rather than a reflection of the species' parameters for survival. This may reflect a past refuge for the species, or alternatively, it may reflect that the species is a comparatively very recent (though pre-human) arrival in Tasmania.

Attempts to explain the distribution of this species are also hampered by the lack of similar species with which to make comparisons. *B. tasmanicus* is the only species in the genus in Tasmania and there are none in Victoria. Several dozen species of *Bothriembryon* (the exact number is unknown because of the proliferation of undescribed forms) occur in Western Australia and South Australia. In the south-west corner of the continent, *Bothriembryon* is the dominant native land snail group, in the absence of the camaenids which are so diverse, widespread and abundant over much of the rest of the continent. The Western Australian species sometimes occur close together, a well-known example being the presence of three species in the Perth bushland enclave of Kings Park, the species finely demarcating the landscape by substrate and even by the size of grains in the sand (Hill et al, 1983). The situation occurring in Tasmania, with an apparent single form widespread across a considerable geographic range *and* a full range of habitats without apparent habitat-based speciation, has no parallel in the diverse and widespread Western Australian *Bothriembryon* fauna (M.S. Johnson, pers. comm.)

Explanation of this species' distribution and coastal affinities would alone merit a substantial research project. This species has a unique range among the Tasmanian snail fauna.

Family Punctidae

Paralaoma halli (Legrand, 1870) (Plate 7c-d)

Taxonomy: **(Elevation from synonymy)**

> "Shell narrowly umbilicated, conoid, thin, pale yellowish-brown, very finely striated; whorls 4.5 to 5, regularly increasing in size, rounded; suture deeply impressed; spire conically elevated; aperture lunately-oval; periostome simple, thin; columellar margin expanded at the base. Diameter, greatest 0.06; least 0.05; height 0.04 of an inch [1.5, 1.25, 1.0 mm]" – Cox in Legrand (1870)

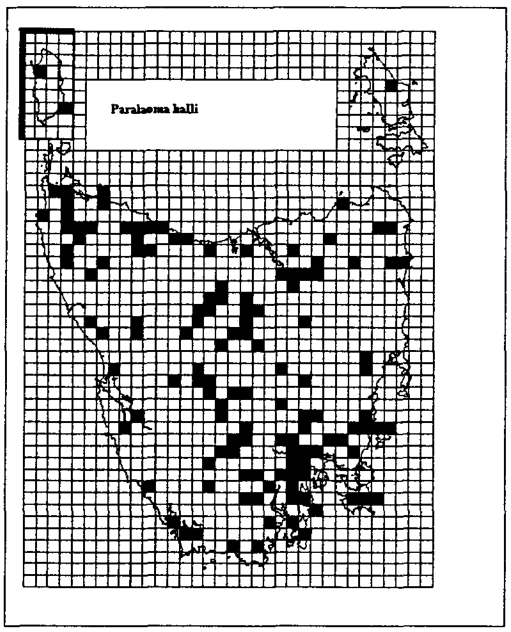
This species is easily distinguished from *P. caputspinulae* by the higher-spired shell, the significantly smaller umbilicus (D/U 6-15 for *P. halli*, 3-4 for *P. caputspinulae*), the lower pseudo-primary ribbing and the smaller shell size (*P. halli* seldom exceeds 1.6 mm and no specimens wider than 1.8 mm were examined). The whorl number given by Cox appears incorrect, as none of over 100 specimens examined exceeded 4.4 whorls. Climo (1983) also considered that *P. caputspinulae* has slightly fewer spiral lirae on the protoconch.

P. halli displays significant variation in shell height proportional to shell width, and in the "roughness" of the sculpture. Sometimes the sculpture has an appearance of regular sharp thin blades with interstices of very fine riblets, but on some specimens there is considerable irregularity in both the height and spacing of ribs, producing a rough, corrugated appearance. This variation appears to be continuous but is over a wide enough range to raise some suspicion about *P. halli* being a single species. Very small and high-spired specimens (c. 1.1 mm wide) are sometimes seen, having the same shell form as *Trocholaoma parvissima* but being more prominently bladed. These also appear to have more protoconch lirae than normal *P. halli* but this may be an artefact of the more elevated spire exposing more of the protoconch. These in particular bear a strong resemblance to Australian mainland *Iotula* species and require more examination. Climo, probably correctly, considered *P. halli* to be best placed in the genus *Gratilaoma* Iredale, 1939.

Climo (1983) distinguished another species with similar shell morphology, to which he gave the manuscript name "*Primapiculus tasmanicus*" (never formally published) and considered to belong to a different lineage. However Climo's line drawing of that species and his SEM photographs of two *P. halli* juveniles, plus his text notes, are insufficient to distinguish between them.

Identification: Some records have been based on misidentifications of *Trocholaoma parvissimia.*

Distribution map:



Discussion: This species' natural distribution outside Tasmania is unclear. The author has seen very similar forms in Victoria and New South Wales but a full review of the species will be necessary to examine their taxonomic status. In Tasmania this species is very common. It is recorded from 136 grid squares but this underestimates its true frequency as some records of *Paralaoma* spp. by Smith and Kershaw (1981) have been discarded because they were aggregated under *P. caputspinulae* and it is impossible to determine which species they referred to.

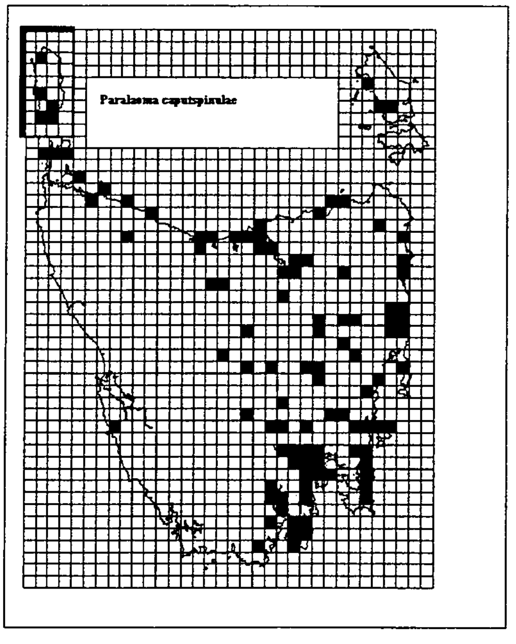
This species occurs statewide with no significant gaps in its distribution. It appears scarce in the central east and on the Bass Strait islands but in the former case this is probably due to a lack of targeted searching for this very small snail. It is common in virtually all forest types and is sometimes collected in rough pasture on farmland. Iyt is also sometimes found in coastal shrubbery but is much less common than *P. caputspinulae* in such situations. However, unlike *P. caputspinulae,* it has not yet been recorded from urban gardens. As this species occurs statewide in suitable habitat, it is not biogeographically informative in a Tasmanian context.

Paralaoma caputspinulae (Reeve, 1851) (Plate 7a-b)

Taxonomy: This was formerly considered to be an extremely variable species, but with many of the "variations" here treated as distinct species (*P. halli*, *P. mucoides*, *P.* sp. "Hartz") the variation is less substantial. What is considered here to be *P. caputspinulae* remains somewhat variable in height and regularity of sculpture, degree of elevation of spire, umbilicus width and shell width, but not suspiciously so.

Identification: A small number of records have been based on misidentifications, most commonly of *Planilaoma luckmanii*. Many records of this species are actually *P. halli* or *P. mucoides*. Records published by Smith and Kershaw (1981), but where no specimen is known, have usually been rejected as it is generally impossible to determine which of the three common *Paralaoma* species they refer to.

Distribution map:



Discussion: This species' natural distribution outside Tasmania includes New South Wales, Victoria and South Australia (Smith, 1992) and the Australian Capital Territory (author's records), and it is also found in New Zealand, its type locality (Climo, 1975) making it the only Tasmanian native snail recorded outside Australia. It is also present as an apparently introduced species in many parts of Europe and North America (Smith, B.J. *pers. comm.*, numerous internet reports). In Tasmania it has been recorded from 109 grid squares, but this number underestimates its frequency compared to other species as some records of *P. caputspinulae* prior to recognition of *P. halli* and *P. mucoides* have been excluded. It is recorded almost entirely in the north and east. There is a single record from Hibbs Lagoon on the west coast but this is based on archaeological specimens. More study is required to determine whether *P. caputspinulae* is still present in the south-west. The differentiation of *Paralaoma* species occurred too late for this to occur during the project period.

P. caputspinulae is generally found in dry and moderately wet eucalypt forests and coastal shrubbery, and is extremely scarce in very wet forests. It is extremely disturbance-tolerant and has been found in several largely or entirely urbanised gardens in the Hobart suburbs of Sandy Bay, South Hobart, West Hobart and Mt Stuart. Its tramp character is particularly prominent in the Tasmanian midlands, where the species is very frequently found in sites so disturbed that no other native snail, except sometimes *P. halli,* is present. It is not even clear to what extent urban occurrences of the species are remnants of native populations and to what extent they are accidental re-introductions, not even necessarily of Tasmanian stock.

More searching for this species is necessary to determine if it is present statewide in suitable habitat (which would potentially exclude most of the inland west) or if its present-day distribution in Tasmania is strictly eotlian.

Paralaoma mucoides (Tenison-Woods, 1876) (Plate 7 e-f)

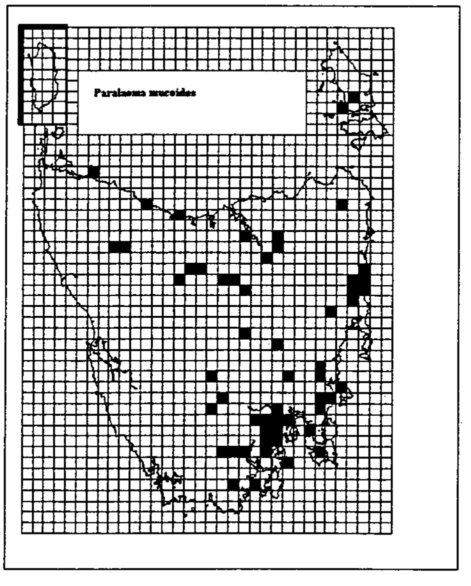
Taxonomy: **(Elevation from synonymy)**

"Diam. maj. 3, min. 2.5, alt. 1.5 millim. Shell minute, widely umbilicate, depressed, orbicular but hardly discoid, rather solid, shining as if from oil, very closely corrugated, irregularly striate, yellowish horn, of one uniform colour and translucent. Spire exsert, apex slightly prominent, obtuse. Suture not impressed. Whorls 4.5, rounded, increasing gradually, the last flat above and obtusely keeled. Base convex and rugosely striate as above, but more finely, and under the lens seen to be closely, very finely spirally lirate. Umbilicus perspective, scarcely one-third the diameter of the shell. Aperture subquadrate, a very pale blueish white within. Periostome simple with obtuse margins which are not approximate. Columella slightly expanded and reflected. The shell is more or less marked with large irregular sooty patches" – Tennison Woods (1876:125)

This species is easily separated from *P. caputspinulae* by the different shape of the aperture. In *P. mucoides* the upper right hand corner of the aperture is always sharply acute, whereas in *P. caputspinulae* it is bluntly rounded. The body whorl is nearly always conspicuously shouldered. *P. mucoides* is always very tightly coiled (1.5-1.8 mm wide at 4.5 whorls) and the spire is always slightly and evenly elevated. The umbilicus is always wide (D/U c. 3) and deep, and there is usually a clearly recognisable primary sculpture of large, prominent complex axial blades. While Tenison-Woods referred to a Victorian specimen 3 mm wide, Tasmanian specimens exceeding 2 mm are extremely unusual. Climo (1983) considered this species to be distinct at genus level from *P. caputspinulae* by "the distinctive anatomical peculiarity of a glandular outgrowth from the base of the penis."

<u>Identification:</u> No issues identified.

<u>Distribution map:</u>



Discussion: This species occurs statewide, in Victoria and possibly in southern New South Wales. In Tasmania, it has been recorded from 57 grid squares and is moderately common. Existing records suggest a very broad eotlian distribution (the only eotlian species known from the Waratah area in the inland north-west, but this requires confirmation with more collecting in the west of the state targeted at this species' preferred microhabitats. *P. mucoides* is most common in dry and wet eucalypt forests where is sometimes found under rocks and frequently occurs in piles of fresh bark around gummy eucalypts. It can also be found in leaf litter, where it often clings to the underside of large eucalypt or musk (*Olearia argophylla*) leaves. The apparent absence of the species from King Island requires confirmation.

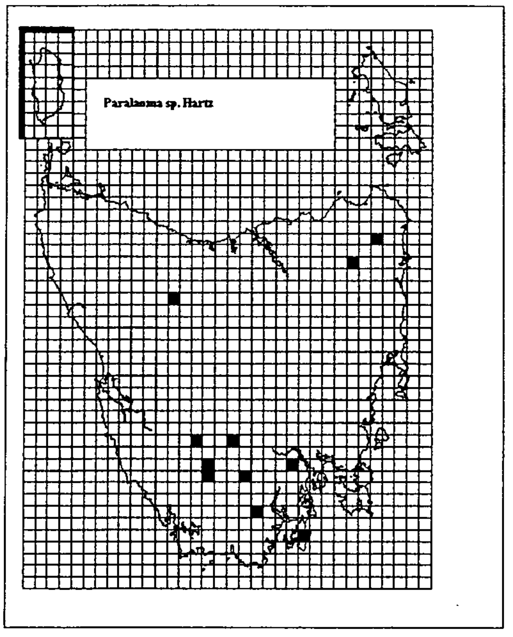
Paralaoma sp. "Hartz" (Plate 7g-h)

Taxonomy: **Brief diagnosis:** Small punctid, adults 1.8 – 2.3 mm wide at 3.8 – 4.3 whorls, bronzed medium to dark brown (dead specimens often yellow to honey coloured), spire elevated, body whorl rounded, aperture large and rounded, umbilicus small (D/U c. 8-12), protoconch of numerous (at least 15) very low spiral traces, adult sculpture of weak irregular radial ridges to blunt blades and conspicuous closely-packed spiral traces.

This most closely resembles *Paralaoma halli* but is larger, and the protoconch is different (*P. halli* has 8-12 more widely spaced and pronounced spirals). The radial adult sculpture is more reduced (interpreted as obsolete by Climo (1983)) than on *P. halli*, and the spiral adult sculpture is more prominent. This appears to be the species listed by Climo (1983) as "N. gen. (2) n. sp. [Tas]" although Climo gave no locality data. Climo considered this to be not related to *P. halli, P. mucoides* or *P. caputspinulae* (which may belong to three different genera in any case) but to be a gigantic development of what he calls "the *Miselaoma* radiation". This putative radiation included *Trocholaoma parvissima* and *Miselaoma weldii*.

Identification: No issues identified.

Distribution map:



Discussion: This species is known from eleven grid-square records scattered across most of the state, with eight in the south, two in the north-east and one at Cradle Mountain. The concentration of records in the south reflects more collecting likely to capture the species in this area. Records of this species have come mainly from pyrethrin knock-downs from trees in mostly (but not exclusively) high altitude rainforests (National Rainforest Conservation Project), and from beatings from alpine conifers (Belinda Yaxley). The author has hand-collected the species in the Hartz Mountains in the far south, where it can be found living in moss and under shrubs on rocky outcrops and among plant roots under rocks.

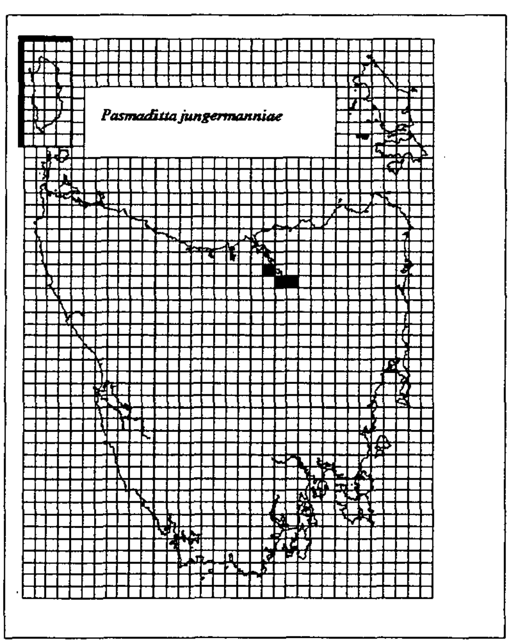
The existing records all come from high-rainfall areas, nearly all of them supporting either rainforest or alpine/montane vegetation. If this pattern is maintained, the species is likely to occur widely through Wotlia, and also the north-east, but its full distribution remains unclear.

Pasmaditta jungermanniae (Petterd, 1879) (Plates 8c, 27b)

Taxonomy: Aside from misidentifications, no issues identified. This species is superficially quite similar to *Planilaoma luckmanii* in size, shape and colour but can be separated by the lack of regularity in the primary ribbing at sufficiently high magnification (x60 and above especially). Also, the spiral traces that are visible on the shell at low magnification turn out, when viewed at higher magnification, to consist of irregular fine indentations running roughly parallel to the spire, and becoming less so on later whorls. The difference between the species is shown in Plate 27.

Identification: Substantiated records of this species are known only from Cataract Gorge, Distillery Creek (19th century only) and Notley Gorge, and the last is dubious as despite the presence of a sample of genuine specimens, attempts to again find the species in Notley Gorge have not succeeded. Reports from elsewhere probably result from confusion with *Planilaoma luckmanii* or *Pedicamista* sp. "Chisholm".

Distribution map:



Discussion: This is an extremely localised endemic species. The recording of this species from three grid squares actually gives an over-impression of its distribution as this is based on three apparently very localised colonies. It is known from Cataract Gorge, Distillery Creek and Notley Gorge, although the last record is based on a single 1984 collection of several specimens taken outside the main gorge area, and later searches for the snail in Notley Gorge (including at the claimed grid reference) have repeatedly failed. Within Cataract Gorge it is most prevalent in moss on rocky cliff faces surrounded by wet scrub. At Distillery Creek it has not been recorded since the 19th century. In other, seemingly extremely similar conditions very close nearby, for instance at Trevallyn State Reserve, it fails to occur, and even within Cataract Gorge, its occurrence is not uniform. Despite this, it is locally abundant, and up to twenty specimens can often be obtained from a hand-sized clump of moss.

For some time, the taxonomy of the species was extremely confused because of the superficial similarity of *Planilaoma luckmanii.* Indeed, *Planilaoma luckmanii* consistently occurs commonly in habitats similar to the *Pasmaditta jungermanniae* Cataract Gorge habitat elsewhere (including in other parts of Cataract Gorge). Where *Pasmaditta jungermanniae* occurs, however, only a very small form of *Planilaoma luckmanii* (described by Petterd (1879) as *Helix trucanini* although this is here considered a synonym) is usually found.

This is considered to be one of several species involved in the phenomenon of "gorge endemic" species, forms and localised populations in the Launceston area.

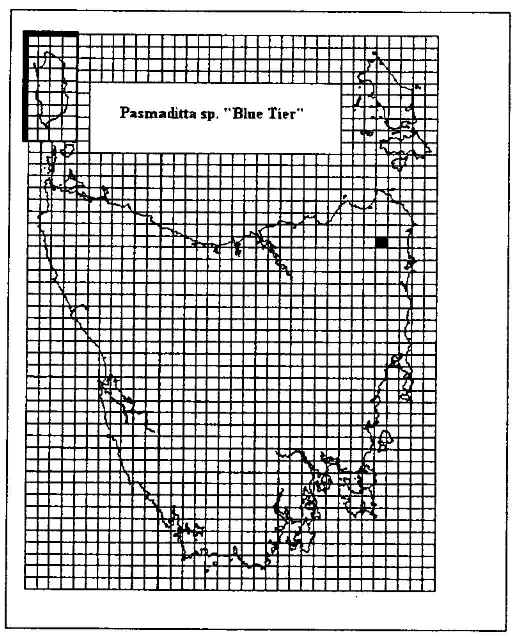
Pasmaditta sp. "Blue Tier" (Plate 8a-b)

Taxonomy: **(Brief diagnosis)** (Limited material – one specimen only) Small punctid, sole specimen is 1.8 mm wide at 4.0 whorls, colour frosted metallic yellow-brown umbilicus extremely small but open (D/U 15), spire slightly elevated, protoconch apparently smooth, adult sculpture of weak, widely spaced and irregular radial corrugations with irregular fine spiral-like indentations running roughly parallel to the spire.

This species is superficially similar to *Paralaoma* sp. "Hartz" and *P. halli* but the microsculpture of irregular fine indentations instead of true spirals is distinctive at genus level. The species differs from *P. jungermanniae* by its smaller size (the latter is typically 2.3 – 2.7 mm wide at 4.0 whorls), much narrower umbilicus (*P. jungermanniae* D/U 5-6), and more reduced radial sculpture. As there are no *Pasmaditta* records in the area between Blue Tier and Launceston, and as the genus appears to be a poor disperser, it is extremely unlikely that this is just a variation of *P. jungermanniae.*

Identification: No issues raised.

Distribution map:



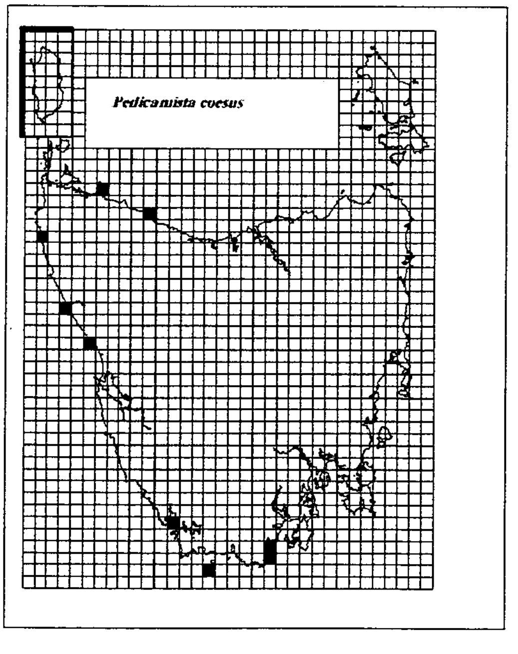
Discussion: As only a single specimen of this species is known, it is not possible to make any confident inferences about its distribution. The single specimen was collected crawling on a log in rainforest near the summit of Mt Michael, in an area very close to the modelled location of past glacial refuges (see discussion for *Anoglypta launcestonensis*). The localised distribution of *P. jungermanniae* is suggestive of poor dispersal ability and if this is also true of this species, then it is likely to be endemic to the area surrounding Blue Tier. However this requires further investigation.

Pedicamista coesus (Legrand, 1871) (Plate 8d)

Taxonomy: No issues identified (but see other *Pedicamista* species for comparisons).

Identification: Only one specimen from the Bass Strait Islands (as reported in Petterd, 1879) is known and there is no information on which island it came from. King Island records may have been due to *Flammulops* or also to low-sculptured forms of *Magilaoma penolensis* that have since been recorded there. Inland specimens of the species have also been rejected, as all those for which specimens exist are *Pedicamista* sp. "Chisholm". A record from South Bruny Island by Smith and Kershaw (1981) is not accepted as there is no specimen and it was probably either *M. penolensis* or *P.* sp. "Southport".

Distribution map:



Discussion: This apparently endemic snail is a sparsely recorded species that occurs exclusively in coastal situations, typically in shrubbery just above the high-water mark. Its distribution has been difficult to determine because of confusion with spineless forms of *Magilaoma penolensis*, and several putative records have been discarded for this reason. The remainder are scattered around the wotlian half of the coast, but are so sparse (only 9 confirmed grid square records) that it is impossible to draw firm conclusions that the species occurs nowhere else. In the south-east it may be replaced by *Pedicamista* sp. "Southport", although there is one record of both at the same site. There is not yet enough information to determine the range of this species accurately.

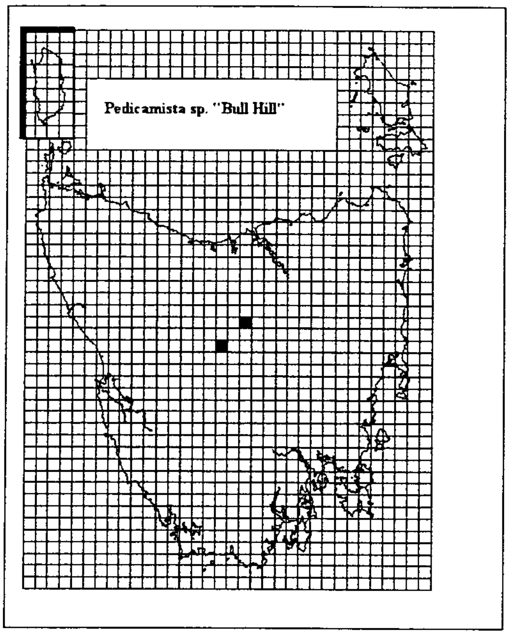
Pedicamista sp. "Bull Hill" (Plate 8 g-h)

Taxonomy: **Brief diagnosis:** (Limited material – 4 adult and 3 slightly sub-adult specimens) Medium-sized punctid, adults 2.8-3.5 mm wide at 4.0-4.5 whorls, rich bronze colour, semi-translucent, spire elevated, umbilicus minute but open (D/U c.20), adult sculpture of close low radial riblets, apparently distinct and regular at low magnification, but irregular and indistinct at higher magnification (x60), regular very weak spiral traces, stronger underneath, not keeled.

This species differs from *P. coesus* in being smaller, in having a smaller umbilicus (*P. coesus* D/U c. 10), and in the close and relatively uniform sculpture, which resembles that of the most prominently ribbed specimens of *P.* "Southport" (from which it differs by having far fewer whorls, a smaller umbilicus and a different colour). This species was initially confused with the variable *Planilaoma luckmanii* but can be distinguished from it at high magnification – the riblets on *Planilaoma luckmanii* are genuinely distinct from each other at any magnification. It also resembles *Pasmaditta jungermanniae* but differs from that species in having more even radial sculpture, a higher spire, narrower umbilicus and regular spiral microsculpture.

Identification: No issues identified.

Distribution map:



Discussion: This is a rare local endemic species recorded from 2 grid squares on the Central Plateau, although more records would be expected with more collecting. While there is not enough evidence to determine the species' actual range, it is unlikely to extend beyond the Plateau. This species is similar to *Paralaoma* sp. "Hartz", which also occurs in alpine areas, but does not fill exactly the same niche. *Paralaoma* sp. "Hartz" is usually found associated with shrubs or mosses whereas *Pedicamista* sp. "Bull Hill" is more likely to be found under bare rocks. This makes it difficult to draw the conclusion that *P.* sp. "Bull Hill" simply replaces *Paralaoma* sp. "Hartz" on the Central Plateau, especially as the latter has not been targeted in its preferred microhabitat on the Plateau.

Pedicamista sp. "Bull Hill" is one of only Tasmanian snail species recorded only from alpine areas, indeed all three records of it have been above 1000 m ASL. As the Central Plateau environment is among the most extreme Tasmanian environments for a land snail, in particular having lower winter temperatures than elsewhere in the state, it is plausible that this is species that is able to replace other species that cannot occur in these harsh conditions (eg *Planilaoma*, which is abundant at slightly lower altitudes but absent from sites where this species occurs).

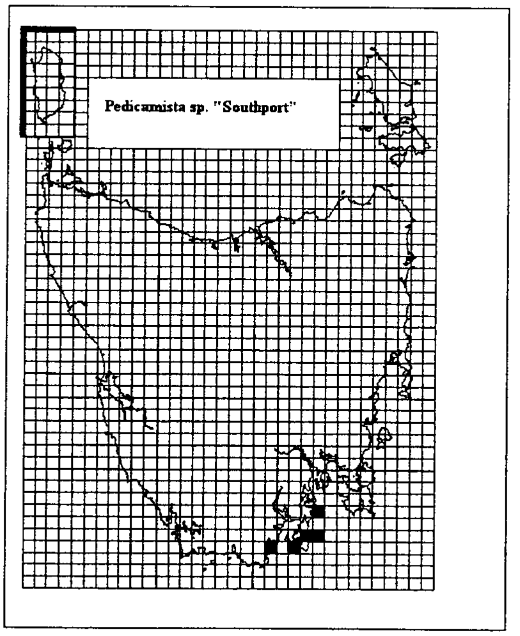
Pedicamista sp. "Southport" (Plate 9d)

Taxonomy: **Brief diagnosis:** Relatively large tightly-coiled punctid, adults 2.8-4.0 mm wide at 5.0-6.0 whorls, spire elevated, not keeled, adult sculpture of minute to low irregular closely-spaced blunt radial riblets with regular spiral growth lines, umbilicus narrow (D/U c. 8-12), entire top of shell covered in numerous thin, regularly spaced white and dark red rays.

This species is similar to *P. coesus* but is slightly smaller (*P. coesus* reaches 4.5 mm), far more tightly coiled (*P. coesus* typically has 4.0-4.5 whorls, rarely up to 4.7), and the sculpture is more regular compared to *coesus* where broad irregular ribbing often develops on the last whorl. The irregular ribbing is less variable in size and more regular in spacing and the riblets are swept back from the interstices at a less acute angle. *P. coesus* also lacks any colour rays. These species have been found nearby at one site and no intergrades between them were observed.

Identification: No issues identified.

Distribution map:



Discussion: This locally endemic species is recorded from 5 grid squares in the far south and south-east, with all records bar one coming from Bruny Island, where it is locally abundant. It is, like *P. coesus*, an exclusively coastal species typically recorded only just above the high water mark, however at Fluted Cape (grid squares 5219-5319) it lives in *Casuarina* forest along clifftops 120 metres above the sea. It could represent a parapatric replacement for *P. coesus,* or it could be simply a coincidence that there is no known overlap between their ranges (both occur at Southport Bluff, separated by a distance of about 100m). The ecological relationship between this species and *Magilaoma penolensis,* which it morphologically resembles, also merits investigation as the two species have never been recorded in microsympatry despite both being common in similar habitats on Bruny Island. At Mars Bluff (grid square 5221), searching of four apparently similar coastal shrubbery inlets separated by headlands and bays revealed this species only at the second inlet, but *Magilaoma penolensis* only at the first, third and fourth.

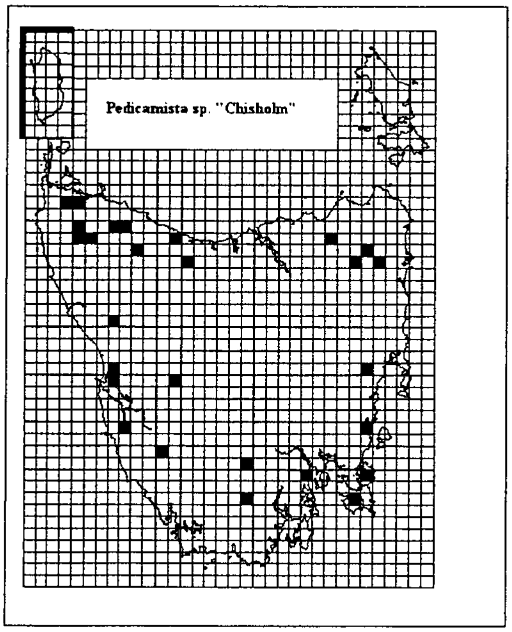
Pedicamista sp. "Chisholm" (Plate 8e-f)

Taxonomy: **Brief diagnosis:** Small punctid (adults 2.1-2.6 mm at 4.2-4.6 whorls), turbinate, umbilicus very small and partly covered by the columella (D/U >10), aperture very large, adult sculpture solely of irregular unevenly spaced radial corrugations of greatly varying heights (but not sharp plate-like ribbing) covered with regular, dense and very prominent spiral lines, shell yellow-tan to olive-yellow.

The relationships of this species are unclear. It may be closer to *Magilaoma* (despite the lack of spines) than *Pedicamista,* but it is responsible for the majority of incorrect inland records of *Pedicamista coesus.* It most closely resembles *Paralaoma* sp. "Hartz" but differs in the strength of the spiral lines (extremely pronounced just after the protoconch and on the base), the narrowness of the umbilicus (although there is some overlap), the slightly larger shell size and the lack of any regularity in the adult ribbing. It is much smaller than other *Pedicamista* species except *P.* sp. "Bull Hill" which is somewhat larger, more evenly ribbed, and with much weaker spiral sculpture.

Identification: Some specimens identified as this species in previous reports by the author were actually *Paralaoma halli* or *Paralaoma* sp. "Hartz", which had not then been recognised as distinct.

Distribution map:



Discussion: This is one of the more frequently recorded undescribed species with 27 grid square records covering most of the state. The species occurs in wet forests and rainforests, and is almost exclusively arboreal, with less than 5% of records from ground collections (exempting dead shells which appeared to have fallen out of trees.) It is likely that this species has been greatly under-recorded as a result, and a large proportion of records come from collecting efforts targeting arboreal habitats. As an example of this, the species was found quickly by specifically targeting mossy treebranches in Truganini Reserve (grid square 5224), a locality which only supports three other species of preferentially "wet forest" snail, and which had previously been very well searched on the ground without this species being encountered. Another overwhelmingly arboreal species, *Discocharopa mimosa*, was recorded in the reserve for the first time by the same method.

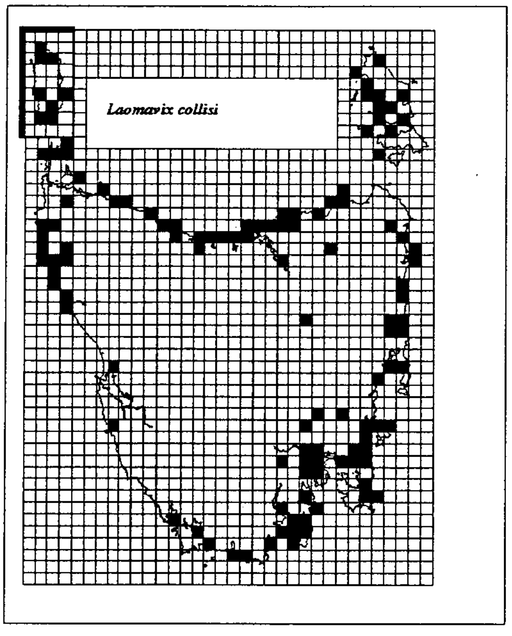
The species is most densely recorded in the north-west, and only occasionally found in the central east, where suitable habitat is scarce. There is a large gap (c. 150x130 km) in the centre of the state with no records of this species. Although this gap is very sparsely sampled, there are still a total of 533 grid-square species records within it. The number of wet forest sites searched within this region is not large and it would be premature to assume the species is absent from this assumed gap, especially as many environments within it have been mostly ground-searched only. The species is therefore considered likely to be statewide (excluding Bass Strait) within suitable habitat, but this is not confirmed yet.

Laomavix collisi (Brazier, 1877) (Plate 9a-b)

Taxonomy: No issues identified.

Identification: Very rarely, a specimen recorded as this is actually a very flat form of *Paralaoma caputspinulae* or an unusually low-ribbed form of *Paralaoma mucoides.* A record from near Lake St Clair has been excluded as there is no confirmed record of anything resembling this species near that area and the habitat is not similar to that of other records.

Distribution map:



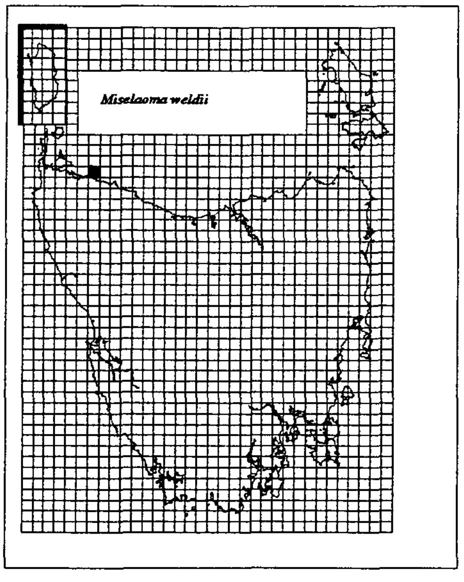
Discussion: This is a very common species, represented by 118 grid square records. It also occurs in Victoria, New South Wales, South Australia and Western Australia (Smith, 1992). Tasmanian records of this species are predominantly coastal, with only 17 (14.7%) occurring in squares that contain no saltwater, and only six occurring in squares surrounded entirely by squares containing no saltwater. These six are exclusively in the eastern half of the state. Only two of these, Eldon Road (grid square 5329) and Illa Brook (5025) are based on recent records with habitat details. In the former case, specimens were found in the leaf litter of *Pomaderris apetala* growing on sandstone in riparian semi-wet eucalypt forest. In the latter, specimens were found in dense moss on the ground in open but fairly wet eucalypt forest. Both these situations are very similar to those in which the species commonly occurs around Hobart, particularly on the Eastern Shore. These types of situations appear to be the preferred habitat for the species anywhere where it is found more than about a kilometre inland, the association with *Pomaderris* spp. litter being especially strong as the species likes to cling to the undersides of the crumpled dead leaves of this tree. *Pomaderris* spp. are comparatively sparse in western Tasmania away from the coast (Kirkpatrick and Backhouse, undated) and where it does occur there it is typically as an edge or disturbance species and seldom in dense mature stands (author's observations). In coastal habitats, the habitat preferences of *L. collisi* are much broader and it can be found in the litter of almost any shrub or tree species, not necessarily native. *Laomavix collisi* is therefore considered to occur statewide in suitable habitat, although suitable habitat is considered to exclude most of the inland west/south-west of the state. Much more work would be needed to establish the species' inland boundaries.

Miselaoma weldii (Tenison-Woods, 1877) (Plate 9c)

Taxonomy: No issues identified at state level.

Identification: No issues identified.

Distribution map:



Discussion: This species, recorded from a single grid square, represents the Tasmanian toehold of a small group of sinistral punctids in south-eastern Australia. Other members of the group are the South Australian *Miselaoma reevesbyi* Cotton, 1938, the Victorian taxon described as *Laoma sinistra* Gabriel 1930, and undescribed forms from the south-eastern New South Wales forests (Australian Museum collections). *M. weldii* and *M. sinistra* are currently considered conspecific (Smith 1992) but on the basis of examining Australian Museum specimens of *M. sinistra*, which are much thinner, smaller and higher-spired, this requires reconsideration. Here they are assumed to be the same species.

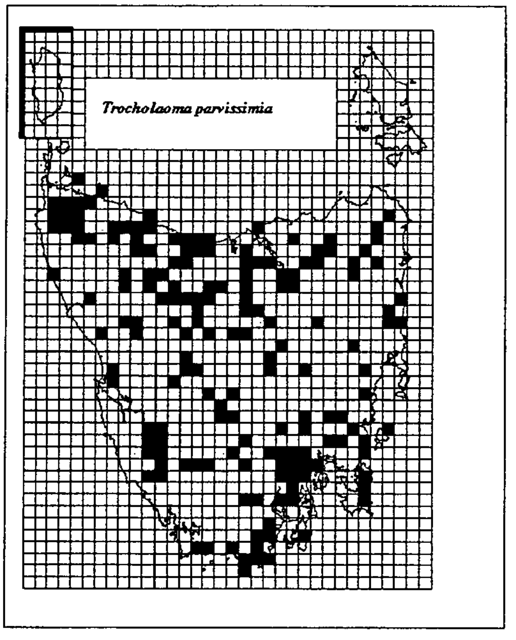
M. weldii was first recorded from The Nut, a prominent basaltic formation on a small peninsula at Stanley in the state's north-west, by Tenison-Woods (1876). Considerable searching has failed to yield records anywhere else on that peninsula, or anywhere else in Tasmania, resulting in the species being upgraded to Endangered status on the Tasmanian Threatened Species List with a known range of around two square kilometres and an estimated area of occupancy of four hectares (Bonham, 1999a). This makes it likely to be Tasmania's most localised species. The species appears incapable of colonising adjacent "generic coastal environments" (specifically, wattle scrub on sand dunes) despite being abundant in suitable habitat on the rich volcanic basalt of the Nut. Precise distribution data for the mainland species of *Miselaoma* are not available but they appear to be localised and widely separated. Possibly these are remnants of a group that formerly had a wider distribution, but has since disappeared from all but a few exceptionally favourable habitats. Climo (1983) speculated that they are remnants of a former Bassian Plain radiation.

Trocholaoma parvissima (Legrand, 1871) (Plate 9e-f)

Taxonomy: No issues identified, but see *T. spiceri*.

Identification: Some records from scattered localities are *Paralaoma halli*. Records from Flinders Island have been rejected as all available museum specimens are *P. halli*. A number of records of *T. spiceri* have been given as this species in the past due to *T. spiceri* being treated as a synonym of it.

Distribution map:



Discussion: This species is also present in southern Victoria (Smith and Kershaw 1979). In Tasmania it is very frequently recorded with 166 grid square records. This is despite it almost invariably occurring at low population densities, accounting for a mean 5.6% of all native snail specimens at sites where it is recorded (author's records). Although apparently absent from both major Bass Strait islands, there are no other major gaps in its recorded Tasmanian range that cannot be explained by lack of sampling. This species is therefore classified as statewide.

Trocholaoma spiceri (Petterd, 1879) (Plate 9h)

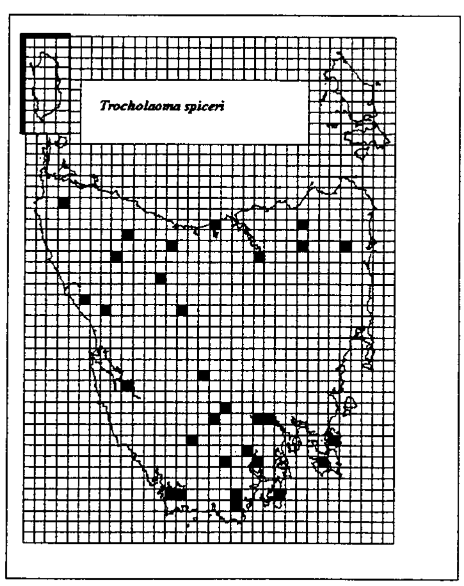
Taxonomy: **(Elevation from synonymy)**

> "Shell perforately, turbinately-globose, thin, yellow-brown, shining; above obliquely striate and conspicuously decussate, base of body whorl almost smooth and much more shining than upper surface; whorls 5, convex, gradually increasing in size; spire obtusely-conical, last slightly angled, not descending in front; aperture irregularly-lunate; periostome thin; margins distant, joined by a thin but distant callus; columellar margin slightly expanded. Diameter, greatest [1.25]; height [1.25] mil" (Petterd, 1879, sp. 34)

This species was synonymised by Smith and Kershaw (1979) without stated reason, probably because of lack of material. Petterd had considered it a dubious species on describing it Petterd and Hedley (1909) recognised it as clearly valid and illustrated the distinctive sculpture. *T. spiceri* differs from *T. parvissima* in having a very prominently spiral protoconch, and adult sculpture of regular low closely spaced blunt riblets cross-cut with very strong spiral lines to create an almost reticulated appearance on the upper surface, this sculpture typically and very sharply reduced on the base. This is in contrast with *T. parvissima* where all elements of the sculpture are very fine and indistinct. The sculptural differences are so great that it is questionable whether the species are even closely related. *T. spiceri* is typically larger and higher (the largest recorded specimen, from Tobys Hill Road, Cygnet (5022), is 1.8 mm wide, 1.9 mm high and has 6.5 whorls, whereas nearly all *T. parvissima* are less than 1.2 mm wide and 1.1mm high.) Sometimes *T. parvissima* approaches the size of *T. spiceri* (eg Plate 9f) but even where this occurs the sculptural differences are consistent.

Identification: A collection from Precipitous Bluff by Stefan Eberhard (specimen mentioned by Stephanie Clark but not seen in the Australian Museum (AM) collections) has not been included, as without seeing the specimen it cannot be determined whether it is *T. spiceri* or a large form of *T. parvissima,* although it is most likely to be *T. spiceri.*

Distribution map:



Discussion: This endemic snail is a reasonably scarce species, with 30 grid square records although its range covers almost half the state. Within its range it is responsible for only 1.4% of all grid square species records. It is generally uncommon, although it occasionally occurs in large numbers. The species is only recorded from very wet eucalypt forests, mixed forests and rainforests, but this alone does not explain the scarcity of records as these habitat types predominate in the species' known range.

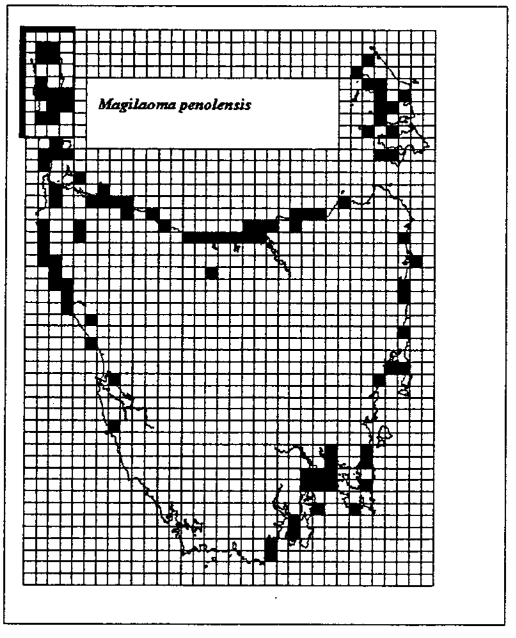
Records are concentrated in the west of the state but recent finds have confirmed its presence in the north-east, meaning that it is broadly present across the high-rainfall areas of the state. The pattern of records is extremely similar to that for *Pedicamista* sp. "Chisholm", except that there are no *T. spiceri* records from the central east coast. As the species is not especially common elsewhere, its absence in this area requires confirmation before it could be assumed that the species is really confined to high-rainfall areas.

Magilaoma penolensis (Cox, 1868) (Plate 9g)

Taxonomy: This is a variable species in a number of features including the strength of ribbing, whether or not ribs are produced to spines sticking out from the shell (as in Plate 9g), number of whorls, shell size and spire height. Specimens from a given population tend to be very similar in these aspects but substantial variation among nearby populations can occur for no apparent reason. Climo (1983) considered that there was a second, probably endemic, species of *Magilaoma* in Tasmania, and gave records for this second species from Rocky Cape, The Nut and Table Cape in the north-west (all in sympatry with *M. penolensis*) and Freycinet Peninsula on the east coast. According to Climo, this species differs in "having a strongly black-blotched mantle roof, a relatively longer mantle cavity, rounder kidney lobes more convoluted and more finely divided ridges in the penis lumen". Shell characters are said to completely overlap. The author became aware of this claim by Climo too late to include an assessment of it in this thesis, so *M. penolensis* is here treated as a single species. No other issues identified (but see Charopidae sp. "Swallet").

Identification: Following the diagnosis of Charopidae sp. "Swallet", various inland records of *M. penolensis* were transferred to that species. This was not done in areas where inland *M. penolensis* records were known to be genuine or in areas well outside the range of Charopidae sp. "Swallet".

Distribution map:



Discussion:

This species, *Laomavix collisi*, *Pernagera officeri* and (often) *Paralaoma caputspinulae* make up an almost ubiquitous coastal assemblage. It is another species that is widespread on the Australian mainland, including Victoria, New South Wales and South Australia (Smith and Kershaw 1979). In Tasmania, it is commonly recorded with 98 grid square records. It displays a similar pattern to *Laomavix collisi* in that it occurs around the entire perimeter of the state with the majority of records being coastal, but the pattern is not as spatially restricted (while these inland occurrences occur mainly in the north-west, there is even one in the east). It is unusual that *M. penolensis* occurs inland in wet eucalypt forests in the north-west but that it is then apparently absent further south in rainforest and other very wet environments, where the morphologically almost identical Charopidae sp. "Swallet" occurs instead. Near Strahan, *M. penolensis* occurs at Hogarth Falls (square 3633), but Charopidae sp. "Swallet" occurs at Teepookana Reserve (3632), which is only slightly more inland.

There is a gap for records in coastal environments in the south-west, covering close to 200km of coastline, but this is not meaningful as the area is extremely poorly surveyed with a total of only around 50 grid-square species records. The species is also less reliably recorded than normal on Bruny Island, where *Pedicamista* sp. "Southport" occurs at many sites where it would have been expected.

Family Charopidae

Planilaoma luckmanii (Brazier, 1877) (Plates 10a-b, 27a)

(Synonyms: *Helix neglecta* Brazier, 1870, *Helix sitiens* Legrand, 1871, *Helix trucanini* Petterd, 1879, *Laoma pipaensis* Suter, 1893)

This widespread and common species has caused great confusion to all Tasmanian snail workers (including the author, who incorrectly treated *Pasmaditta jungermanniae* as a synonym at one stage as a result). Petterd (1879) considered four taxa, *luckmanii, sitiens, trucanini* and *jungermanniae* to be distinct but very similar species. While he was wrong about *jungermanniae,* which has a fundamentally different adult sculpture at higher magnification, the remaining taxa are indeed similar, all having an adult sculpture of very fine riblets, which at high magnification are clearly distinct, and in all of which the riblets are swept back at an acute angle from the sutures. In some specimens these riblets are all very fine and close, in others some are produced to a greater height than others, producing a primary ribbing-like effect similar to that on most *Paralaoma caputspinulae* and *P. mucoides*. However, this represents a continuum of variation. It is impossible to split specimens from localities where both patterns occur into two groups discretely, and all specimens have a degree of irregularity in the height of the ribbing.

Iredale (1937a) was excessively influenced by variation in shell height within this group and erected the following genera:

Planilaoma: Flattened Laomid [sic] shells, broader than high, umbilicus deep and narrow, mouth wide for this series, protoconch smooth, sculpture of adult whorls fine striation

Trocholaoma: Conical many whorled Laomid shells, periphery rounded, sculpture very fine striation, mouth small, umbilicus deep and narrow.

At this time the three taxa *sitiens, luckmanii* and *trucanini* were placed in three different genera. Iredale also (presumably from studying insufficient material) was unaware that all three taxa typically had a protoconch with very weak widely spaced spiral traces, which in anything but very good specimens give an appearance of smoothness, so separating *luckmanii* from the others on this criterion was incorrect, as forms under the name *sitiens* (which is supposedly distinguished from *luckmanii* by the presence of "rather prominent riblets at regular intervals") are equally prone to having a smooth-appearing protoconch. Iredale also ignored that far from being "many whorled", *trucanini* is described by Petterd as having only 4 whorls.

The status of *Planilaoma* became more complicated when Solem (1976), upon dissecting *Planilaoma*, declared it to be not a punctid but a primitive charopid:

> The only charopid known to me that may lack a secondary ureter is the Tasmanian species *Planilaoma luckmanii* (Brazier, 1877). The material available of this species was very limited and this observation (Solem, *unpublished*) needs to be confirmed by more dissections. To date, this is the only Indo-Pacific taxon seen that might be in any way transitional from the pallial cavity states of the Endodontidae to the Charopidae. (Solem, 1976:85)

This is Solem's entire published discussion of this species; his reasons for considering *Planilaoma* a charopid were never published. Smith and Kershaw (1979) then included *Planilaoma luckmanii* in the Charopidae, while synonymising *sitiens* and *trucanini* under *Paralaoma caputspinulae* and *Trocholaoma parvissima* respectively, in both cases without giving reasons. Smith and Kershaw give the following characterisation of *luckmanii* (p. 154):

> Shell small, 4-5 whorls, with almost flat spire, medium umbilicus, roundly olique lunate aperture. Sculpture of fine, spaced radial ribs with close radial

riblets and spiral striae in interstices. Protoconch with radial lines to smooth. Colour light brown with red segments (dorsal surface only.)

The first point of interest here is that the protoconch is stated as having "radial lines" when radial lines are not noted by any previous author. Secondly, if the sculpture is of fine spaced radial ribs with close radial riblets, this is actually consistent with the description of *sitiens* and not *luckmanii.*

The Field Museum of Natural History, Chicago collections include three samples of *Planilaoma luckmanii,* none of which display radial riblets on the protoconch (J. Gerber, pers. comm.). SEMs taken by Solem of a dissected specimen clearly show variation in rib height, as is indicated in the description of *sitiens.* The radula is shown as having tricuspid lateral teeth, which alone explains why Solem considered *Planilaoma* not to be a punctid (laomid), as Solem described the Laomidae (now Punctidae) as always having bicuspid laterals. Significantly, the locality (near Great Lake (4735)) for the material used was well away from the type locality (Hobart, 5224).

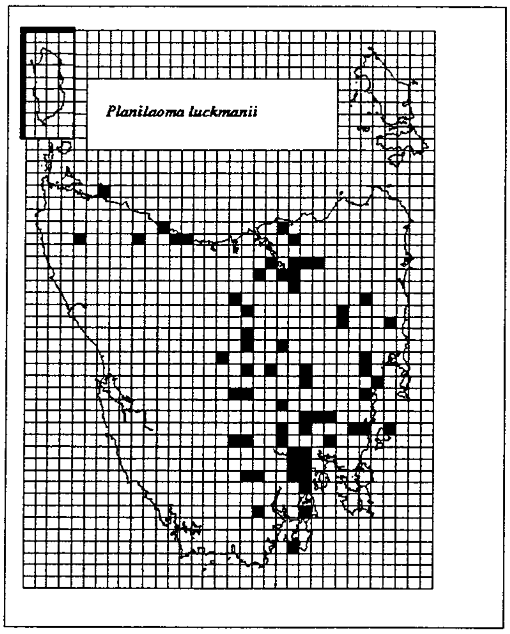
I extracted radulae from specimens of *trucanini* from Cataract Gorge (its type locality, 5041) and *luckmanii/sitiens* from Knocklofty (5225) and from near Bend 5 on Nelson Road (5224), which were the two closest large populations of *Planilaoma* I was aware of to the type locality of *P. luckmanii* (likely to have been near the present Waterworks Reserve). The lateral teeth are clearly tricuspid in each case, confirming that *sitiens* and *trucanini*, like *luckmanii,* are charopids. Given that the claimed "radial lines" on the protoconch as mentioned by Smith and Kershaw did not exist on any specimen available, including hundreds of specimens from as near as possible to the type locality, or on any known museum specimen (there is no known physical holotype), or in the original description, the idea that *Planilaoma luckmanii* has a radial protoconch can be dismissed. It is not known why Smith and Kershaw (1979) reported a protoconch with radial ribs, but the same authors also incorrectly report radial protoconch ribbing on *Discocharopa mimosa* and *Pernagera tasmaniae.*

The only issue remaining is whether these forms are all one species or multiple species. There is substantial variation in spire height (flat to subturbinate), umbilicus width (D/U 5-15), strength of the irregular pseudo-primary ribbing (where present), shell colour (some specimens are rayed, some on the upper surface only and some on both surfaces) and shell size (adults of 3.8-4.5 whorls are 2.3-3.4 (-3.8 rarely) mm wide). However, this variation appears to be continuous and the variation in specimens from individual localities can extend across most of the variation range for the entire species. In the case of the most extreme specimens (the small, high-spired, uniformly bronze and narrow-umbilicus *trucanini* at Cataract Gorge) there are simple ecological explanations for the variation, including the impact of a locally successful competitor in the same size range (*Pasmaditta*). This thesis treats all these forms as one species, *Planilaoma luckmanii,* for these reasons, but extreme forms are worthy of study.

In summary, this thesis includes under the name *Planilaoma luckmanii* any Tasmanian charopid within the size range stated above, having a protoconch that is smooth apart from irregular pitting (possibly a corrosion effect) and/or weak spirals, an open umbilicus, and a sculpture of genuinely distinct low radial riblets which are strongly swept back from the sutures at an acute angle, with interstices of regular spiral traces. Usually but not necessarily there are higher ribs of irregular size (not reliably distinguishable from the lower riblets on early whorls), but sometimes apparently regular spacing, emerging from the lower riblets.

<u>Identification:</u> This species has caused substantial confusion, but this mostly involves genuine specimens being misidentified as something else. A small number of records from western localities including Lake St Clair and from islands off the far south coast have been rejected as the habitat is not typical for the species and there are no known specimens. Specimens of some of the finer-sculptured *Pernagera* species are sometimes confused with this species.

Distribution map:



Discussion: This is a commonly recorded species with 62 grid square records. Its distribution is typically eotlian with the exception of two apparent gaps. One is in the north-east. As 400 grid-square species records (of all species) have occurred in this gap, and as these were generally in suitable habitat (*P. luckmanii* occurs mainly in fairly dry to fairly wet eucalypt forest, including subalpine forests, but is also found in very wet eucalypt forest and rainforest) it is very likely this gap is genuine – the reasonable frequency the species at some sites close to the edge of the gap (eg Skemps, square 5342) further supports this view. The second possible gap is on the Tasman and Forestier Peninsulas, from which 110 grid-square species records have been made, but very little collecting there has been in this species' most preferred range of habitats.

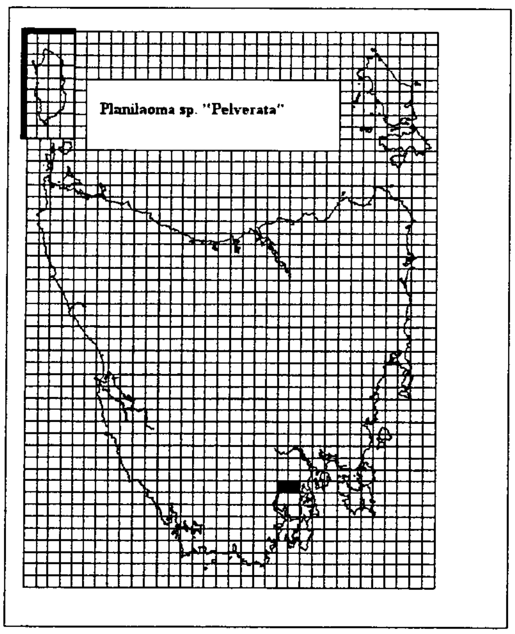
Planilaoma sp. "Pelverata" (Plate 10c-d)

Taxonomy: **Brief diagnosis:** Medium-small charopid (requires confirmation), spire very slightly elevated, adults 2.8-4.0 mm wide at 4.1-4.7 whorls, protoconch smooth at x60 magnification, adult sculpture of low riblets, these very similar to *Planilaoma luckmanii* at low magnification but actually irregular, indistinct and of variable height, with weak spiral traces generally stronger near the sutures. Umbilicus medium (D/U c. 6), shell densely rayed with grey-white to reddish-pink alternately with medium-brown.

This species has a very similar appearance to *Planilaoma luckmanii* but is slightly larger and can be distinguished by the sculpture, which also separates it from all other charopids except *Planilaoma* sp. "Breaksea". It is here assumed to be a charopid because of the flat spire, shell size and open umbilicus, but it could also be a punctid related to *Pedicamista* sp. "Southport", from which it is distinguished most easily by gross shell shape and lower whorl count.

Identification: No issues identified.

Distribution map:



Discussion: This is a very poorly known local endemic species, so far collected only from Pelverata Falls and another site 3 km downstream. Establishing the exact range of the species is difficult because accessible sites in the immediate area are often on private land. Within the Pelverata Falls gorge it occurs in environments extremely similar to those often inhabited by *Planilaoma luckmanii* – in moss and leaf litter on rock faces in scree and under rocks. The habitat is open wet forest and *Allocasuarina* scrub on dolerite and the scree downstream of the waterfall is extensive.

Planilaoma luckmanii is extremely reliably recorded in dolerite screes throughout its range. The author has found it at 41 of 45 such screes where more than an hour's collecting has occurred. It is thus surprising that *P. luckmanii* is absent from the scree where *P.* sp. "Pelverata" is recorded. The Cygnet district further south of Pelverata (between the Huon River and D'Entrecasteaux Channel) lacks any records of either species, and both are also unrecorded from Snug Plains directly east of Pelverata. Despite this, *P. luckmanii* recurs on South Bruny Island. Whether the two species influence each other in any way or whether it is pure coincidence that a species apparently closely resembling *P. luckmanii* occurs in a similar habitat close to its apparent range edge, is a matter for further study. *P.* sp. "Pelverata" is considered to be a scree endemic as it fails to occur in the well-searched forests immediately surrounding the scree area, both on Snug Tier and on the Pelverata Falls track.

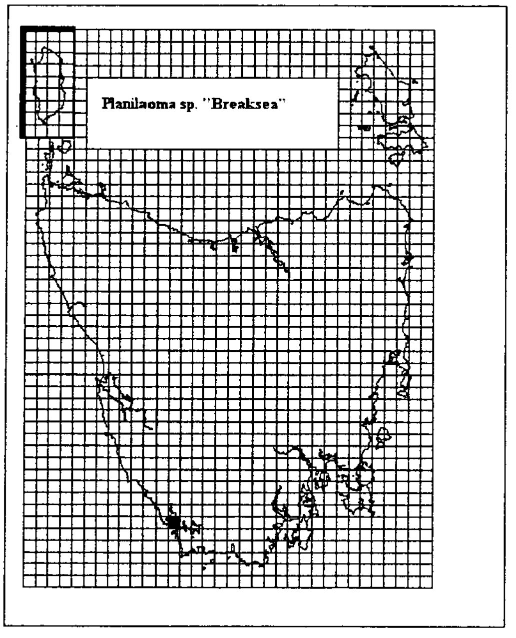
Planilaoma sp. "Breaksea" (Plate 10e-f)

Taxonomy: **(Brief diagnosis)** (Limited material – one specimen) Small charopid (requires confirmation), only known specimen 2.0 mm wide at 3.8 whorls (possibly subadult), spire slightly elevated, umbilicus small (D/U = 8.5), protoconch smooth, adult sculpture of low coarse riblets, these very similar to *Planilaoma luckmanii* at low magnification but actually irregular, indistinct and of variable height, with very weak spiral traces most visible on the base. Shell semi-translucent with wide, fairly indistinct, yellow-horn and orange-red rays (paler and brighter than shown in Plate 10e).

There are no significant sculptural differences between this species and the previous. The differences in umbilicus width, shell size, degree of elevation of the spire and shell colour, plus the large distance between the locality where the specimen was found and the restricted area where *P.* sp. "Pelverata" occurs, make it extremely unlikely that it is the same species.

Identification: No issues identified.

Distribution map:



Discussion: This presumably locally endemic species is only known from a single specimen collected on Breaksea Island, an oceanic island at the mouth of Bathurst Harbour in the far south-west. The specimen was found in leaf litter in wet *Leptospermum/Tasmannia* scrub. With very little collecting in similar areas it is not possible to say whether the species is confined to the island or occurs elsewhere.

Discocharopa lottah (Petterd, 1879) (Plate 10g-h)

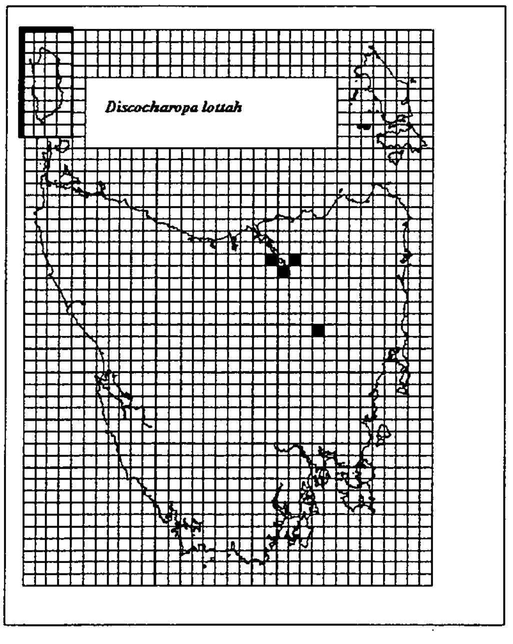
Taxonomy: **(Elevation from synonymy)**

> "Shell openly umbilicated, depressed, discoid, translucent, thin, white, scarcely shining, regularly rather coarsely ribbed throughout, interstices with extremely fine striae; spire flat; suture moderately impressed; whorls 4.5, slightly convex, apical (2.5) quite smooth, last rounded, not descending in front, below with striae as above running into the somewhat shallow, open umbilicus, which is flattened at the bottom; aperture lunate; periostome simple, thin. Diameter, greatest 2.75, least 2, height 1 mil."
>
> \- Petterd (1879: sp.57)

This species requires reallocation to a different genus. Solem (1983) correctly stated that all Tasmanian species allocated to *Discocharopa* are not true *Discocharopa* (which is similar in shell form to the Tasmanian species but completely lacks spiral adult sculpture) but did not attempt to reallocate them. This species was synonymised under *D. vigens* by Petterd and Hedley (1909) but these authors overlooked the fundamental difference in protoconch, significant at genus level – *D. vigens* has a strongly radial protoconch but that of *D. lottah* is smooth. Smith and Kershaw (1979) transferred it to the superficially similar and possibly closely related *D. mimosa*. *D. lottah* lacks any spiral traces on the protoconch, is slightly larger, has a flat rather than slightly convex spire, has a larger protoconch, a totally different colour pattern and a radically different ecology (having only been recorded under rocks, whereas *D. mimosa* is almost exclusively arboreal (author's data)).

Identification: No issues identified.

Distribution map:



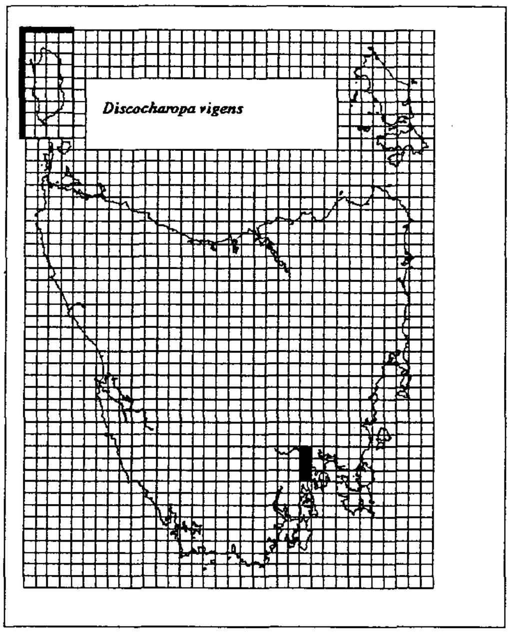
Discussion: This obscure local endemic species is known only from four localities, Notley and Cataract Gorges near Launceston, a site on the western side of Mt Arthur near Lilydale, and Conara in the Northern Midlands. At Cataract it was said by Petterd (1879) to occur at "Cataract Hill … on the under surface of large boulders" and to be "extremely rare". Two recent records have confirmed that the species survives in a gully at Cataract Gorge, although it is uncommon there and the site where it survives (living only under large rocks) is very degraded. The habitat at Notley Gorge is unknown. At Blythe Spur, just three specimens were found under a small rock at a site that has been surveyed very thoroughly. The Conara record contains no habitat descriptions and the habitat remaining in this area is very different from that remaining in Cataract Gorge, being mostly dry woodland only. Possibly gullies near Conara contained more appropriate vegetation prior to clearance, or possibly the record is incorrect. The Blythe Spur record shows, and the Conara record (if correct) suggests, that the species is not confined to gorge environments as may be the case for *Pasmaditta jungermanniae*. There is currently not enough information to categorise or explain the range of this species.

Discocharopa vigens (Legrand, 1871) (Plate 11a-b)

Taxonomy: This species requires reallocation to a different genus (see comments for *D. lottah*) and is also distinct at genus level from *D. lottah* and *D. mimosa* on account of the difference in protoconch sculpture. No species-level issues identified, except for misidentifications.

Identification: Especially since the inclusion of this very rare species in Smith and Kershaw (1979), misidentifications of other species as this species have been far commoner than genuine records. These errors have resulted from two sources – taxonomic errors (specimens that are actually *D. lottah* or Charopidae sp. "Skemps" but were allocated to *D. vigens* before those species were known to be distinct) and identification errors (of specimens of *Pernagera* spp., *Allocharopa* spp., *Planilaoma luckmanii* and *Roblinella gadensis*). Only records from the Hobart area are accepted. There is only one record from elsewhere backed by what appear to be correct specimens. Locality information about this record (specimens collected by Petterd and held in the Queen Victoria Museum collections) is contradictory as the specimens are labelled "Hillgrove" and the box is labelled "Nabowla". The only place currently known as "Hillgrove" is near Burnie, while Nabowla is east of Launceston.

Distribution map:



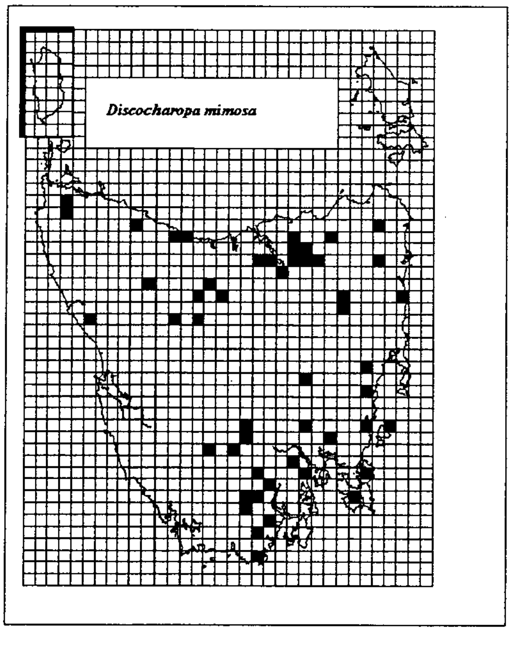
Discussion: Despite the large number of erroneous records of this endemic species, it is only reliably recorded from three adjacent grid squares in the Hobart region. This is based on two (possibly three) 19th century localities, and two recent sites, one of them the first north of the Derwent. The species appears to only occur in dry eucalypt forests, and to be extremely rare. One recent site on Grass Tree Hill yielded three dead specimens in 1990 and another in 2002. These were all dead shells in poor condition, found on a dry, sparsely vegetated knoll where the undersurface of most rocks remains dry even in very heavy rain. It is not clear how rapidly dead shells would decay in such circumstances. The second site, near Romilly Street in South Hobart, has yielded two live and four dead specimens in five hours' searching since the species was first found there November 2002. This, the sole recent record of the species alive, comes from an area of short wet eucalypt forest that is nearly surrounded by houses and farms, and hence has not been burnt since major fires in 1967. Specimens have been found over an area of about a hectare; the total area of forest in the block is 4 ha but some of it is severely infested with plant weeds. It is possible that this species has been much more widespread in the past and has been adversely affected by human activities such as overburning of dry forest.

Discocharopa mimosa (Petterd, 1879) (Plate 11c-d)

Taxonomy: This species requires reallocation to a different genus (see comments for *D. lottah*). No species-level issues identified. Bonham (1995) discussed features of this species, and its rediscovery from presumed "extinction".

Identification: A record from Walkers Lookout, Flinders Island has been discounted as the specimen is a juvenile *Thryasona diemenensis*. In some cases, *Pernagera kingstonensis* and *Planilaoma luckmanii* have been misidentified as this species. Neither the drawing nor description of the species in Smith and Kershaw (1979) represent its features with complete accuracy (see Bonham 1995).

Distribution map:



Discussion: This species is widely recorded with 50 grid square records, but these are scattered rather sparsely around the state, so that the number of records is very low compared to the total number of grid square species records across its range (1.3% of total) and the total number of grid squares within its range (6% of total). These figures are distorted by the difficulty of finding this snail, which is almost exclusively arboreal, mostly found in mosses, loose bark and leaf litter on the stems and limbs of a wide range of trees. Searching for it is time-consuming and often does not yield a wide range of other snails. Furthermore, because there was very little searching of arboreal habitats until the last 15 years, the species has been under-represented in collections to the point where it was once wrongly considered extinct (Bonham 1995). Such has been the acceleration in recording of this snail that 32 (64%) of the records in this project date from the last seven years.

The existing records of the species cover almost the entirety of the mainland of Tasmania. The species appears to be absent from the major Bass Strait islands where the same microhabitat is frequently occupied by *Pernagera officeri*. There is a gap in records in the Central Plateau area, presumably because of the lack of suitable habitat. The species has not been recorded on eucalypts, which are the only significant trees apart from alpine conifers on much of the Central Plateau. Tree genera it is recorded from include *Olearia, Pomaderris, Bedfordia, Nothofagus, Atherosperma, Eucryphia, Melaleuca* and *Acacia*. There is also a gap in records in the south-west, but this is likely to be because the majority of records from this gap date from prior to the increase in record density resulting from improved knowledge of the species' microhabitats. The gap (delimited using the 37N and 43E grid lines) includes 408 grid-square species records (not an especially significant figure for a species which accounts for only 1.2% of grid-square species records over the Tasmanian mainland anyway) but only 97 of these date from the past seven years. It is most probable that the species is scarcer rather than absent in the south-west as its primary habitat trees (*Olearia* and *Pomaderris*) are rarely present in significant densities there. This species is considered to be statewide (excluding Bass Strait) in suitable habitat.

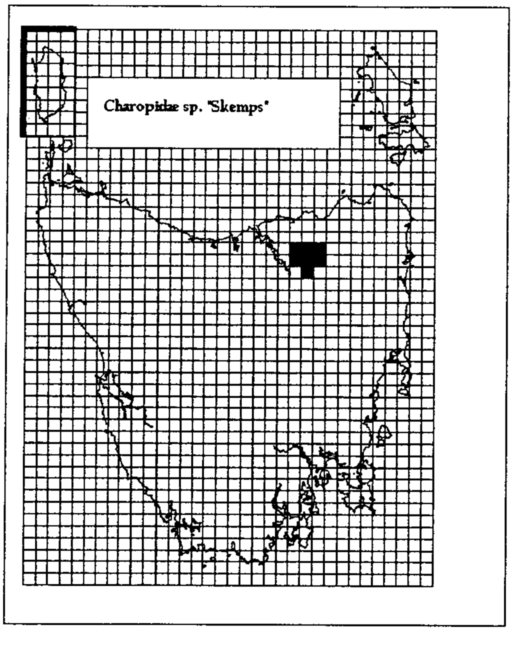
Charopidae sp. "Skemps" (Plate 11e-f)

Taxonomy: **Brief diagnosis:** Flat-spired charopid, adults 3.8-4.6 mm wide at 4.5-5.3 whorls, umbilicus extremely wide (D/U c. 2.5), protoconch of strong radial ribs, adult sculpture of fairly strong sharp radial primary ribs (c. 80-100 on last whorl) with interstices of radial riblets and less apparent spiral striae, colour white to greyish yellow, no colour rays.

Specimens of this species have often been mistaken for *Discocharopa vigens* but C. sp. "Skemps" can be distinguished by its far greater size and whorl count (*vigens* is 2.5-3.0 mm wide at 3.5-4.0 whorls), sharper ribs, and by the rough-looking periostracum covering the shell of *vigens*. It is probably most closely related to *Pernagera officeri* but differs from it by never having an elevated spire (*P. officeri* usually slightly elevated – H/D typically 0.35-0.40 for C. sp. "Skemps" and 0.40-0.50 for *P. officeri*), by having more widely spaced and bold ribs (*P. officeri* of similar size c. 130 ribs on last whorl), by a slightly wider umbilicus (*P. officeri* D/U 3.3-4 (occasionally 2.5-3.3)), and by the last whorl sharply descending at the aperture (which is more or less rounded in *P. officeri*).

Identification: No issues identified.

Distribution map:



Discussion: This is a local endemic that occurs in a range of approximately 30x30 km in the inland north-east, and has been recorded from 7 grid squares. The north-east is a very well-surveyed area for snails and the chance of records much outside the known range (excluding possibly north and north-west of it, where the amount of searching has been lower) is remote. The snail occurs in very wet forests, and is normally (but not always) present in areas close to creeks.

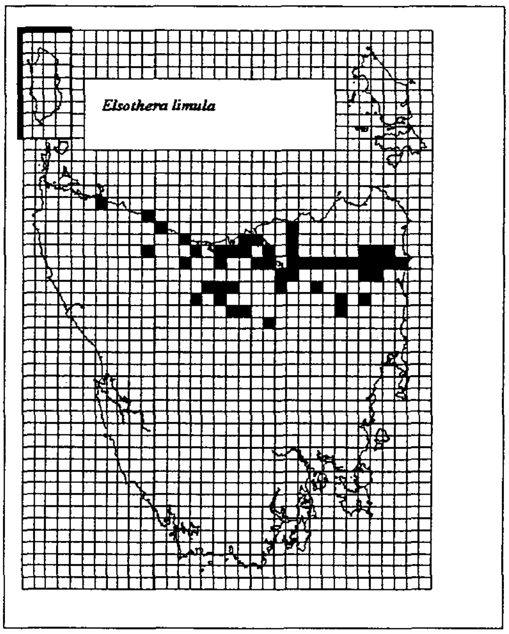
Although most of the species' range is inside Plomley's Island, it extends slightly outside that zone with occurrences at Lilydale Falls and on the western side of Mt Arthur, both localities where *Anoglypta launcestonensis* is apparently absent despite suitable habitat. The most striking corellation between its range and any other species is that its range is almost identical to that of the crayfish *Engaeus orramakunna* Horrwitz, 1990 (Doran and Richards 1996). *Engaeus orramakunna* is itself part of a multi-species crayfish mosaic including several local endemics, whereas Charopidae sp. "Skemps" appears not to share a border with any snail species. Charopidae sp. "Skemps" is classified as a local endemic with an unexplained range.

Elsothera limula (Legrand, 1871) (Plate 12 a-b)

Taxonomy: No issues identified.

Identification: Lower Gordon survey records cited as this species in some sources and as *E. ricei* in others have been rejected as neither species occurs anywhere near this area and the specimens are either lost or misidentified. Most probably they were either *Elsothera* sp. "Needles" or *Stenacapha vitrinaformis*. A record from the Duck River area by Smith and Kershaw (1981) has been dropped, as there is no known supporting evidence and no recent records. A Petterd (1879) record from Circular Head is retained - although there are no recent records from there either, the extent of habitat disturbance has been too great to say that the species was never there, and early paintings (now held in the Union Hotel, Stanley), suggest the area was suitable. Some museum specimens identified as this species have been found to be *E. ricei*.

Distribution map:



Discussion: This endemic species is recorded from 49 grid squares in the north of the state, excluding the far north-west. Its distribution is very similar to that of *Victaphanta lampra* except that it is not known to extend south into the Lake Leake area. The same comments made for *Victaphanta lampra* (that the species combines an eotlian western boundary with a southern boundary roughly along the Great Western Tiers face but excepting the upper Forth valley) also apply to this species.

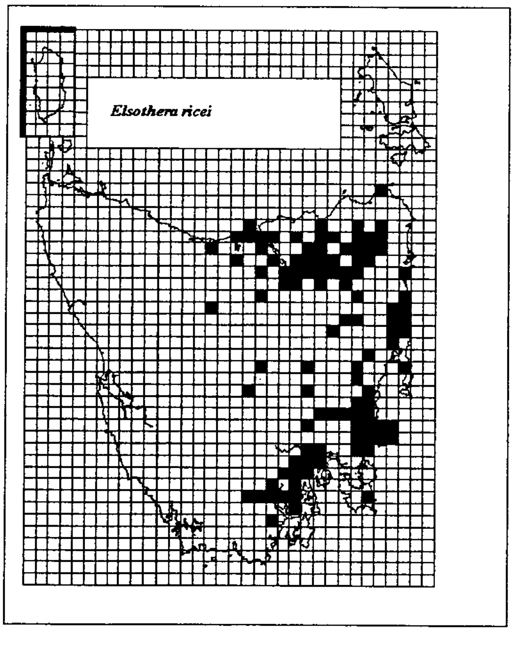
This species is the same size as *Elsothera ricei* and occupies similar habitats and microhabitats. There are three known localities where they occur together – Notley Gorge (square 4942), Prossers Forest (5142), and East Diddleum (5442). At the latter, microsympatry was observed, with the two species living together under the same log. It is normal to find only one at any given site, but the criteria determining which species occurs at a given site are unknown. Habitat does not appear to be the key determinant as both species are present at some dry forest sites and some rainforest sites. The distribution of the two species in the north-east is unusual, with *E. limula* being consistently recorded in the southern and western portions of the inland north-east (especially around the 42N grid line) but with no records further north-east. Even within the areas where *E. limula* is commonest, there are also some sites dominated by *E. ricei*. The apparent gap for *E. limula* in the far north-east could represent a genuine absence or an area where *E. limula* is naturally scarce.

Elsothera ricei (Brazier, 1871) (Plate 12 c-d)

Taxonomy: No issues identified. (N.B. This species should probably be known as *Elsothera legrandi*, see note under *Allocharopa legrandi*)

Identification: *Elsothera ricei:* See above for Lower Gordon survey details. An isolated record from the north-west in Smith and Kershaw (1981) has been discounted as it is well beyond the species' known range and there is no known supporting evidence – a juvenile *Stenacapha* is more likely for that area.

Distribution map:



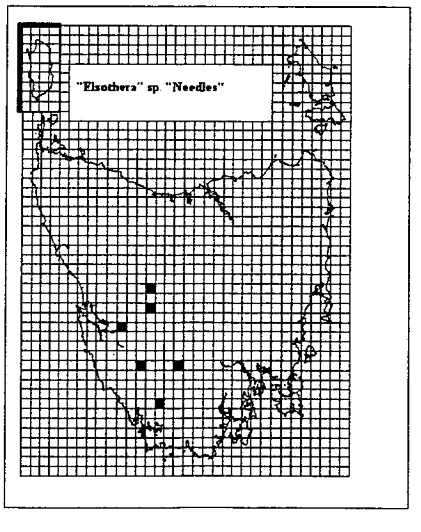
Discussion: This endemic species is recorded from 103 grid squares in the eastern half of the state. The consistency of records is highest in areas that are well surveyed for snails generally, and lowest in areas (like the Midlands generally) that are poorly surveyed. There is no real difference in the frequency of the species in different parts of its range, although in the north-east it is more likely to occur in rainforests than elsewhere, where it is mainly a dry and wet eucalypt forest species. The scarcity of records in the upper Derwent Valley makes it difficult to determine the western boundary of this species, although the amount of searching without any records in the Mt Field and Florentine Valley areas suggests that it is absent there. It probably has a typical eotlian distribution. Unlike *E. limula*, there are no apparent gaps in this species' range in the north-east where the two species are both present.

Elsothera sp. "Needles" (Plate 11 g-h)

Taxonomy: **Brief diagnosis:** Medium-sized charopid, adults c. 4.5-5.5mm at c. 5 whorls, deep rounded body whorl (shell height c. 3 mm), flat spire, umbilicus medium (D/U c. 5), steep sided and deep. Radial sculpture of fine straight radial ribs with reticulate interstices (very similar to Tasmanian *Elsothera*) but protoconch of fine spiral traces to smooth, shining. Colour orange-pink or greyish-purple to deep purplish red.
This species has a superficially similar appearance to *Elsothera ricei* but once the non-radial protoconch sculpture is noticed it is unmistakably different from any other Tasmanian charopid. For this reason it is not a true *Elsothera*.

Identification: No issues identified.

Distribution map:



Discussion: This rare endemic species is known from 6 grid square records in the south-west, covering an area of approximately 120x60 km. The scarcity of records is partly a result of the low rate of surveying within the species' range (mean 3.28 species recorded per square). It may also be a result of under-reporting, as there are unclarified records from the Lower Gordon Survey that may be of this species. Indeed, the general lack of surveying in areas adjacent to the species' known range makes it difficult to comment on how restricted the species is. It is unlikely to extend further east into the well searched Florentine/Mt Field/Tarraleah areas, and is also unrecorded from the Southern Forests, but the remainder of its range margins are so poorly searched that it could be far more widespread in western Tasmania.

All sites where this species has been recorded have been in rainforest or near-rainforest situations, but these have included low myrtle scrubs at high altitudes in the Western Arthurs, where the species appears common and all other snails are scarce or absent.

There is not enough information to determine the range of this species yet, although it is reasonable to expect it not to occur outside the western half of the state.

Allocharopa legrandi (Cox, 1868) (Plate 12e-f)

(N.B. Use of this name for this species appears to be formally incorrect).

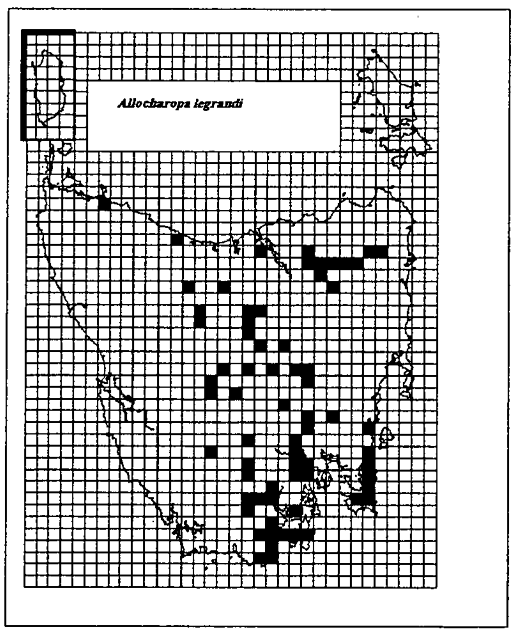
Taxonomy: This species, and *A. kershawi*, have caused considerable taxonomic confusion, which includes name allocation issues that are serious and unresolved. Specifically, Petterd (1879) treated *Helix ricei* Brazier, 1871 as a synonym of *H. legrandi*, and gave a description that clearly indicated that the species is similar to what is now called *Elsothera ricei* (eg shell width of 3.3 mm and note saying "Very much resembling *H.*[*Helix*] *iuloidea*".) Petterd appears to have included what is now thought of as *Allocharopa legrandi* under *H. kershawi*. Despite this, Petterd and Hedley (1909) noted "The author of this species [*H. legrandi*] appears to have distributed *H. ricei* under this name. What passes in all collections as *H. legrandi* is a species at variance with the original figure and description." The original figure accompanying the description of *Helix legrandi* (Cox, 1868) shows a shell with a considerably wider umbilicus than is normal for *E. ricei,* but the shell width is again more compatible with a small *E. ricei* than with *A. legrandi,* which is typically 1.6-2.3 mm wide. I examined the syntypes of *H. legrandi* in the Australian Museum collection [AM 63673] and they are clearly small specimens of what is now known as *E. ricei,* meaning that "*E. ricei*" should really be *E. legrandi* and that "*A. legrandi*", a widespread and common snail, is actually undescribed. Petterd (1879) was correct but Petterd and Hedley (1909) were not, and Iredale (1937a) and Smith and Kershaw (1979) then followed Petterd and Hedley's error.

As formal taxonomy beyond the level of species recognition is beyond the scope of this thesis, the name *Allocharopa legrandi* is still used here but there is actually a need to describe the species commonly and incorrectly known as *A. legrandi* under a new name (unless a name referring to it can be found). That species is characterised for the purpose of this thesis as a very small charopid, with adults of 3.7-4.5 (very rarely to 5.0) whorls being typically 1.6-2.3 mm wide (very rarely to 2.5 mm), with a strongly radial protoconch crosscut with weak spirals and adult sculpture of low, tightly packed (typically 120-220 on body whorl) radial ribs, interstices reticulate with spiral elements very strong in specimens from some areas, umbilicus medium (D/U 4-6), spire flat or nearly so (can be slightly elevated or very marginally sunken).

Despite the separation of numerous undescribed species from *A. legrandi,* the remaining specimens classified under this name are still variable and more research may result in more species being recognised. Specimens from the far south of the species' range are generally white, with the spiral cross-sculpture on the protoconch stronger than normal. However, populations with one or both of these characters occur locally elsewhere. Specimens from the northern Forestier Peninsula and adjacent mainland are slightly larger with more whorls and a slightly wider umbilicus (D/U c. 4) than normal, however similar specimens again occur sporadically elsewhere. Spiral sculpture around and on the walls of the umbilicus is stronger than normal on most Tasman and Forestier Peninsula specimens, and also some from the Glenorchy-Collinsvale area just north of Hobart (5125, 5225). Specimens from the north of the state tend to have slightly more widely spaced sculpture, and also tend to have dark lines along the top of the ribs (a feature of *A. kershawi.*)

Identification: Some early records under this name are actually *Elsothera ricei* because of the taxonomic confusion between the two (but see under both species for discussion of the names involved). The record of *A. kershawi* from Sandford by May (1923) was incorrectly transferred to *A. legrandi* by Smith and Kershaw (1981) who regarded *A. legrandi* as exclusively southern and *A. kershawi* as exclusively northern. Sometimes *Roblinella gadensis,* which looks similar but has a different protoconch, has been misidentified as this species. Numerous records of this species have been transferred to other *Allocharopa* spp following the recognition of numerous undescribed species in the genus.

Distribution map:



Discussion: This endemic species is widespread and widely recorded, with 70 grid-square records. It is apparently absent from the Bass Strait islands, from the far north-west (where *Allocharopa tarravillensis* occurs), and from the remainder of the west (where *A.* sp. "Teepookana" occurs). The known ranges of these two species both go close to the edge of the known range of *A. legrandi* in places, but there is presently no evidence of lengthy parapatric boundaries. There are also no records of *A, legrandi* from the east coast (where *Allocharopa* sp. "Douglas" occurs – again, there is no evidence of parapatry yet) although the absence of this species from the area requires confirmation given the relative lack of focused searching. The species has been recorded in sympatry with six other *Allocharopa* species at different localities, namely *A. kershawi*, *A.* sp. "Wellington", *A.* sp. Sandspit", *A.* sp. "Victoria Valley", *A.* sp. "Dromedary" and *A.* sp. "Junee".

This species is treated provisionally as an eotlian species with an East Coast gap similar to the gaps for *Thryasona diemenensis* and *Stenacapha hamiltoni.* However any treatment of this species must be very tentative, as it is possible it will require further taxonomic division, and as seperation of many *Allocharopa* species has only occurred very recently with limited opportunities to test their ranges through targeted sampling.

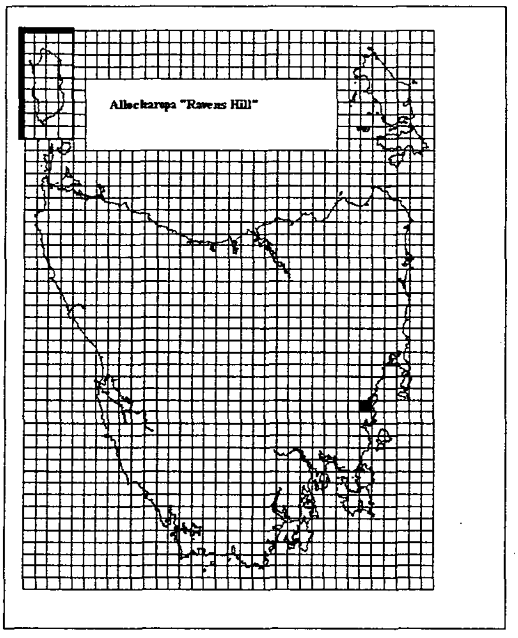
Allocharopa sp. "Ravens Hill" (Not illustrated)

Taxonomy: **Brief diagnosis:** (Limited material – five specimens) Small charopid, 2.6-2.9 mm wide at 4.8 whorls, tightly coiled, protoconch as for *A. legrandi,* primary sculpture of fairly close bold blunt radial ribs, c. 120 on body whorl, spire elevated, secondary sculpture with radial riblets more prominent than spirals, umbilicus closed, colour whitish tan.

The combination of the radial protoconch and closed umbilicus distinguish this from all other small Tasmanian species except *Elsothera limula*, which is much larger and more bulbous, and the similar *A.* sp. "McGregor", which is slightly smaller, with a less elevated spire, closer and less prominent ribbing and fewer whorls. There also appear to be minor differences in the interstical sculpture but more specimens are needed to confirm this.

Identification: No issues identified.

Distribution map:



Discussion: This presumably locally endemic species is recorded from a single location, Ravens Hill near Triabunna, where several specimens were collected in wet sclerophyll forest on dolerite. This site is inside the Buckland Military Training Area, in which there has been relatively little snail sampling (most of it by Mesibov in 1991) due largely to access issues. The species has not been recorded in the well-searched Orford-Wielangta area to the south, or in some searching in the Little Swanport area forests to the north, so it may be very localised. This is one of four small-umbilicus species with moderately to very fine sculpture in the south-east. So far as is known the species do not overlap (Fig 4.4) and more research will be required to establish whether there are any parapatric boundaries. This is one of three possible sub-radiations within the Tasmanian *Allocharopa* radiation of at least 17 species.

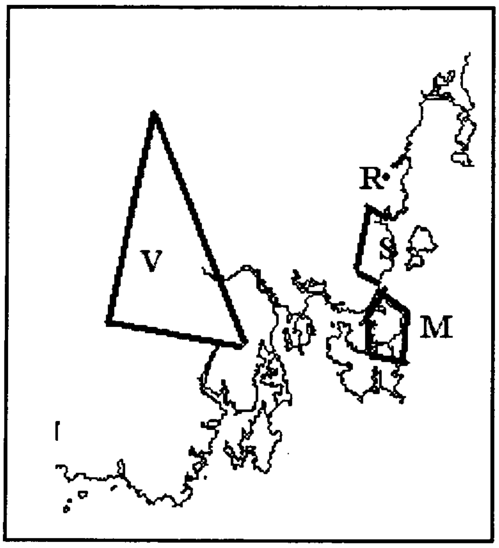


Fig 4.4 Known distributions of four small-umbilicus finely-sculptured *Allocharopa* in south-eastern Tasmania. R= *A.* sp. "Ravens Hill", S= *A.* sp. "Sandspit", M=*A.* sp. "McGregor", V= *A.* sp. "Victoria Valley"

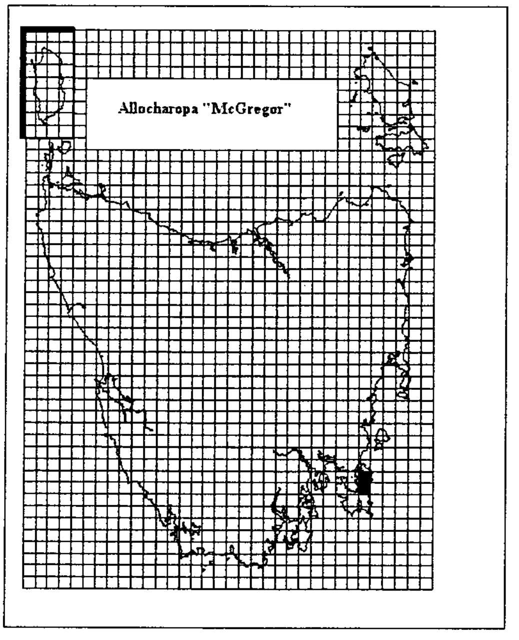
Allocharopa sp. "Mc Gregor" (Plate 13a-b)

Taxonomy: **Brief diagnosis:** Small charopid, 2.0-2.3 mm wide at 4.4-4.6 whorls, tightly coiled, spire flat to marginally elevated, very similar to *Allocharopa legrandi* (sculpture identical) except in tighter spire (as indicated) and most significantly in having a minute to closed umbilicus (D/U >50), c. 140-170 low primary riblets on body whorl, spiral secondary sculpture typically as prominent as radial or more so, colour pale horn.

For separation from *A.* sp. "Ravens Hill" and for separation of these two species from all others see that species. Whether the umbilicus is termed "minute" or "closed" may be a matter of terminology. In some specimens, there appears to be a very small umbilicus where the riblets fuse to form a partial "plug", but the whorls cannot be seen through it.

Identification: Specimens of *A.* sp. "Ravens Hill" and *A.* sp. "Sandspit" were initially thought to be this species.

Distribution map:



Discussion: This is a local endemic found on the Tasman and Forestier Peninsulas and presently recorded from 2 grid squares. All records have been associated with mossy dolerite rocks in wet eucalypt forest and mixed forest. It has only been recorded at three sites, with single specimens at Bellettes Creek (Forestier Peninsula) and Camp Falls (Tasman Peninsula) and a total of 16 specimens at McGregor Peak (Forestier), 13 of which were on a single mossy boulder approximately a metre wide. Given the amount of searching in the area it appears to be a rare species. This is one of three species (the others being *Helicarion rubicundus* and *Pernagera* sp. "Waterfall") that is confined to these two peninsulas, and in common with these species, it is only known from the northern part of the Tasman Peninsula so far. Endemism to these peninsulas could potentially be due to glacial refuge endemism and/or effective island endemism. See *A.* sp. "Ravens Hill" for comments on its geographic relationship to other species. This species has been recorded in sympatry with *Allocharopa legrandi.*

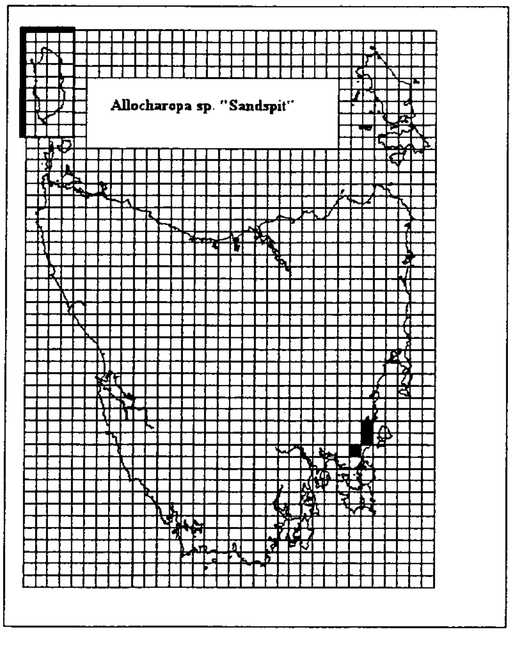
Allocharopa sp. "Sandspit" (Plate 13c-d)

Taxonomy: **(Brief diagnosis)** (Limited material – five adult specimens) Small charopid, 2.3-2.9 mm wide at 4.5-5.1 whorls, tightly coiled, spire flat to very marginally elevated, sculpture identical to *A. legrandi* but with radial interstices more prominent than spiral, umbilicus small (D/U 6-7), primary ribbing very fine (150-200 ribs on body whorl), colour tan to whitish tan, shell usually has a battered appearance due to periostracal peeling.

This is another small-to-closed-umbilicus *Allocharopa* similar to the previous two species but with a small rather than closed to minute umbilicus. Some specimens have more whorls than virtually all *A. legrandi* but more adult specimens are needed to determine the range of whorl counts at which this species is mature.

Identification: No issues identified.

Distribution map:



Discussion: This is a local endemic found in the Wielangta forests and around Orford in the south-east. The four known records occur from 3 grid squares and cover an area of about 5 x 20 km. Like *A.* sp. "McGregor", it is generally associated with dolerite rocks and screes, but it is not usually associated with moss. This species has been recorded in sympatry with *A. legrandi* and *A. kershawi*. See *A.* sp. "Ravens Hill" for comments on its geographic relationship to other species.

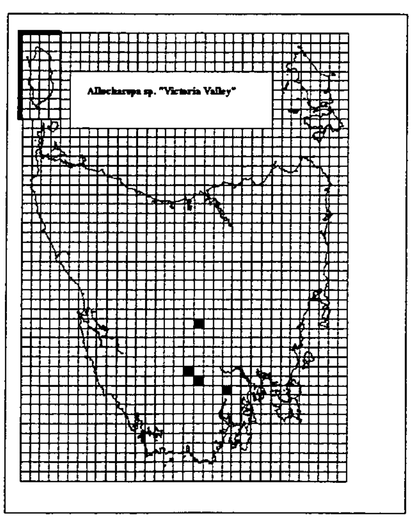
Allocharopa sp. "Victoria Valley" (Plate 13e-f)

Taxonomy: **Brief diagnosis:** (Limited material – nine specimens) Small charopid, 2.2-2.4 mm wide at 4.3-4.6 whorls, spire flat to slightly elevated, sculpture identical to *A. legrandi* with spiral interstices prominent, umbilicus very small (D/U c. 10) with whorls sometimes visible through it, c. 170-190 riblets on body whorl, colour tan to pale brown, often with dark lines along the tops of primary riblets.

This is the final small-to-closed-umbilicus *Allocharopa*. The umbilicus is much narrower than in *A.* sp. "Sandspit" and the secondary sculpture is more similar to *A.* sp. "McGregor".

Identification: No issues identified.

Distribution map:



Discussion: This species is treated as a local endemic, but may not be, as the four known records, each from a different grid square, cover a triangular area with sides of about 70 by 40 km. The four sites the species has been recorded at are quite distinct from each other: Victoria Valley Falls (dolerite scree with sparse riparian scrub), Junee Cave (karst around cave mouth), Styx River (oldgrowth mixed forest) and Jeffreys Track near Crabtree (subalpine wet forest on dolerite). More information is required to determine the range of this species more accurately and consider its relationship (if any) to the distribution of other *Allocharopa* species. This species has been recorded in sympatry with *A. legrandi, A.* sp. "Junee" and *A.* sp. "Wellington".

Allocharopa sp. "Mystery Ck" (Plate 13g-h)

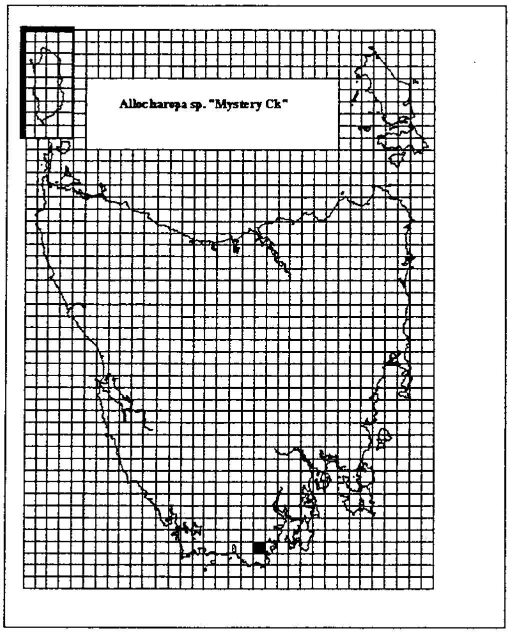
Taxonomy: **Brief diagnosis:** (Limited material – eight adult specimens) Small charopid, 2.2-2.4 mm wide at 4.4-4.7 whorls, spire flat, shell very flat (H/D 0.25-0.3), umbilicus very wide (D/U c. 3), sculpture as for *A. legrandi* with strong spiral elements cross-cutting radials on protoconch, riblets very fine, c. 170 on body whorl, aperture in plane of shell or nearly so, shell colour bright white.

This is the first of three wide-umbilicus *Allocharopa* species. It is very similar to *A.* sp. "Douglas" (which see) but the differences in shell shape produced by the much flatter shell, plus the distance between the two species, make it very unlikely that this is the same species.

Identification: No issues identified.

Discussion: This species is known from a single collection of several specimens made under limestone boulders along a length of walking track at Mystery Creek Cave in the far south. Although parts of the area covered by the collection were within 0.5 km of the range of *A.* sp. "Quarry", this species was not recorded in sympatry with it or any other *Allocharopa*. This is considered to be a karst endemic. See comments under *A.* sp. "Christ College".

Distribution map:



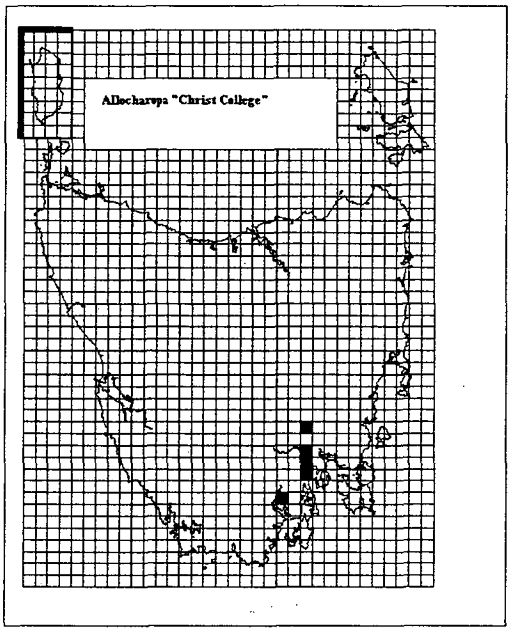
Allocharopa sp. “Christ College” (Plate 14a-b)

Taxonomy: **Brief diagnosis:** Small charopid, 1.7-2.1 mm wide at 4.2 – 4.6 whorls, spire flat to very slightly elevated, umbilicus very to extremely wide (D/U 2.8-3), aperture depressed, sculpture as for *A. legrandi* and *A. kershawi* with c. 90-150 coarse riblets on body whorl, height and boldness of riblets variable between specimens, colour pale tan to medium bronze-brown, more coarsely ribbed specimens usually with darker brown colour along the top of primary ribs.

This is another wide-umbilicus species, but it has some similarities with *A. kershawi* as well as with the two white fine-sculptured species *A.* sp. “Douglas” and *A.* sp. “Mystery”. There is only a risk of confusion with some very widely-umbilicated *A. kershawi,* but these are significantly larger for a given number of whorls (2.1-2.8 mm at 4.2-5.0 whorls). There is considerable variation between the known specimens of *A.* “Christ College”, particularly in ribbing density, and this may represent more than one species.

Identification: No issues identified.

Distribution map:



Discussion: This locally endemic species has been recorded from 5 grid squares in the south-east, principally in the Hobart suburbs with outlying records at Chauncy Vale in the southern midlands and Cradoc in the Huon Valley (the latter requires taxonomic confirmation as the specimen is in poor condition.) With the exception of the Cradoc record on mudstone (unusual for an *Allocharopa*), all records of this species are from dry to moderately wet forests on dolerite. Some are from dolerite screes while some are not – for instance on Knocklofty the species has mainly been found in bark at the base of large *Eucalyptus globulus*. It has been recorded in sympatry with *A. kershawi* on Knocklofty. At Lambert Park it occurs nearby to a population of *A.* sp. "Wellington" but this does not seem to be a case of true sympatry as the two species occur in different habitats within Lambert Park.

The three wide-umbilicus *Allocharopa* cover much of the near-coastal portion of eastern Tasmania between them and may constitute another subradiation within the Tasmanian *Allocharopa* radiation (Fig 4.5)

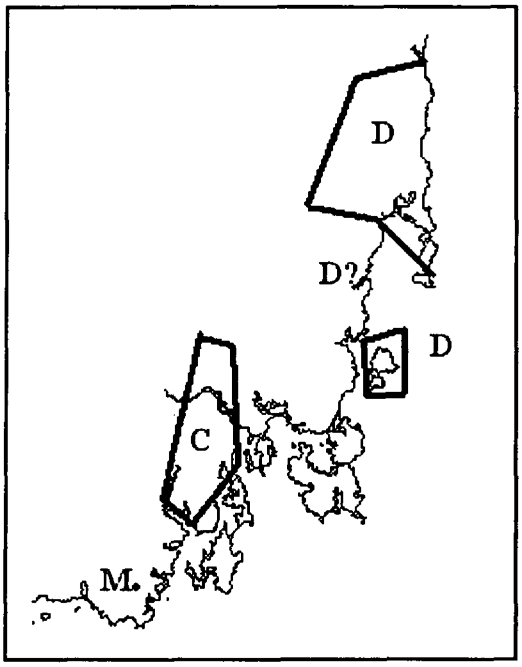


Fig 4.5 Known ranges of three wide-umbilicus *Allocharopa* species in eastern Tasmania: D – *A.* sp. "Douglas", C – *A.* sp. "Christ College", M – *A.* sp. "Mystery Creek"

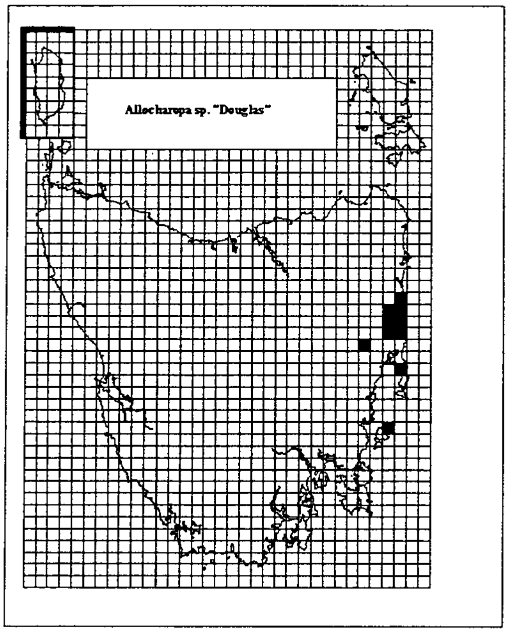
Allocharopa sp. "Douglas" (Plate 14c-d)

Taxonomy: **Brief diagnosis:** Small charopid, adults 1.7-2.1 mm wide at 4.2-4.9 whorls, spire flat to slightly elevated, umbilicus very to extremely wide (D/U 2.8-3.2), shell not especially flat for this genus (H/D = 0.40-0.45), aperture depressed, sculpture as for *A. legrandi* with spiral secondary sculpture prominent, c.140-220 low blunt riblets on body whorl, colour white, off–white or pale grey, body whorl very narrow, aperture lip often slightly curled.

This is the third wide-umbilicus *Allocharopa*. It is the same colour as *A.* sp. "Mystery Creek" but smaller and less flat with a depressed aperture and a more tightly coiled shell, the narrowness of the body whorl being especially noticeable. *A.* sp. "Christ College" has coarser and less tightly packed primary sculpture and a much rougher appearance as well as a different shell colour, and a less narrow body whorl.

Identification: No issues identified.

Distribution map:



Discussion: This endemic species occurs in parts of the east coast from St Marys south to Maria Island and is recorded from 10 grid squares. It appears to be reasonably common in a range of wet and fairly wet forests, chiefly on dolerite and often in screes and rocky areas. More material is needed to determine its exact range, as there is a gap in confirmed records between Meetus Falls and Maria Island, a distance of 70 km. The Wineglass Bay record is very likely to be correct as no other compatible *Allocharopa* species occurs near the area, but is included cautiously as this record occurred prior to the splitting of *A. legrandi* during this project, and all specimens were lost in the field. The known range of *A.* sp. "Douglas" covers substantial portions of the Eastern Tiers range shared by *Tasmaphena quaestiosa* and *Pernagera* sp. "Paradise", and like these species it occurs in the St Marys area but no further north, but more searching is needed to determine how far south it extends on the Tasmanian mainland. This species has never been recorded in sympatry with any other *Allocharopa* although sympatry with *A. kershawi* is likely. See *A.* sp. "Christ College" for further detail.

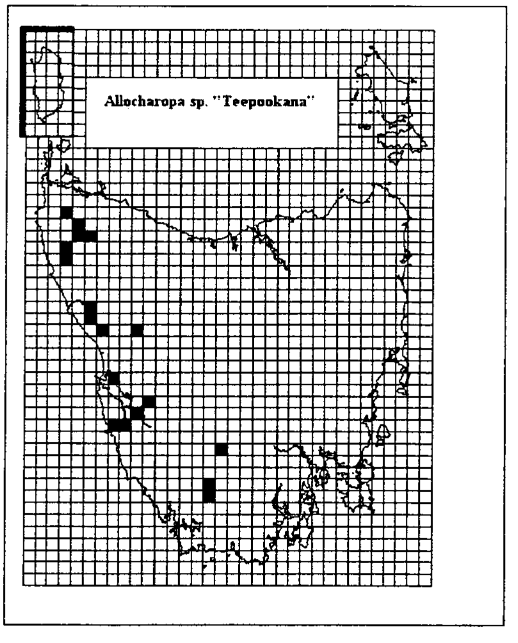
Allocharopa sp. "Teepookana" (Plate 14e-f)

Taxonomy: **Brief diagnosis:** Small charopid, 1.7-2.4 mm wide at 4.0-4.5 whorls, spire flat to slightly sunken, umbilicus medium (D/U 4-6), protoconch wide with whorl after protoconch often narrow, sculpture as for *A. legrandi* but with particularly bold radials on protoconch and extremely prominent spiral secondary sculpture, c.110-160 primary radial ribs on body whorl, riblets and aperture swept forward to make a conspicuously acute angle with the previous whorl as in *Geminoropa antialba,* shell colour pure white to honey-orange or bronzed brown.

The prominently swept-forward ribs and aperture lip distinguish this from all other radial-protoconch small charopids except *Geminoropa hookeriana,* which has over 5 whorls, a very wide umbilicus, and a significantly sunken spire.

Identification: No issues identified.

Distribution map:



Discussion: This endemic species occurs widely in western Tasmania, chiefly fairly close to the west coast. It is reasonably common although seldom numerous, and has been recorded from 18 grid squares. With more searching in the south-west this number is likely to increase considerably. Most records have occurred in rainforest, with some in wet eucalypt forest and wet scrub. Unlike most *Allocharopa*, it is sometimes recorded arboreally. *A.* sp. "Teepookana" has been recorded in sympatry with *A.* sp. "Franklin" at one site. It occurs close to records of *A. tarravillensis* (possibly a parapatric boundary) and *A. legrandi* (unlikely to be a parapatric boundary, or if so probably a short one as elsewhere there are large gaps between the two species' apparent boundaries.) This species has a wotlian distribution, but is not known to extend as far east in the northern part of its range as many wotlian species.

Allocharopa sp. "Junee" (Plate 14g-h)

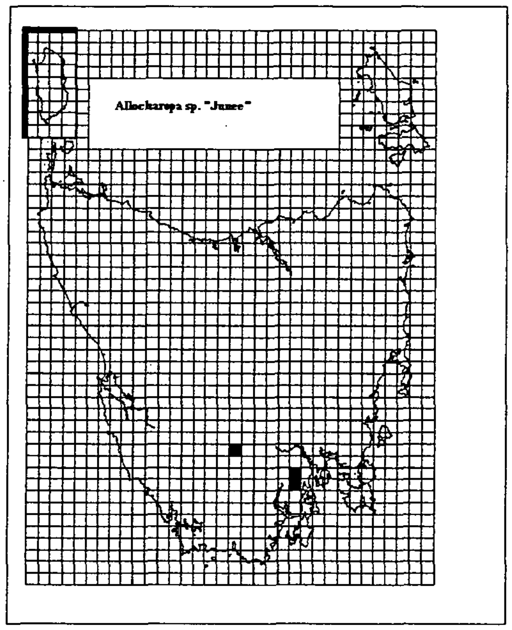
Taxonomy: **Brief diagnosis:** Very small charopid, 1.7-1.85 mm wide at 4.2-4.6 whorls, spire prominently elevated, umbilicus medium-wide and steep-sided (D/U c.3.5), sculpture as for *Allocharopa kershawi* with strong fairly widely spaced moderately bold radial ribs, c.90-110 on body whorl but more tightly packed towards aperture, hence only c.70-75 on previous whorl, colour pale dull yellow-brown, usually with darker ribs.

The combination of the prominently elevated spire, moderately but not wide umbilicus, widely spaced ribbing and very small shell size make this species very easy to distinguish from other *Allocharopa.*

Identification: No issues identified.

Discussion: This apparent local endemic is known from three grid squares, representing collections in three areas. Two of these, close to each other, are the Wellington Range dolerite boulderfields, where it is localised and uncommon, and the Pelverata Falls dolerite scree, where only one specimen has been recorded. The third, 50 km away from these two, is the Junee Cave karst area, where it is very common and occurs broadly, not just around significant cave mouths. It is possible that these records represent two distinct species but there is no evidence of this based on shell features. This species does not appear to be very similar to any other *Allocharopa* and has been recorded in sympatry with *A.* sp. "Junee", *A. legrandi, A.* sp. "Pelverata" and possibly *A.* sp. "Wellington". Its distribution is considered poorly defined based on existing records, the shortage of records from such a generally well-searched area suggesting that it is very localised.

Distribution map:

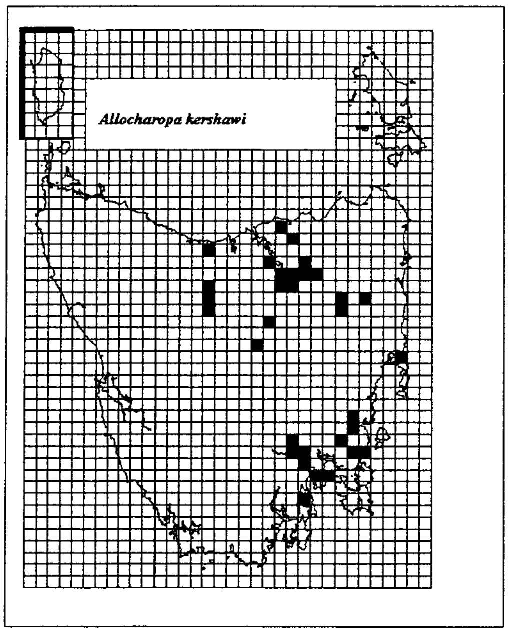


Allocharopa kershawi (Petterd, 1879) (Plate 15a-b)

Taxonomy: No issues identified, except for differentiation with other *Allocharopa* (which see below). There is some variation in roughness of sculpture and shell colour, with specimens from some northern localities more finely sculpted, and with the colour differences between the ribs and the rest of the shell larger at some localities than others. However there is no geographic pattern to this that would suggest extra species.

Identification: Petterd (1879) considered *A. legrandi* to be a synonym of this species, and hence gave several records well outside the now-known range of *A. kershawi*. These have been referred to *A. legrandi* or to *A. tarravillensis*, or in geographically unclear cases, dropped.

Distribution map:



Discussion: *A. kershawi* (32 grid square records) is a widespread endemic species which is absent in the wetter parts of the south-east, where *A.* sp. "Wellington" occurs. The exact, probably eotlian, distribution of *A. kershawi* is unclear due to past confusion with *A. legrandi,* and its range could easily extend much further west on the north coast, and into the midlands and far north-east where records are lacking.

The closest boundary between the two species occurs, fortunately, in the Hobart area, which has allowed it to be studied closely – see Figure 4.6. Only *A. kershawi* occurs on the eastern shore (and not commonly) but both species occur on the western shore. Here there is a likely parapatric boundary between the two species, with *A. kershawi* occurring on some low-altitude dry forest hills (from north to south, Poimena Reserve, Barossa Hill and Knocklofty). Throughout the higher and more wetly forested mountains (Mt Faulkner, Mt Wellington, Collins Cap) only *A.* sp "Wellington" is found. This also applies to the southern Wellington Range foothills Chimney Pot Hill and Mt Nelson, such that *A.* "Wellington" extends down to the Derwent River.

The development of urban Hobart has reduced bushland in the western-shore range of *A. kershawi* to a limited number of small bushland reserves, frustrating attempts to determine the exact western shore distribution. Also, the Goat Hills/Tolosa area (the dark shading west of the second K in the gap between the two species) has not yielded a record of either species in three trips to the area.

A. kershawi occurs in a range of habitats including both dry and wet forests, usually on dolerite. It has been recorded in sympatry with *A. legrandi, A.* sp. "Christ College", and A. sp. "Sandpit" and can be expected to occur in sympatry with other eastern Tasmanian *Allocharopa* spp.

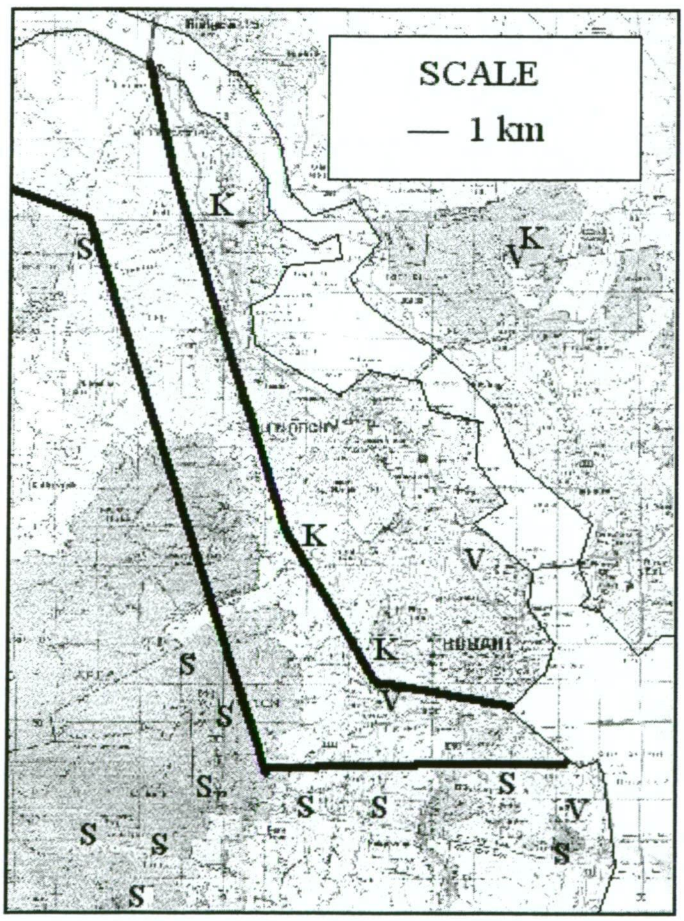


Fig 4.6 Distribution of *Allocharopa* sp "Wellington". (S) and *Allocharopa kershawi* (K) in the Hobart area. *Discocharopa vigens* (V) is also shown. Dark thick line shows boundaries based on known records, edge of the Derwent River is highlighted in a thin dark line. The distribution of the three known records of *Discocharopa*

vigens is also shown because it highlights a significant point. This species, and *A. kershawi*, are both found on both sides of the Derwent River but have small western shore ranges. The Derwent River is likely to have formed a substantial impediment to snail migration for so long that these populations could be effectively island-like populations. Map after Lands Department (1985).

Allocharopa sp. "Wellington" (Plate 15c-d)

Taxonomy: **Brief diagnosis**: Small charopid, adults 1.6-2.5 mm wide at 3.6-4.5 whorls, umbilicus small (D/U 5.5-7) spire very slightly to slightly elevated. Sculpture similar to *A. kershawi* but even bolder and usually more widely spaced (c.45-75 ribs on last whorl compared with c.70-130), primary ribs very rounded and regular (*A. kershawi* often have rough, angular-looking ribs), interstices reticulate, often no trace of colour on top of the ribs (nearly all *A. kershawi* have darker lines on top of ribs), shell weakly to strongly shining, usually pale greyish yellow.

This species is similar to *A. kershawi* but has a smaller umbilicus, an elevated spire, and the other differences mentioned above. It is most similar to the following two species. It superficially resembles *Dentherona subrugosa* but the secondary sculpture of that species consists of coarse radial riblets and is not reticulate. The illustrated specimen is more finely sculptured than most specimens of this species.

Identification: No issues identified.

Discussion: This species is a very common south-eastern endemic which has been recorded from 13 grid squares. It occurs in a range of wet forests, frequently in dolerite screes or rocky areas, and has been recorded in sympatry with *A. legrandi* (including microsympatry) and *A.* sp. "Victoria Valley", possibly *A.* sp. "Junee" and close to, but not in strict sympatry with, *A.* sp. "Christ College". As well as having a likely parapatric boundary with *A. kershawi,* it is very similar to the following two species, and these three species may form another subradiation in the *Allocharopa* radiation (Fig 4.7).

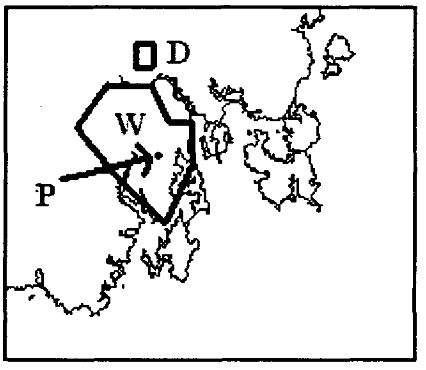
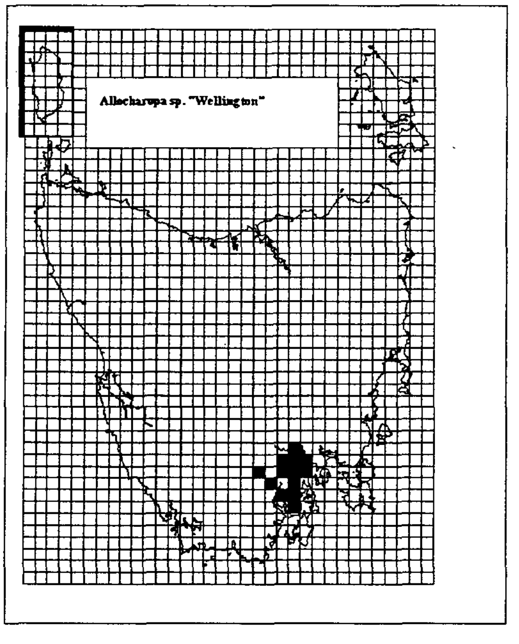


Fig 4.7 Distributions for three Allocharopa species with moderately small umbilici, elevated spires and widely spaced ribbing. D= *A.* sp. "Dromedary", W= *A.* sp. "Wellington", P = *A.* sp."Pelverata"

Distribution map:



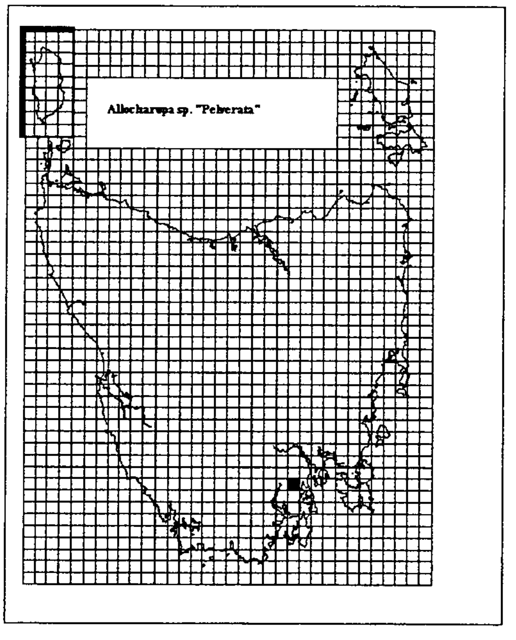
Allocharopa sp. "Pelverata" (Plate 15e-f)

Taxonomy: **Brief diagnosis:** Small charopid, adults 2.3-2.7 mm wide at 4.2-4.4 whorls, spire slightly elevated, very similar to *A.* sp. "Wellington" but with much less widely spaced ribs (c.90-100 on body whorl), colour glistening pale yellow-grey, semi-translucent, umbilicus small (D/U 4.8-5.5), radial interstices slightly more prominent than spiral.

The differences between this and *A.* sp. "Wellington" are slight. The ribs on those few specimens of *A.* sp. "Wellington" that reach this species' generally larger size range are very widely spaced, so the Pelverata specimens do not appear to be part of a continuous variation. This may just be a local variation of *A.* sp. "Wellington" but this appears unlikely.

Identification: No issues identified.

Distribution map:



Discussion: This is an apparently very localised endemic recorded only within the Pelverata Falls dolerite scree, as is *Planilaoma* sp. "Pelverata".

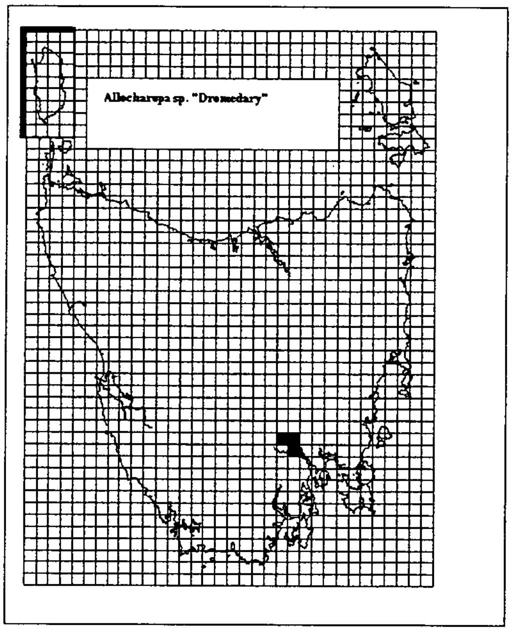
Allocharopa sp. "Dromedary"(Plate 15 g-h)

Taxonomy: **Brief diagnosis:** Small charopid, adults 1.8-2.3 mm (rarely exceeding 2.0 mm) wide at 4.1-4.5 whorls, slightly elevated spire, sculpture as for *A. legrandi* with blunt quite prominent radial primary ribs, c.70-100 on body whorl, umbilicus small (D/U c.6), shell colour dull grey-yellow to semi-translucent pale grey.

This species resembles the previous two species but has a more tightly coiled and generally smaller shell, with closer ribbing than *A.* sp. "Wellington". There are some similarities to *A.* "Sandspit" but that species does not have an elevated spire and is larger, as well as having much closer ribbing.

Identification: No issues identified.

Distribution map:



Discussion: This species has been recorded from three grid squares around the eastern slopes of Mount Dromedary, but this includes records from an area of only 3x1.5 km. The surrounding areas have not been searched so it would be expected that the species' known range would expand with more searching. The species is extremely common in the dolerite scree slopes of the mountain but has not been recorded from similar habitats in the Wellington Range to the south or the Meehan Range to the east. It is likely to be a localised endemic and may be confined to dolerite screes. *A. legrandi* and *A. kershawi* occur in the same area, although actual sympatry has only been observed with *A. legrandi*, which was very scarce in the area. See *A.* sp. "Wellington" for discussion of this species' possible place in the *Allocharopa* radiation in Tasmania.

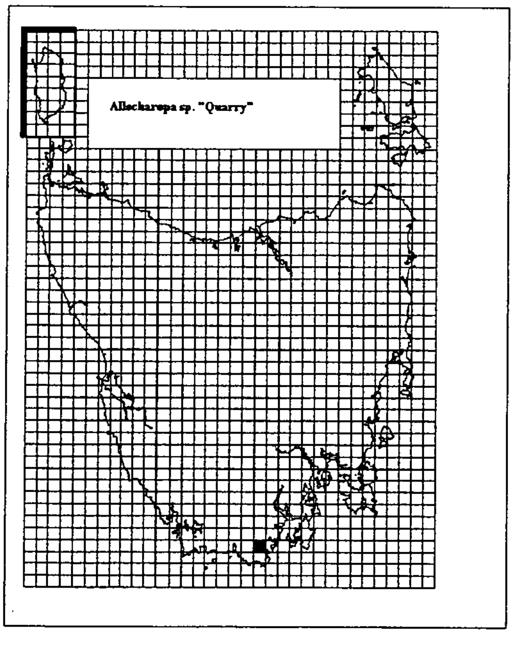
Allocharopa sp. "Quarry" (Plate 16 a-b)

Taxonomy: **Brief diagnosis:** Small charopid, 2.0-2.3 mm wide at 4.2-4.6 whorls, umbilicus fairly wide (D/U c.3.5), spire flat, sculpture similar to *A. kershawi,* ribs low and blunt but widely spaced (c. 65-80 on body whorl), no colour on tops of ribs, ribs often slightly curved especially on later whorls, shell pale yellow, semi-translucent.

This resembles *A. kershawi* but does not reach such a large size (*A. kershawi* 2.0 – 2.8 mm at 4.2 – 5.0 whorls) and the ribs are blunter and typically slightly less closely packed. While the differences are not conclusive by themselves, the gap of 50 km between the two species' distributions makes it extremely unlikely that they are the same species. Indeed, there are no other *Allocharopa* with widely-spaced ribs within 20km of the sole known location of this species.

Identification: No issues identified.

Distribution map:



Discussion: This species is recorded only from a single site above Benders Quarry at Moonlight Ridge, in the same karst system as Mystery Creek Cave. Although it was recorded very close to the area where *A.* sp. "Mystery" was recorded, the two species are not yet known to be sympatric, nor is any other *Allocharopa* recorded from the region. This species is considered to be a karst endemic, and as its taxonomic relationships to other *Allocharopa* are unclear, no further comments about its geographic relationships to other *Allocharopa* are possible. It is surprising that two locally endemic *Allocharopa* are found in this karst system, but at the nearby Hastings karsts, only *A. legrandi* has been recorded.

Allocharopa tarravillensis (Gabriel, 1930) (Plate 16e)

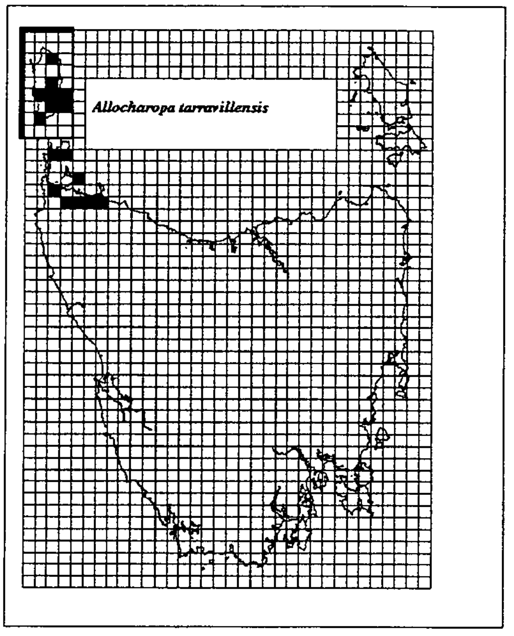
Taxonomy: **(New record for Tasmania)** *Allocharopa* specimens in the far north-west of the state (including the western Bass Strait islands) are frequently relatively large for a given number of whorls (to 2.2-2.7mm at 4.1-4.7 whorls), with strong widely-spaced radial ribs not marked with dark traces on top, and with a slightly elevated spire. This combination of features did not match other Tasmanian *Allocharopa* and on comparison with Victorian specimens, they were found to be extremely similar to (perhaps marginally smaller than) the Victorian *A. tarravillensis* and were therefore allocated to that species.

Identification: No issues identified.

Discussion: This species has previously only been recorded from Victoria (Smith and Kershaw 1979) and was only identified as also Tasmanian during this project. In Tasmania it occurs on King Island, where it is very common, and on the Hunter Group and adjacent Tasmanian mainland (in these areas it is much rarer). There are 16 grid square records for this species. This is regarded as a toehold distribution.

There is no known overlap between this species' range and any other *Allocharopa* but the species occurs very close to others in two known areas: Togari Block/Eldridge Road (squares 3247-3246, gap 8 km, *A.* sp. "Teepookana") and Smithon/Black River (squares 3447-3547, gap at most 11km, *A. legrandi*). *A. legrandi* is very scarce in the area but there may be a parapatric boundary with *A.* sp. "Teepookana" which is reasonably common immediately to the south of the range of *A. tarravillensis.*

Distribution map:



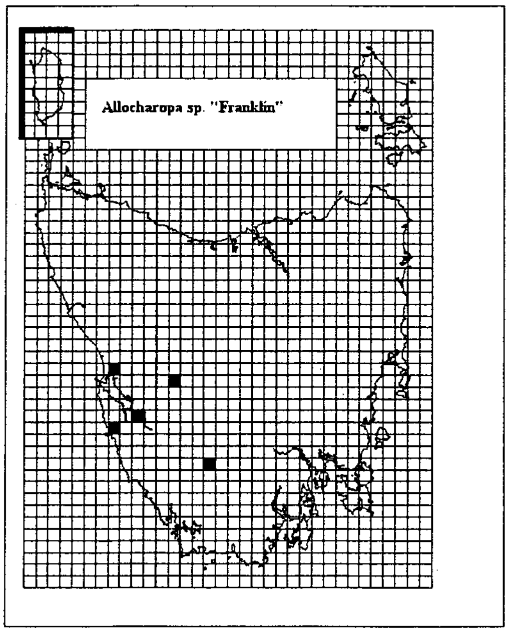
Allocharopa sp. "Franklin" (Plate 16c-d)

Taxonomy: **Brief diagnosis:** (Limited material – 4 adults and several juveniles) Small charopid, adults of c.4 whorls are 2.3-2.7mm wide. Superficially resembling *A. kershawi* but can be distinguished (as well as by the more loosely coiled spire for a given shell width) by the secondary sculpture, which consists of radial interstices, with extremely faint spiral traces sometimes barely visible at x60 magnification. Colour reddish brown with dark brown striations on top of ribs as in *A. kershawi.* Umbilicus medium (D/U c.4.5). Ribbing fairly close but not as close as on *A. legrandi,* c.90-120 ribs on body whorl, ribs often strongly curving and even wavy in appearance.

The secondary sculpture is the most clear distinguishing feature of this species, but the comparatively loosely-coiled shell with its small number of whorls is also distinctive.

Identification: No issues identified.

Distribution map:



Discussion: This rare endemic species is recorded only from 5 grid squares in the west and south-west, although it is likely to be far more widely recorded with more surveying. The intensity of surveying in its known range (4.05 species records per square) is low. Similar comments apply to this species as apply to *Elsothera* sp. "Needles" – areas surrounding the species' range are so poorly surveyed that that range could easily be much larger. For this reason, although its known range covers only 80x80 km, it is not treated as a local endemic.

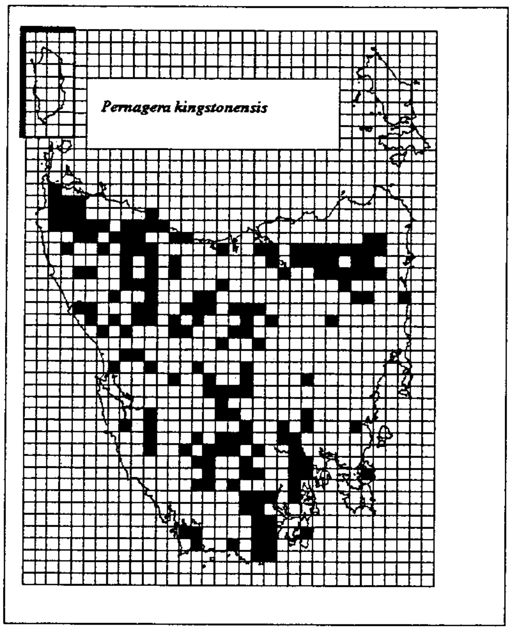
It is plausible that this species forms parapatric boundaries with various other *Allocharopa* spp. but many more records are needed before this can be assessed. At this stage it has only been recorded in sympatry with the other western species, *A.* sp. "Teepookana". The range of this species is not considered adequately defined or categorised.

Pernagera kingstonensis (Legrand, 1871)(Plate 16f)

Taxonomy: Bonham (1997a) identified a number of unusual local forms of this species but there has been no further progress on these.

Identification: Some western records have been referred to P. sp "Waratah". *Planilaoma luckmanii, Pernagera officeri* and *P. architectonica* have all been sometimes misidentified as this species.

Distribution map:



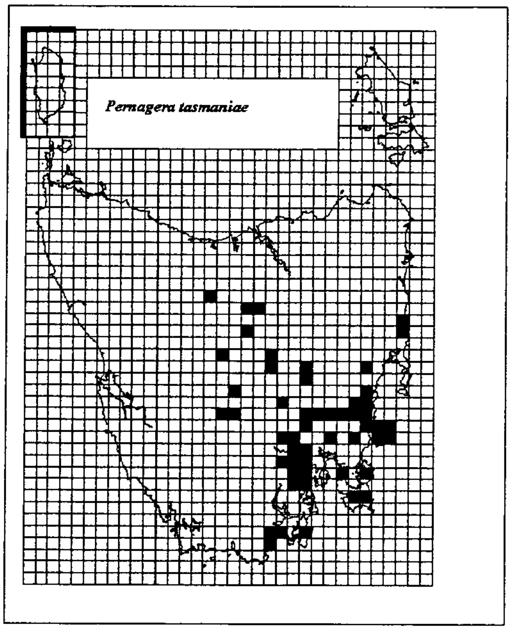
Discussion: This is a very widely recorded and common endemic species with 175 grid square records. This species is absent from the Bass Strait islands and apparently absent from most of the central east, where *P.* sp. "Paradise" is present (see that species for discussion of their ranges). A single specimen of *P. kingstonensis* was collected at Paradise Gorge, Orford, within the range of *P.* sp. "Paradise". As this area has been very thoroughly searched it is surprising that only one *P. kingstonensis* was found and more records are needed from the area to confirm that the species normally occurs there, rather than this being a case of extralimital translocation.

Pernagera tasmaniae (Cox, 1868) (Plate 17e)

Taxonomy: No species-level issues identified. This species requires reallocation to a different genus as the protoconch does not have strong radial ribbing, but has indistinct low spirals with weak radial striae becoming visible towards the end of the protoconch only.

Identification: *P. architectonica* has been sometimes misidentified as this species.

Distribution map:



Discussion: This endemic species is recorded from 52 grid squares, but is not recorded from the west or the north coast. In this respect it displays an eotlian boundary but without being present through the full eotlian area. It is reasonably common within its range and the density of records appears to be proportional to the amount of searching within different parts of its range. Its distribution is almost the reverse of that displayed by *Elsothera limula* and *Victaphanta lampra*, which are present in the north coast north of the face of the Great Western Tiers. There is a small overlap with this species extending just over the face of the Tiers to Liffey Falls, Quamby Bluff and Marakoopa, sites within the range of *E. limula* and *V.*

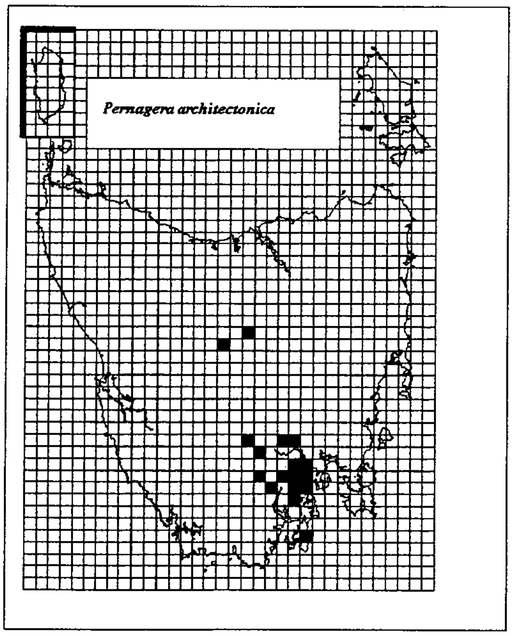
lampra. It does not appear to reach the north coast, however, with no records of this species out of 676 grid-square species records north and east of Marakoopa.

Pernagera architectonica (Legrand, 1871) (Plate 16g)

Taxonomy: **(Elevation from synonymy)** This name was synonymised with *P. kingstonensis* without stated reasons by Smith and Kershaw (1979). As discussed by Bonham (1997a), this is incorrect as *P. architectonica*, unlike *P. kingstonensis,* does not have strongly radial protoconch sculpture, and should be reallocated to a different genus, probably the same genus as *P. tasmaniae.* Adult specimens on Bruny Island are slightly larger with slightly more whorls than normal.

Identification: Some early records of this species from well outside its normal range have been excluded, in particular the "variety" from Myrtle Bank referred to by Petterd (1879) is clearly Charopidae sp. "Skemps" which is actually very distinct from *P. architectonica.* The remainder are most likely *P. kingstonensis.* Records from the Tasman and Forestier Peninsulas have all been referred to *P.* sp. "Waterfall".

Distribution map:



Discussion: This endemic species is recorded from 17 grid squares, and is generally quite uncommon. Its range appears to be similar to that of *P. tasmaniae* but considerably less extensive, especially on the east coast, where *P.* sp. "Paradise" is present, and the Tasman and Forestier Peninsulas, where *P.* sp. "Waterfall" occurs. There is a cluster of records of *P. architectonica* in the south-east where 15 of the 17 grid square records occur, with a gap of 70 km to a further two records on the Central Plateau. This is likely to be an artefact of a lack of collecting rather than a genuine gap. Within the cluster of records the species accounts for 3.7% of grid square species records (15 of 402), but in the remainder of its range (the Central Plateau plus the gap) this drops only to 2% (2 of 106). This difference is not significant, and that may also be a result of the generally less favourable habitat within the gap for this species, which is more often found in very wet forests. On the Central Plateau it occurs in alpine scree, a less optimal habitat type, and is scarce. This is consistent with its occurrence on Mt Wellington, where it becomes scarcer at an altitude of around 800 m as wet closed forests give way to scrubby scree. While this species has aspects of its range in common with *P. tasmaniae,* in having an eotlian boundary which extends north only to around the face of the Great Western Tiers, it is also clearly more restricted in its western range where it is absent from squares within the *P. tasmaniae* range containing a total of 446 grid square species records.

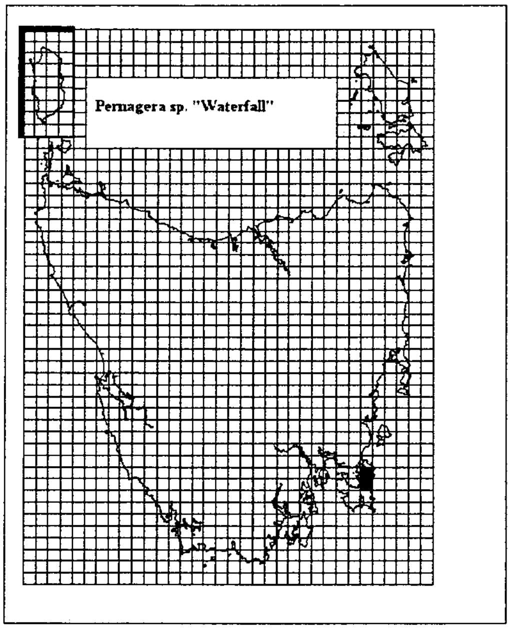
Pernagera sp. "Waterfall" (Plate 17f)

Taxonomy: **Brief diagnosis:** Small charopid, 2.9-3.5 mm wide at 4.5-5.2 whorls, tightly coiled, spire elevated and pointy, protoconch of c.12-15 close strong spiral ridges crosscut by more widely spaced radial riblets to produce lozenge-shaped structures, adult sculpture of prominent low blunt, slightly wavy cord-like ribs, c.80-120 on body whorl, interstices of radial riblets and spiral striae with radial riblets dominant, umbilicus very wide (D/U c.2.8-3) and deep, almost perpendicular, shell white to orange-pink (grey to brown in old specimens) sometimes with numerous weak narrow rose-red colour rays.

This species very closely resembles *P. architectonica* but the protoconch sculpture distinguishes it from any other similar species in Tasmania. Also the number of whorls is slightly larger and the spire is higher. This species probably requires a new genus due to the difference in protoconch sculpture – the lozenge-like structures being unusual in the Tasmanian Charopidae.

Identification: No issues identified.

Distribution map:



Discussion: This endemic species is recorded from only 2 grid squares on the Forestier and Tasman Peninsulas. It is fairly common on the Forestier Peninsula (very common at McGregor Peak), where it has been recorded from four localities. On the Tasman Peninsula it has only been recorded from the area between Waterfall Bay and Tatnells Hill. It occurs in a range of microhabitats in wet forest. The range of this species is very similar to the ranges of *Helicarion rubicundus* and *Allocharopa* sp. "McGregor". As with those species, both past glacial refuges on the peninsulas and the effective island status of the peninsulas for wet forest species could contribute to the species' limited range.

Pernagera sp. "Paradise" (Plate 17c-d)

Taxonomy: **(Brief diagnosis)** Small charopid, 3.5-4.3 mm wide at 4.5-5.2 whorls, tightly coiled, spire elevated, protoconch of weak radial riblets (discontinuous with adult sculpture but still clearly radial), adult sculpture of moderately bold, blunt and wide, cord-like ribs, c. 90 on last whorl, interstices of radial riblets and spiral striae with radial elements dominant, umbilicus very wide (D/U 2.5-2.8) and extremely deep, shell white banded with indistinct, narrow and straight bands of rose-pink to red.

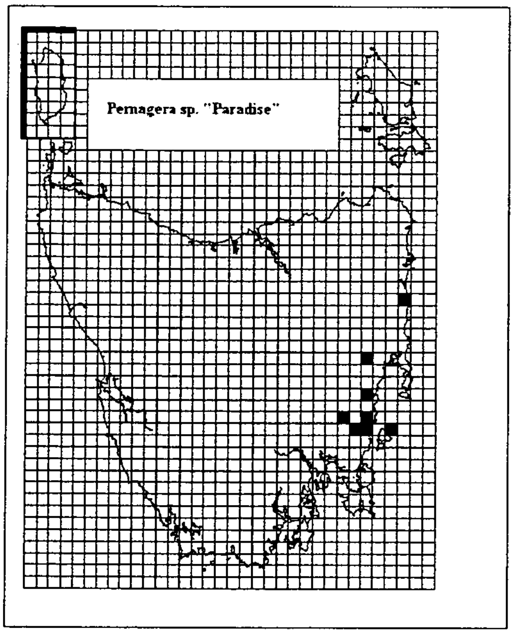
An early specimen of this species was misidentified by Bonham (1997a), who, noticing an extreme outlier on a PCA graph based on a range of shell measurements for *Pernagera officeri,* wrote:

> "The outlier OE (Orford) was re-examined and found to be probably a freak *P. tasmaniae* on which the variability of protoconch sculpture had produced an unusually strong radial sculpture."

While the first specimen was in fairly poor condition, better-quality specimens proved to have a strongly radial protoconch sculpture incompatible with *P. tasmaniae* which has a protoconch sculpture consisting of a weak, irregular, combination of radial and spiral traces. The prominently elevated spire (H/D c. 0.6 compared to c. 0.5 for *P. officeri*), wide and extremely deep umbilicus, relatively tightly coiled spire and relatively spaced ribs all separate this species from *P. officeri.* The protoconch (being clearly radial but not to the rib height of the early adult whorls) is also significant. In fact, this species looks most like *P. architectonica* but with a different protoconch.

Identification: No issues identified.

Distribution map:



Discussion: This endemic species occurs on the east coast of mainland Tasmania, and is presently known from 8 grid square records, a total likely to grow with further sampling. It appears to be reasonably common, with more than 10 specimens recorded at each of several sites. There are two potentially significant geographical relationships with other species, one with *P. kingstonensis* (which is probably closely related – Fig 6.8 (a)) and one with *P. architectonica* and *P.* sp. "Waterfall" (which are convergent in shell features with it but probably not closely related - Fig 6.8 (b)).

The presence of *P.* sp. "Paradise" in what appears to be a gap for *P. kingstonensis* may be a coincidence rather than reflecting a parapatric boundary. Points against a parapatric boundary include (i) at St Patricks Head at the far north of the former's known range, the two species occur together, although the fine-scale spatial manifestation of this was not examined (ii) a single specimen of *P. kingstonensis* has been recorded well within the range of *P.* sp. "Paradise". The three species shown in Fig 4.8(b) never occur together, but it is also unclear whether their ranges abut as there are significant gaps between them that have not been filled.

P. sp. "Paradise" is considered to have an Eastern Tiers range very similar to that of *Tasmaphena quaestiosa.*

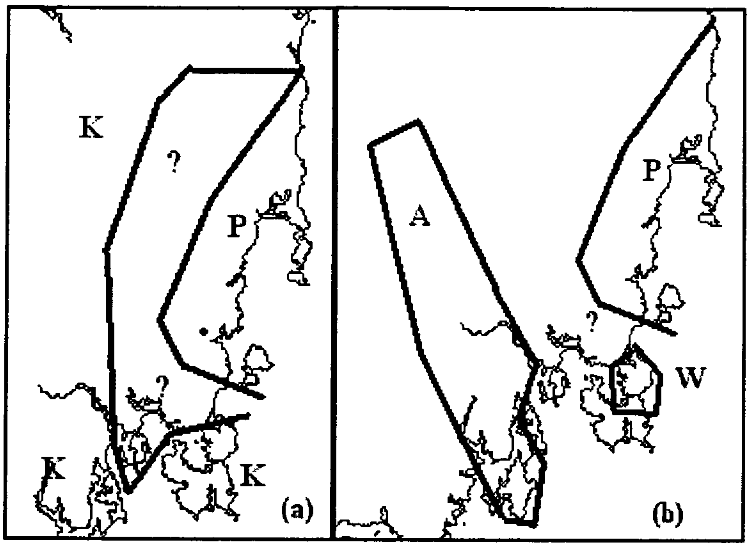


Fig 4.8 Possible relationships of Pernagera sp. "Paradise to other species". P = P. sp. "Paradise", ? = no species shown on this map recorded (a) K = *P. kingstonensis*, dot = isolated record of *P. kingstonensis* within *P.* sp. "Paradise" range (b) A = *P. architectonica*, W = *P.* sp. "Waterfall"

Pernagera officeri (Legrand, 1871) (Plate 17a-b)

Taxonomy: No issues identified. See Bonham (1997a) for explanation of why *P. tamarensis* (Petterd, 1879) is considered a synonym of this species, and for discussion of variation in this species.

Identification: Many inland records of this species, especially in wet forest areas, are *P. kingstonensis* or *P. tasmaniae*.

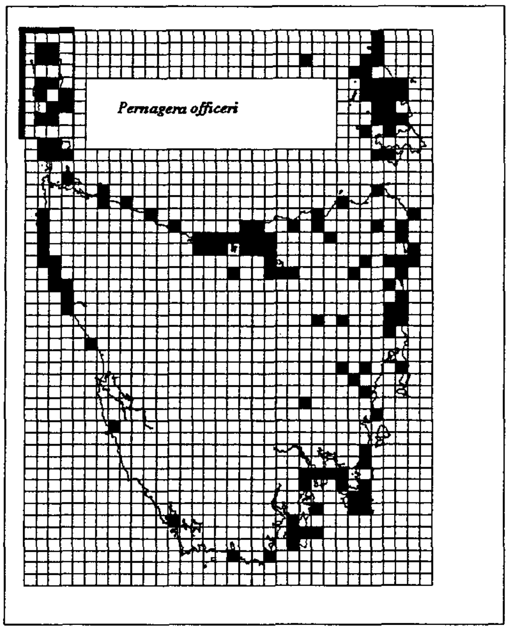
Discussion: This species is present in Tasmania and in southern Victoria (Smith and Kershaw, 1979), where it is recorded under the names *officeri* and *tamarensis*, considered here to be conspecific following Bonham (1997a). *P. monticola* Iredale (1941) is here excluded as a synonym both as its type locality (Mt Kosciusko, NSW) is disjunct and as Petterd's (1879) classification of the Mt Kosciusko population as *P. tasmaniae* suggests that it is not *P. officeri*. In Tasmania, *P. officeri* is common, being recorded from 136 grid squares and also from numerous near-Victorian Bass Strait islands (eg Deal, Erith, Curtis, Rodondo, Hogan). The species is predominantly coastal with only 24 inland grid square records (defined as more than 3 km from either salt or estuarine water) on the Tasmanian mainland. It also occurs inland on both King Island and Flinders Island. On Flinders Island it is an extremely common species that can be found in almost all native bushland environments – it is responsible for 19.6% of all Furneaux Group grid square species records. On King Island it is quite rare in inland situations.

Coastal records are more common in some parts of the state than others – the Bass Strait islands, north coast, south-east and northern west coast are particularly well represented. In the case of the northern west coast, this is because of an intensive survey focussed on coastal areas, something that has not occurred elsewhere in this species' range. The remaining centres of recording are also mainly explained by surveying intensity, and the area with the least records is the south-west where there has been negligible coastal collecting. Inland records occur mainly in the central north, north-east and east, but there is a record at Jericho (square 5230) in the southern midlands. As this single record is isolated from other known records by 30 km (possibly due to lack of collecting in the Midlands generally) the full inland distribution of this species is difficult to establish. *P. officeri* occurs in coastal populations, but not inland, within the range of *P. architectonica* – there is no recorded sympatry with that species. Within the range of *P.* sp. "Paradise", *P. officeri* sometimes occurs inland in sympatry with *P.* sp. "Paradise". Significantly, it occupies very wet forest habitats in this area, including rainforest, that would normally be occupied by *P. kingstonensis* elsewhere.

P. kingstonensis also does not apparently occur in sympatry with *P. officeri,* although their ranges overlap considerably. There are two known localities where the two species occur together, these being St Columba Falls (grid square 5742) and Notley Gorge (4942). In both cases, *P. officeri* occurs uphill from *P. kingstonensis* in a wet eucalypt forest habitat, while the latter occurs downslope in rainforest or mixed forest, and there is a gap of about 200m between the populations. This picture is confused by the nature of variation between the two species, with *P. officeri* and *P. kingstonensis* displaying ecologically-determined shell feature convergence in the north-east to the extent that they are almost inseperable on shell features (Bonham 1997a).

This species is considered statewide in its main suitable habitat, but has an inadequately defined, probably eotlian, range inland.

Distribution map:



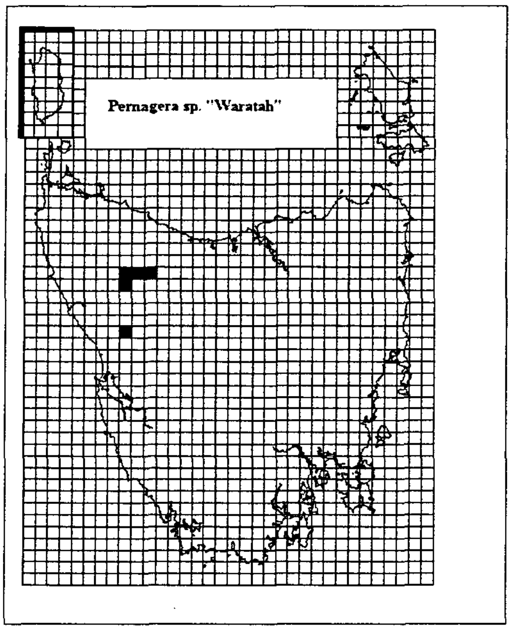
"Pernagera" sp. "Waratah" (Plate 17f)

Taxonomy: **Brief diagnosis:** Charopid, adults typically 4.0-5.5 mm wide at 4.3-4.8 whorls, spire flat, protoconch of extremely densely packed (c. 25) spiral grooves, adult sculpture of densely packed radial riblets with interstices reticulate but with spiral elements very strong and clearly visible at x30 magnification, umbilicus medium-wide (D/U 3.3-4.0), deep but not step-sided, aperture forming an acute angle with the previous whorl, pattern white with numerous straight dark brown bands.

As noted by Bonham (1997a), this species has only been considered a *Pernagera* because of a superficial resemblance to members of the genus produced by a relatively flat spire and colour rays. The protoconch sculpture is totally different from that of any *Pernagera* and suggests the closest affinity of this unusual snail is actually to *Bischoffena bischoffensis,* which has a completely different shell shape.

Identification: No issues identified.

Distribution map:



Discussion: This species is known only from 5 grid square records covering a range of 60x30 km in the Waratah-Rosebery district in the inland west. While this area is well surveyed with an average of 6.6 species records per grid square, there is a comparatively poorly surveyed area measuring 60 km N-S and 20 km E-W to the west (mean 2.6 species records per grid square) and very little surveying to the south-east. The species' range could therefore be larger, but it is still likely to be a local endemic given its absence from well-searched areas such as Cradle Mountain – Lake St Clair, Oonah/West Takone, the Lyell Highway and the Heemskirk Link Road.

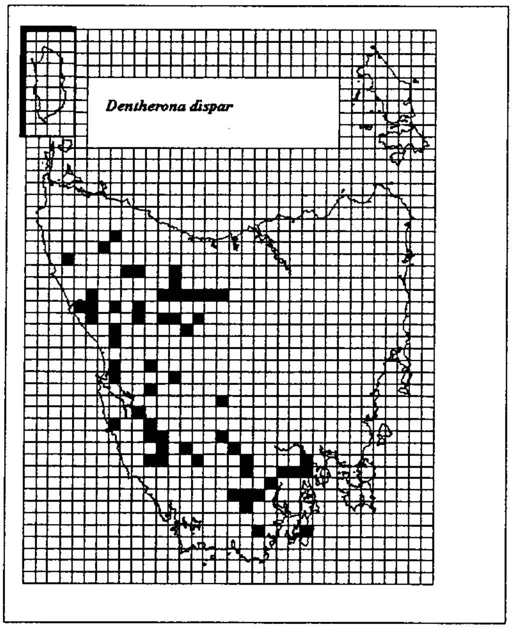
There is no obvious explanation for this species' localised range. A glacial refuge species would be expected to be more widespread in the west, and a species restricted to rainforest (from which all modern records of this species come) could extend further, for instance into the Mt Bertha (Pipeline Road) area. There is also no explanation for this species' range based on the ranges of other snails in the area.

Dentherona dispar (Brazier, 1871) (Plate 17g)

Taxonomy: No issues identified.

Identification: Specimens of completely unrelated species that appear to have a "tooth" inside the shell (often as a result of damage that causes a piece of broken shell to jut inwards) are sometimes misidentified as this, including species as improbable as *Mulathena fordei*. Records from the north-east, which invariably turn out to be *D. subrugosa* if a specimen is present, have been referred to that species.

Distribution map:



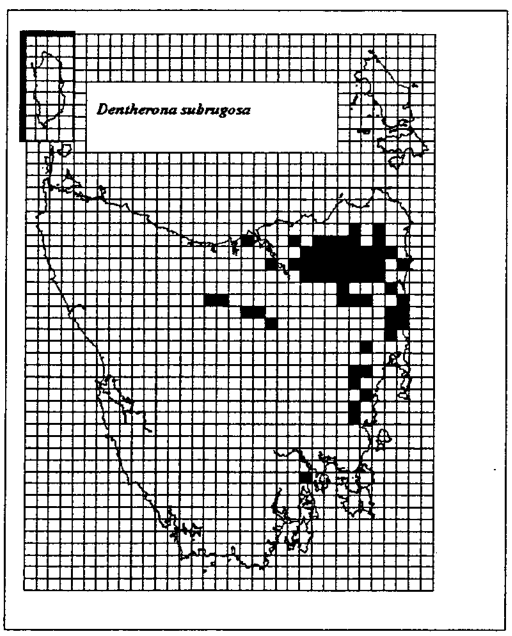
Discussion: This is a common endemic species with 57 grid square records, displaying a wotlian pattern. In the south, its distribution is extremely similar to other such species, but in the north it extends further east than most such species, while also avoiding the northern coast. This species appears to have a parapatric boundary with *D. subrugosa* in the Chudleigh area but determining the exact boundary is difficult because records of *D. dispar* in the boundary area are not recent and no more precise than 10x10km resolution. The difficulty in interpreting the boundary in the south-east is discussed under *D. subrugosa* below.

Dentherona subrugosa (Legrand, 1871) (Plate 17h)

Taxonomy: No issues identified. The two *Dentherona* species have an adult sculpture of extremely strong blunt wide ribs and interstices of solely radial riblets; this separates them from species of strongly-ribbed *Allocharopa* with which they are sometimes confused. In *Allocharopa* the ribs are typically sharper and the interstices include spiral elements (very reduced in *A.* sp. "Franklin").

Identification: Records of this species from within the range of *D. dispar* always turn out to be that species if a specimen is available, and have been referred to that species. The tooth inside the aperture can be difficult to see on some *D. dispar* specimens, even absent on some juveniles, hence the confusion. Specimens from the Hobart area and further south are usually *Allocharopa* sp. "Wellington". Indeed, this error includes some of the earliest collections of this species, but the early collections do include some genuine *D. subrugosa* specimens.

Distribution map:



Discussion: This species is also common, being recorded from 58 grid squares in the north-east and east, and has an eotlian distribution, though not as limited as *Elsothera limula* and *Victaphanta lampra.* Much like *Victaphanta lampra,* it occurs along the northern face of the Great Western Tiers, extends into the north-east and down the east coast. However it extends further south, at least as far as the Orford area. Also, like *V. lampra*, it is absent from the upper Mersey Valley, where *D. dispar* replaces it. There is an isolated nineteenth-century record at Mount Wellington, the type locality. The species has not been seen there since, and *D. dispar* is found on Mount Wellington instead. This record is 50 km from the nearest other record, but is confirmed by at least two museum specimens. As the gap between these records is well-surveyed, the type population of *D. subrugosa* may have been a disjunct remnant, but it is not clear how this would have occurred. Another issue is the wide gap between these species in most of the rest of their ranges. Both are wet forest snails (*D. dispar* in particular prefers rainforests, mixed forests and very wet eucalypt forests while *D. subrugosa* survives in less wet environments including shrubby forests.) This explains their apparent absence from the Central Plateau, but not from the wet forests fringing it to the east, or from areas such as Mt Dromedary.

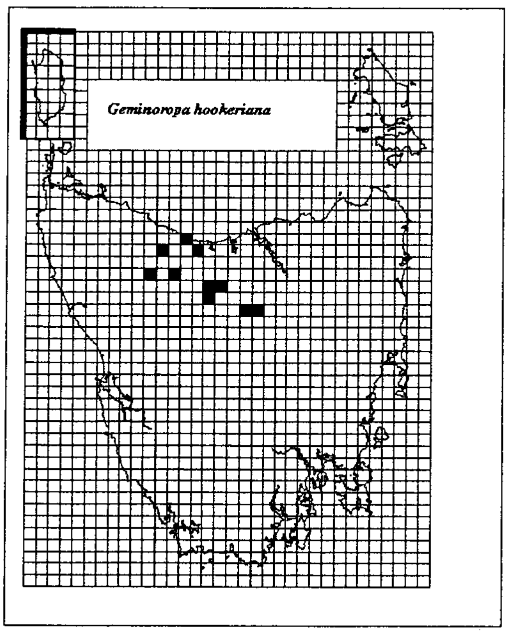
Geminoropa hookeriana (Petterd, 1879) (Plate 18a-b)

Taxonomy: No issues identified, but see under *G. antialba* for explanation of why that species is not a synonym and not even in the same genus.

Identification: This species has been very poorly understood, the name having been widely used not only for *G. antialba* but also for flat or slightly biconcave specimens of some *Allocharopa* species (chiefly *A. legrandi*, *A.* sp. "Teepookana" and *A.* sp. "Douglas"). True *G. hookeriana* is apparently confined to the central north, and records outside that area have been referred to other species or discarded.

Discussion: This local endemic species is recorded only in the central north, where it has been recorded from 10 grid squares. It is unlikely to extend further west as it is not recorded in several well-sampled grid squares on the 37E and 38E lines. To the east it is not recorded in the very well sampled grid squares along the western shore of the Tamar River, but may extend into the Devonport/Railton area where no square has been well-sampled. Alternatively, it may obey the Mersey Break (Mesibov, 1999) To the south it is another species that extends up to the face of the Great Western Tiers but does not occur on the Central Plateau. Like other species in this group, it is absent from the upper Mersey Valley. It is possible that this species has a parapatric boundary with *Geminoropa antialba* but as the line of potential parapatry is small (approximately 50 km) this requires more investigation. Also, as noted in Chapter 3, these species are not actually closely related. The microhabitat preferences of the two species are also different – while both occur in wet forests, *G. antialba* generally prefers rotten logs, whereas *G. hookeriana* is more frequently found under rocks and in leaf litter. This species has a distinctive distribution pattern.

Distribution map:



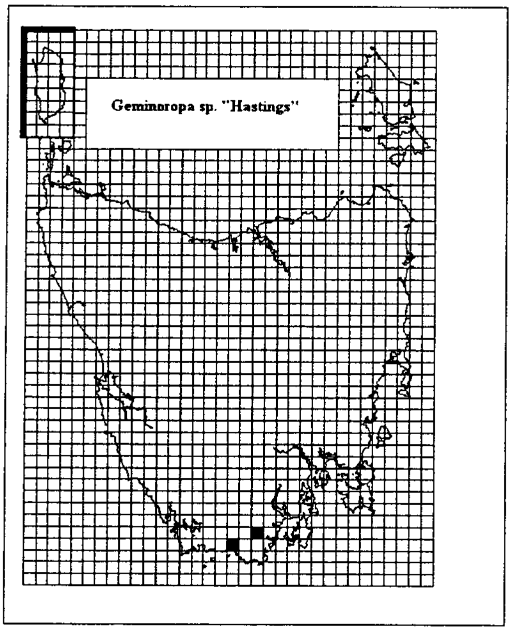
Geminoropa sp. "Hastings" (Plate 18c-d)

Taxonomy: **Brief diagnosis:** (Limited material – 7 adult specimens) Very small charopid, very tightly coiled, sunken spire, c. 2.0mm wide at 5.0-5.5 whorls, umbilicus extremely wide (D/U 2.2-2.5), protoconch apparently smooth, aperture more or less perpendicular to last whorl, otherwise generally identical to *Geminoropa hookeriana*.

The relationships of this species are unclear; despite its very close similarity to *G. hookeriana* (the more perpendicular aperture is the only difference in shell shape), the difference in the protoconch suggests it is not even the same genus. It may be related to the far more boldly sculpted but similarly shaped *Letomola barrenensis.*

Identification: No issues identified.

Distribution map:



Discussion: (includes *G.* sp. "Moonlight") *G.* sp. "Hastings" and *G.* sp. "Moonlight" are karst endemics found in the karsts of far southern Tasmania. Each is recorded from only 2 grid squares. *G.* sp. "Hastings" is known from Hastings (Newdegate) Cave and a cave at Precipitous Bluff. At both these sites the records came from the cave entrance only, and at the former specimens were seen alive crawling around the cave entrance. *G.* sp. "Moonlight" is known from several sites, most but not all being cave entrances or sediments, in the Hastings karsts and adjacent Lune River karsts. Live specimens have been found away from known cave entrances. *G.* sp. "Moonlight" is very similar to *G. antialba* and may represent a range-end development of it, but unlike *G. antialba*, *G.* sp. "Moonlight" is unknown from non-limestone environments despite considerable sampling in such environments within and near its small range.

Geminoropa antialba (Petterd, 1879) (Plate 18g-h)

Taxonomy: **(Elevation from synonymy)**

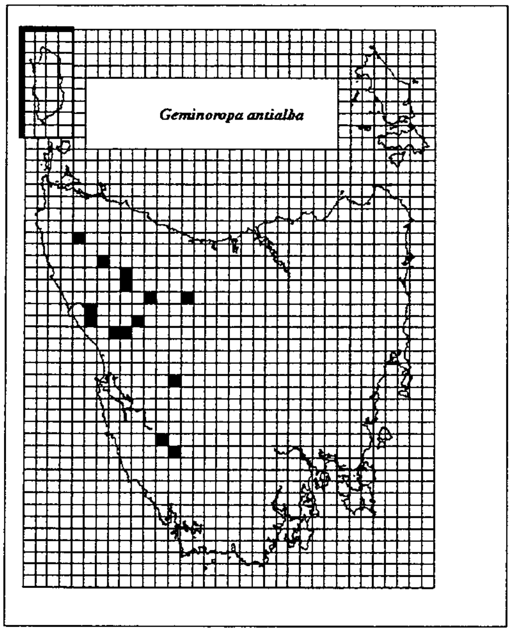
> "Shell umbilicated, concave on both sides, thin, covered with threadlike riblets, not shining, white to brown; spire deeply concave, nearly meeting the umbilicus; whorls 6.5 [sic], slowly increasing, convex, last rounded, higher than broad, below ribbed as above; umbilicus perspective, deep, about one-third [sic] of the diameter of the shell; aperture semi-lunar; peristome simple; columellar margin smooth and shining. Variety a – Brown. Diameter; greatest 2.5, least 2, height, 1 mil" – Beddome in Petterd (1879: sp. 41).

The protoconch has about 10 clearly distinct but weak spiral ridges as does that of the previous species. The whorl count is normally closer to 5.5 and shell width can reach 3.0 mm. This species was synonymised under *G. hookeriana* by Smith and Kershaw (1979) without giving reasons. In this case (unlike *Pernagera architectonica* or *Trocholaoma spiceri*) there was no shortage of museum material so it is strange that it was synonymised when in fact all that *G. hookeriana* and *G. antialba* have in common is that they are both biconcave (and even that to variable degrees). The radically different protoconch sculpture shows that they are not even in the same genus, which means that as *G. antialba* is the type species of the genus, *G. hookeriana* needs a different genus.

Identification: No issues raised.

Discussion: This endemic species is widespread and fairly common in western Tasmania, a total of 14 grid square records probably underestimating its actual frequency as its range is generally poorly sampled (mean 4.09 species records per square). It appears to display a wotlian range although the exact nature of its range in the south-west is unclear because of lack of records – probably, like *Victaphanta milligani*, its boundary in the south-west is much further west than most wotlian species. Like *Dentherona dispar,* it does not reach the northern coast.

Distribution map:



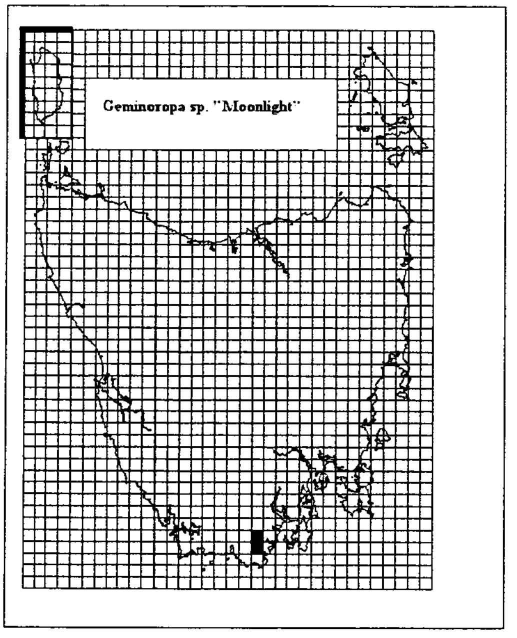
Geminoropa sp. "Moonlight" (Plate 18 e-f)

Taxonomy: **Brief diagnosis:** Small charopid, 2.5-3.3 mm wide at 4.7-5.3 whorls, clearly sunken spire, protoconch of clearly discernable thin spiral ridges (about 10), adult primary sculpture starting with widely spaced strong ribs for the first half-whorl or so, grading rapidly to very fine radial riblets, umbilicus wide (D/U c. 4), deep but not quite perpendicular, colour off-yellow to grey.

This species differs from *G. antialba,* which it strongly resembles, in having a less deeply sunken spire (*antialba* is fully and almost perpendicularly biconcave), in having generally finer adult sculpture, and more importantly, in having a two-stage adult sculpture starting with strong widely spaced ribs and grading to weaker closer ribs (also seen on *Roblinella* sp. "Bishop".)

Identification: No issues raised.

Distribution map:



Discussion: See *Geminoropa* sp. "Hastings"

Roblinella gadensis (Petterd, 1879) (Plate 19a-b)

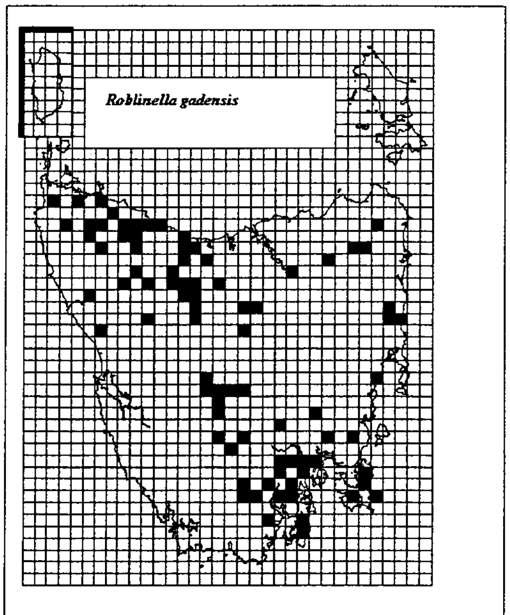
Taxonomy: There is considerable variation in this species, including in shell size and in the spacing and boldness of primary ribs. Specimens from particularly dry or marginal conditions (such as the narrow wet gullies of the Meehan Range (5325) on Hobart's eastern shore) have very bold ribs and a wide umbilicus, giving them a similar appearance to the Tasmanian species erroneously placed in *Discocharopa*. While the amount of variation superficially suggests there is more than one species, the variation appears to be continuous, and as these extreme forms occur in unusual conditions, further investigation is needed to determine if this is simply variation in response to moisture stress or other causes.

A conspicuously striped form of *R. gadensis* occurs at some localities in the south-east: all of the Tasman and Forestier Peninsulas, all of Bruny Island, Snug Tiers, eastern and central Wellington Range, parts of the Upper Derwent Valley. There is also an isolated occurrence of this form at Adamson's Peak (4920) in the far south, surrounded by occurrences of normal *R. gadensis.* Like the presence of orange *Geminoropa antialba* at some localities and white specimens at others (rayed orange and white specimens are known at one site), this is considered to be taxonomically meaningless variation, possibly resulting from minor genetic drift as a species disperses, or possibly being a response to some unknown environmental factor.

It should be noted that the protoconch of *R. gadensis* typically has c.7 very weak well-spaced spiral lines, more evident on some specimens than others. This is an important character in separating it from most other species allocated to *Roblinella*, and suggests that it may not belong in the genus, of which the type is *R. roblini.*

Identification: Some specimens identified under this name have been found to be *R.* sp. "Tahune" or *R.* sp. "Bubs Hill".

Distribution map:



Discussion: This is a common endemic species recorded from 82 grid squares covering most of mainland Tasmania. It displays great variation in the reliability with which it is recorded, however, being especially common in and around the Tyler's Line interzone area. In squares in or within 20 km of the interzone as defined by Mesibov (1996) it is responsible for 3.0% of all grid square species records, while in the remainder of mainland Tasmania it is responsible for only 0.7% of such records. It would be premature to conclude that there were actual gaps in the species range – for example, a large apparent gap in records on the east coast was filled by a record at Mayfield Bay. Only a single specimen was collected, and it is aberrant in some respects (unusually thin with a wider than normal umbilicus and a different colour) so more evidence is required to be certain that true *R. gadensis* is present in the area. The species is often associated with rotting eucalypt logs in wet forests, and this may explain its scarcity in the rainforest-dominated southwest (where *Roblinella* sp. "Tahune" is more common.) This does not, however, explain its scarcity in the east of the state. This species is considered statewide in suitable habitat (excepting the Bass Strait islands) but more collecting is needed to determine whether there are any real gaps in its range.

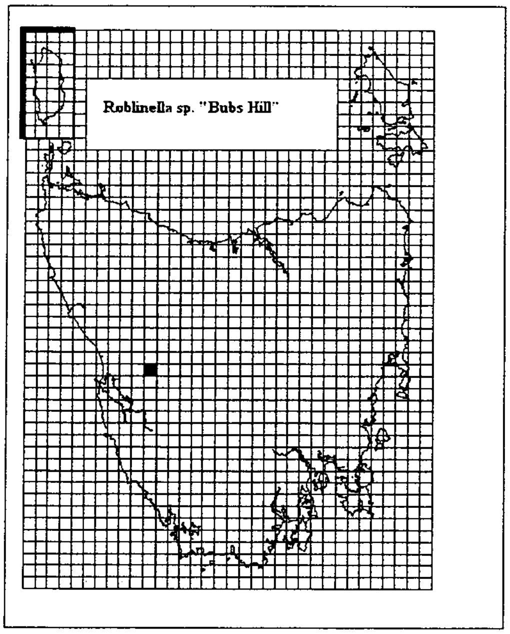
Roblinella sp. "Bubs Hill" (Plate 19c-d)

Taxonomy: **Brief diagnosis:** (Limited material – 5 adult specimens) Small charopid, adults c. 3.0-3.7 mm at c. 4.5-4.7 whorls, protoconch of c. 10 prominent low spiral ridges with densely packed, lower but very prominent, radial interstices. Adult sculpture of fairly fine straight radial riblets, interstices reticulate. Umbilicus fairly wide (D/U c. 3.5-4). Spire flat, aperture nearly in plane of shell. Colour unknown as all specimens are old dead shells from cave situations where bleaching may have occurred, possibly off-white to pale yellow.

This species appears most similar to *Roblinella roblini* but differs in its much greater size, slightly flatter shape, and the unusual strength of the radial interstices on the protoconch sculpture.

Identification: No issues identified.

Distribution map:



Discussion: This endemic species is known only from cave collections in the Bubs Hill area in the central west. No live specimens have been found, nor has it been found in nearby searching in other habitat types (eg the Frenchmans Cap track and Nelson Falls). It is therefore assumed to be a karst endemic.

Roblinella roblini (Petterd, 1879) (Plate 19g-h)

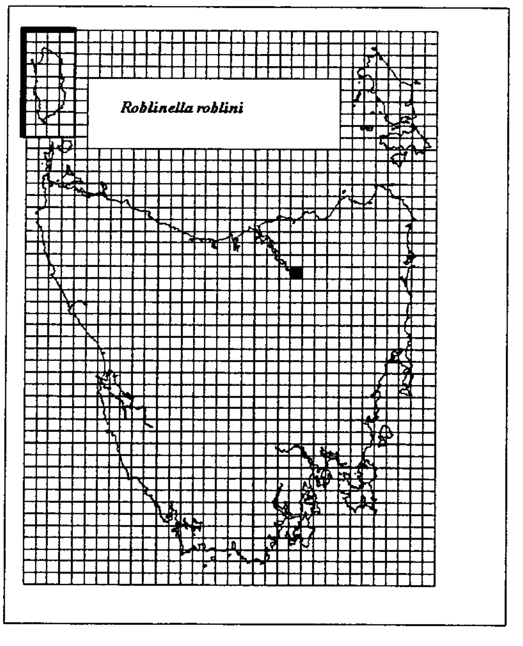
Taxonomy: **(Elevation from synonymy)**

> "Shell small, deeply and narrowly umbilicate, discoid, pure white, finely, very closely and regularly striated above and below, striae abruptly terminating at the apical whorls [1.5 to 2] which are distinctly spirally striate; spire flat; whorls 4.5, slowly increasing in size, last rounded; suture deeply excavate; aperture roundly lunate, not descending in front; margins distant, joined by an extremely thin deposit of callus; columellar not dilated. Diameter, greatest 2.75, least 2, height 1 mil." (Petterd, 1879, sp. 58)

(Based on limited material – 2 specimens examined) On examining the protoconch of the two Petterd-collected specimens available of this species, it is clearly not a synonym of *R. gadensis* on account of the protoconch alone. The protoconch is identical to that of the far commoner and more widespread *R.* sp. "Tahune", but the greater number of whorls, greater size and stronger ribbing of the adult sculpture distinguish it from *R.* sp. "Tahune". This is likely to prove inconvenient for taxonomy as *R. roblini,* the type species of the genus, is only known from one locality and has not been collected for 120 years, whereas *R.* sp. "Tahune", thought to be *R. roblini* by the author for several years, is widespread and common. The specimen measured by Petterd must have been large (either that or Petterd's measurements were inaccurate), because the remaining specimens are 2.0-2.2 mm wide.

Identification: This name was erroneously used for *Roblinella* sp. "Tahune" by the author for several years. True *R. roblini* is recorded solely from Distillery Creek.

Distribution map:



Discussion: This endemic species has not been seen since the original collections in the late nineteenth century. Distillery Creek, east of Launceston is the sole known locality. Searches for the species since have been unsuccessful but these have been focussed on remnant habitats in poor condition. Several distinctive species, forms and local populations are associated with gorges in the Launceston area, and this may be another, but this requires confirmation as the area surrounding Distillery Creek remains insufficiently searched.

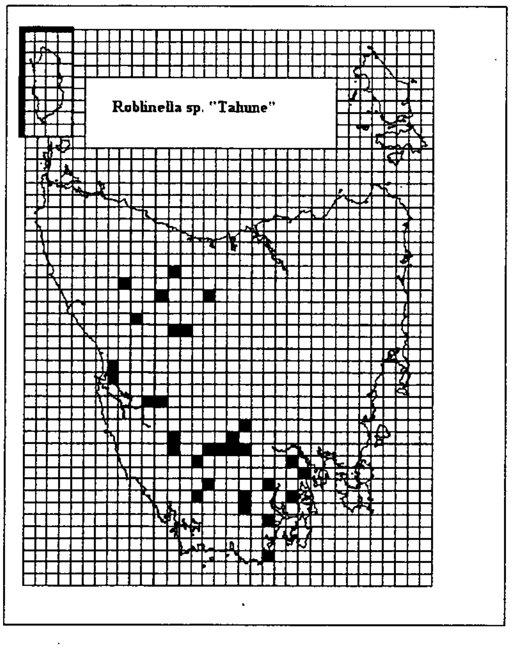
Roblinella sp. "Tahune" (Plate 19e-f)

Taxonomy: **Brief diagnosis:** Very small charopid, adults c. 1.4-1.9mm at c. 3.6-4.0 whorls, protoconch of c. 10 very prominent low spiral ridges with very much lower, densely packed, radial interstices. Adult sculpture of very fine radial riblets and very strong densely packed spiral striae – nearly as strong as the radial riblets so as to produce an almost reticulated adult sculpture. Spire flat. Umbilicus medium (D/U c. 5). Colour frosty white to pale yellow or orange.

This species is similar to *Roblinella roblini* but much smaller, with a lower whorl count and much weaker adult radial riblets.

Identification: No issues identified.

Distribution map:



Discussion: This is a widespread but not especially common wotlian species with 30 grid square records. It may have been under-recorded as it is sometimes confused with other species. Much like *Dentherona dispar* and *Geminoropa antialba* it appears not to reach the north coast.

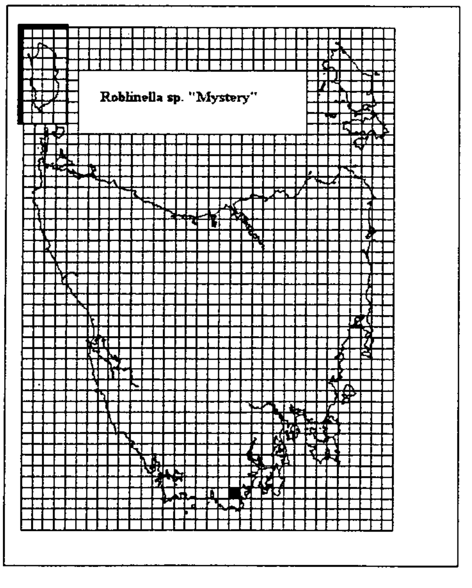
Roblinella sp. "Mystery" (Plate 20a-b)

Taxonomy: **Brief diagnosis:** (Limited material – 1 specimen) Small charopid, spire slightly elevated, whorls 5.5, width 2.8 mm, adult sculpture of low fine blunt radial riblets, protoconch apparently smooth, sutures not excavated, umbilicus medium (D/U c.5), deep, entry not angled, shell apparently white, aperture almost in plane of shell.

Recognising species based on single shells is best avoided where possible, but this specimen simply does not resemble anything else, despite its unremarkable appearance. The combination of a non-radial (but not strongly spiral) protoconch, open umbilicus, elevated spire and relatively low sculpture would suggest either *Pernagera architectonica* or *Roblinella gadensis*, but neither would have this many whorls for a specimen of this size (or any size) and *P. architectonica* is also still too coarsely sculpted. This species is therefore treated as undescribed.

Identification: No issues identified.

Distribution map:



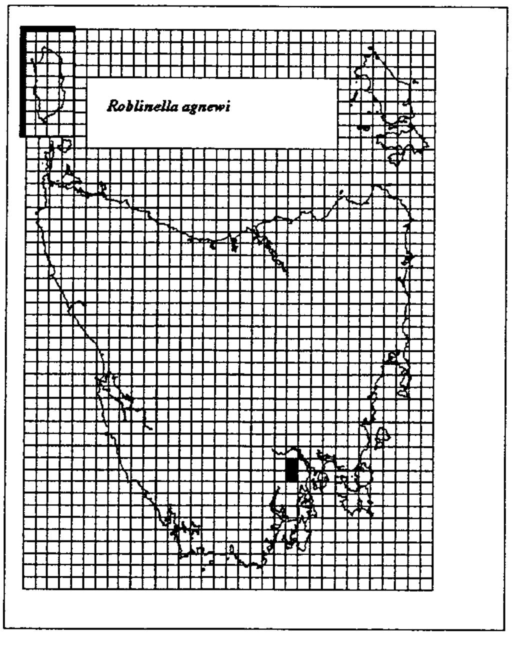
Discussion: This species is tentatively recognised from a single specimen collected in a karst area near Mystery Creek Cave. It is assumed to be a karst endemic.

Roblinella agnewi (Petterd, 1879) (Plate 20c-d)

Taxonomy: No issues identified. To avoid confusion with various other species it should be noted that the protoconch is smooth and the adult sculpture is of extremely fine closely-packed radial riblets, without prominent spiral elements. This species does not remotely resemble anything else assigned to *Roblinella*.

Identification: Records of this species away from the Wellington Range have invariably been found to be incorrect or unsubstantiated. Some are *Pernagera kingstonensis* while others, including that by May (1923) from Esperance (no specimen known), are most likely to be *Thryasona marchianae*, which superficially resembles this species. A record from "Huon Road" is given by several sources but this stems from the inclusion of the synonym *Helix petterdi* Legrand, 1871 under this name, which is highly dubious as the description of *H. petterdi* is incompatible with *Roblinella agnewi*, and it is not clear what the name *H. petterdi* refers to.

Distribution map:



Discussion: This species is known from two grid squares on the upper slopes of Mt Wellington near Hobart. Its total confirmed range measures about 5 km by 2 km. It occurs in dolerite rock screes in subalpine scrub and has been recorded at altitudes between 730 m and 1000 m ASL. There are no records in the closed forest below this scree or in the alpine vegetation above it. The species is scarce with only ten specimens collected in the last 50 years. Fourteen known specimens were collected in the nineteenth century. There are many reasons why a species could be confined to the dolerite scree blockfields where this species occurs, including fire shadow effects, distinctive microclimate and other ecological differences.

Roblinella sp. "Bishop" (Plate 20e-f)

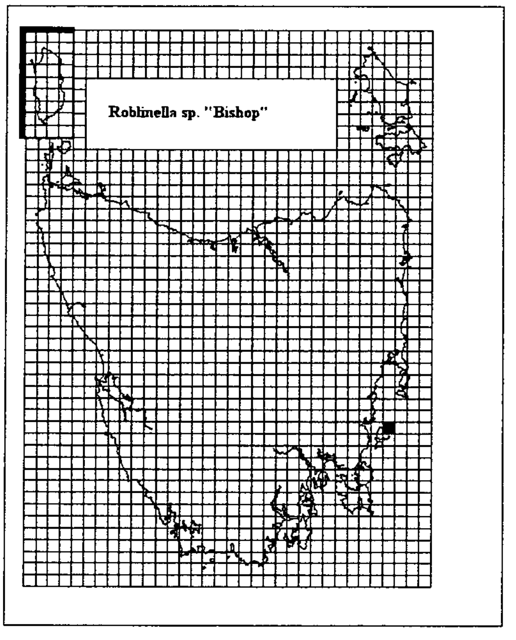
Taxonomy: **Brief diagnosis:** (Limited material – 2 specimens) Adults (?) c. 2.1mm wide at c. 3.7 whorls, spire slightly sunken, protoconch very large (2.2 whorls), protoconch sculpture of c.12 strong low spiral ridges with very low, extremely dense, radial interstices. Adult sculpture commencing with widely spaced bold ribs (c. 15 on first quarter whorl after protoconch) but rapidly becoming closer and finer (c. 120 on last whorl), interstices reticulate and very low. Body whorl rounded, high (shell height c. 1.7mm), umbilicus wide (D/U c. 3.3, deep and steep-sided).

The protoconch suggests this is another of the *Roblinella roblini* group but the shell dimensions and the characteristic strong early teleoconch (adult) ribbing make it quite distinctive. Only two specimens have been found and it is possible both are juveniles, but even so, there is nothing else known of which they could be juveniles.

Identification: No issues identified.

Discussion: This endemic species is known only from a gully on the mountain called Bishop and Clerk on Maria Island, where two specimens have been collected. It is likely to occur elsewhere on Maria Island, particularly on the wet eastern slopes, which are mostly inaccessible. It is not known whether it occurs on the adjacent mainland, but in the absence of any records there it is tentatively treated as an island endemic. The classification of this species as an island endemic is somewhat artificial given that Maria Island is a near-shore island with a snail fauna that is generally very similar to the adjacent mainland.

Distribution map:



Roblinella curacoae (Brazier, 1871) (Plate 21a-d)

(Syn. *Roblinella mathinnae* (Petterd, 1879))

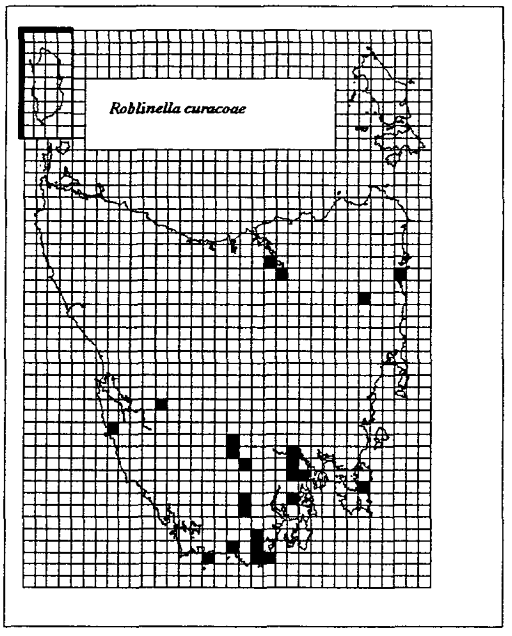
Taxonomy: The "large *Roblinella*" group, which includes medium-sized Tasmanian charopids with strongly spiral protoconch sculpture and very bold curving adult ribs, continues to be problematic. Bonham (1994) attempted to dispose of the problem by pointing out that differences in the density and strength of ribbing were the only real differences that could be extracted from the original descriptions, and that these features varied along a continuum with the Launceston form (*Roblinella mathinnae*) being merely at one end of this continuum.

This solution was unsatisfactory because the next most boldly sculpted specimens came from Precipitous Bluff (4618), and should have been treated as potentially distinct because they are much smaller than other "large *Roblinella*" (typically 3-4 mm compared with 5.5-7.5 (in one case 9.1) mm) and also have a slightly elevated spire, unlike all others (this form is shown in Plates 21c-d.) With much more material becoming available, southern specimens proved to have a very wide range of variation, which the less variable Cataract Gorge (Launceston) specimens fall just outside of. For example southern *R. curacoae* adults have from 70-160 ribs on the final whorl, while Cataract Gorge specimens have 50-60. A specimen very similar to the Cataract Gorge specimens was found at Loila Tier (6041) in the north-east, a very dry site by the standards of this group, but another find in the north-east, at the wetter Tower Hill (5739), fell within the range of variation of southern specimens. It remains the case that there is not enough evidence to reliably separate *R. curacoae* and *R. mathinnae* on the basis of shell features, and while the distance between northern and southern records is great, both forms are so scarce and patchy that it would not be reasonable to assume specimens will not be found in the gap. It also remains the case that finds in the north have generally been in only marginally wet forest types, whereas those in the south are usually in very wet forests, so ecological differences could be driving the shell differences observed.

The Precipitous Bluff form remains far more likely to be a distinct species on account of its smaller size and slightly different shell shape. However, the variation in other known *R. curacoae* specimens in the far south in both sculpture and shell size is substantial, even between presumably similar karst sites, so this form is not treated as a clear species until fresh specimens can be obtained. If it is a different species, it would be another karst endemic from the far south.

<u>Identification:</u> A record from Retreat has been dropped as the specimens are clearly *Stenacapha hamiltoni*. Unconfirmed records from the Hampshire area and from Goulds Country have also been dropped as there is no evidence they are reliable, and this is a scarce species.

Distribution map:



Discussion: This endemic species (a record from Victoria is incorrect), or complex of species, displays one of the strangest distributions in the Tasmanian native land snail fauna. There are 23 grid square records, and these are concentrated in the south of the state (the 30N line and further south) where 19 of the records occur. Even so, it accounts for only 1.4% of grid square species records in this area. The remaining four occur in the north-east, with two in the Tamar Valley gorges (Cataract and Notley), and two much further east (Tower Hill and Loila Tier). It accounts for only 0.5% of grid-square species records in this section of its range. Further complicating the situation, there is variation in the species which has some biogeographical significance (see above). Habitat differences also occur, with the southern specimens being found in rainforest and very wet eucalypt forest (especially on karst) and subalpine scree scrubs while the northern specimens occur in only moderately wet forests. The localisation of the northern specimens (eg the species was fairly common in Cataract Gorge up until approximately the 1950s) strongly suggests that the populations in the north-east are scattered relics of a wider distribution, but this does not explain why the species is much less rare in the south. It is impossible to predict the range of the species in the north of the state given its rarity there. This species' distribution is not considered adequately defined or explained, although it is plausible that the two populations are genuinely disjunct and the Derwent River is a break for the southern population, as it is for a range of wet-forest dependent wotlian species.

Roblinella sp. "Flash Tier" (Plate 20g-h)

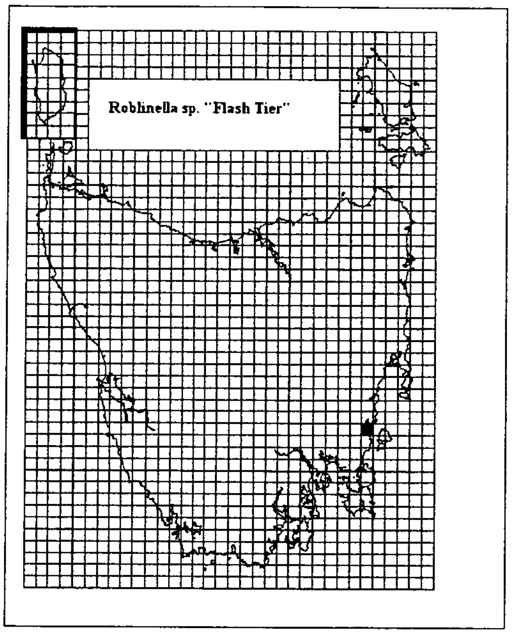
Taxonomy: **Brief diagnosis:** (Based on limited material – two specimens) Adults c. 4.5mm wide at c. 5.8 whorls, outer whorls very slightly elevated, inner whorls sunken, protoconch of c. 10 prominent spiral ridges with low, indistinct radial interstices, adult sculpture of extremely bold straight blunt thick ribs, initially very widely spaced (c. 30 on first teleoconch whorl), becoming closer and less bold with increased whorls (c. 150 on body whorl), interstices reticulate but with radial elements more obvious, body whorl deep and rounded (c. 2.4mm high), umbilicus medium-wide (D/U c. 3.5), very steep and deep, aperture slightly below plane of body whorl, colour mainly white.

This species distantly resembles *R. curacoae* but has a much tighter spire, more whorls, and most importantly straight rather than curved ribs. *R.* sp. "Bishop" is also vaguely similar in having a sunken spire and a sculpture which becomes less bold with increasing whorls, but this starts to happen much later on *R.* sp. "Flash Tier" (not until about the 4th whorl) and the early ribbing is much bolder on *R.* sp. "Flash Tier" in any case.

Identification: No issues identified.

Discussion: This endemic species is known only from two specimens collected in a gully at Flash Tier near Orford. It has not been found at the nearby Thumbs rainforests and rock screes, or in the well-searched Wielangta, Paradise Gorge or Mount Morrison / Bust-Me-Gall Hill areas nearby. It was found in rock scree in very wet eucalypt forest in 1990. An attempt to find further specimens during this project was thwarted by the logging of the site since the species' discovery. It is likely that more specimens will be found nearby, but it remains to be determined whether this species is another scree endemic or whether it has a wider habitat preference.

Distribution map:



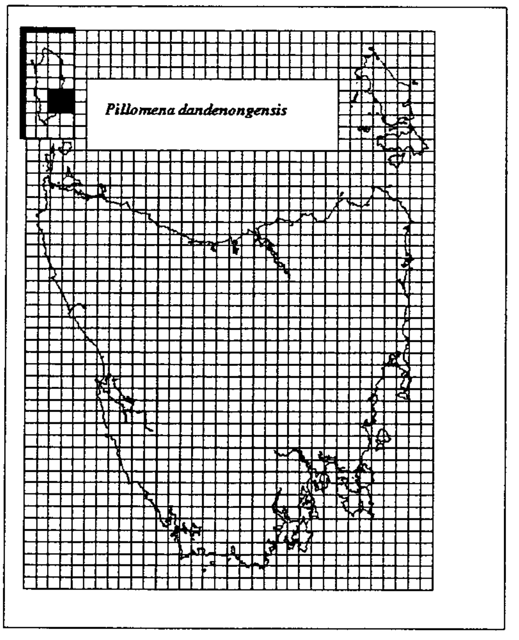
Pillomena dandenongensis (Petterd, 1879) (Plate 21e-f)

Taxonomy: As noted by Bonham (1997b) a charopid found on King Island was found to be extremely similar to this Victorian species, differing only in having a slightly less sunken spire. There are similarities between this and some of the above species, particularly in protoconch sculpture.

Identification: No issues identified.

Discussion: This is a Victorian species recently recorded on King Island, where it is very common in what wet forest habitat remains (4 grid squares). This species is considered to be a toehold species.

Distribution map:

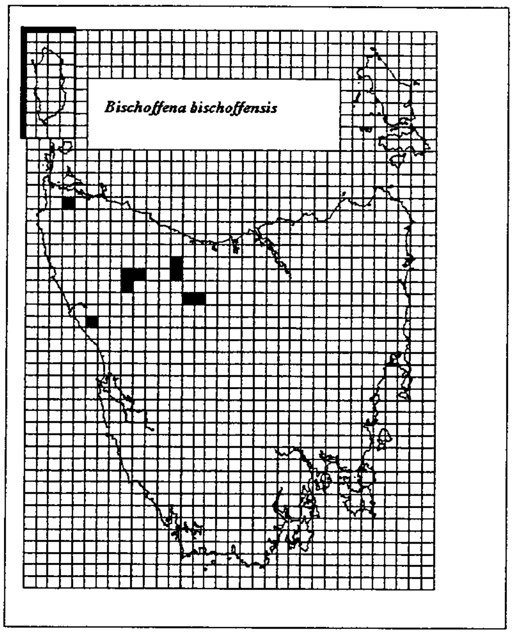


Bischoffena bischoffensis (Petterd, 1879) (Plate 21g)

Taxonomy: No issues identified. To avoid confusion with *Oreomava* it should be noted that this species has a distinctive adult sculpture of very low, regular, very close packed radial ribs with strong spiral interstices producing an almost reticulated adult sculpture, whereas *Oreomava* has stronger and more widely spaced ribs with reticulate interstices.

Identification: Many records of this species are of the superficially similar (in gross shell shape) and commoner *Oreomava johnstoni*. Records from south-western Tasmania are attributable to either *O. johnstoni* or, more commonly, to *Roblinella* sp. "Tahune" which has a very different shell form but a rather similar sculpture.

Distribution map:



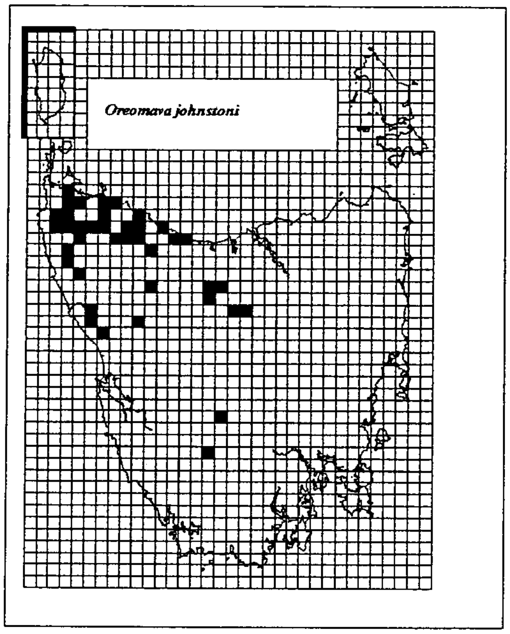
Discussion: This endemic species is apparently confined to the north-west and, although well known to early collectors, is still recorded from only nine grid squares. The core section of its range (between Waratah and Gads Hill) contains seven of these squares in a 30 km by 70 km area, and very large specimen lots from Mt Bischoff (Waratah) are held in the Tasmanian Museum collection. The remaining records are of single specimens 40 km and 70 km from any other record. In the case of the most outlying record (Togari Block) there has been very extensive searching between this site and others where the species has been recorded. These outlying records make it difficult to predict the species' actual range, especially as the Togari Block record (the sole specimen collected in a nine-day survey of Togari Block) could represent either a disjunct population or an accidental translocation outside the species' range. The latter is unlikely as traffic between the species' main range and the Togari Block would be uncommon.

Oreomava johnstoni Iredale, 1930 (Plate 21h)

Taxonomy: No issues identified.

Identification: No issues identified.

Distribution map:



Discussion: This endemic species is known from 41 grid squares. These are concentrated in the far north-west (excluding the Hunter Group) but extend into the central north and, more problematically, the Florentine Valley area. The Florentine records consist of four specimens in the Ragged Range (grid square 4426) and one each at two sites in grid square 4529 in the upper Florentine Valley. There is a gap of approximately 70 km north-south between these and the other *Oreomava johnstoni* records. This gap contains 157 grid square species records for all species, but the species within its main range accounts for 3.8% of grid square species records. This species can therefore be treated either as a wotlian species which is much rarer in the south-west than the north-west, or as a species with an individual range including two disjunct regions. In either case, its eastern boundary in the central north is consistent with the Mersey Break.

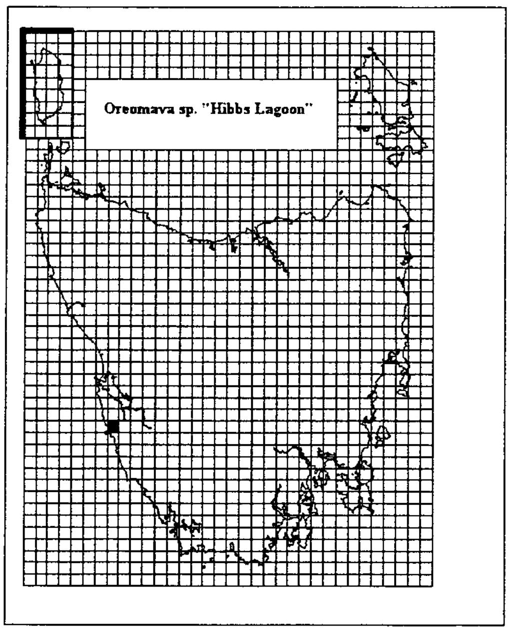
Oreomava sp. "Hibbs Lagoon" (Plate 22a-b)

Taxonomy: **Brief diagnosis:** (Based entirely on material in very poor condition) Adult shells 3.5-4.0 mm at 4.6-4.8 whorls, spire slightly elevated, umbilicus closed, protoconch sculpture definitely spiral but difficult to say more because of poor specimen condition, adult sculpture of fine radial riblets, interstices certainly with strong spiral elements but probably reticulate.

This species resembles *O. johnstoni* but differs in the much finer sculpture (c. 250 ribs on body whorl compared to c. 100 for *johnstoni*) and is also slightly larger and less tightly coiled (*O. johnstoni* reaches c. 3.5mm at c. 5.5 whorls).

Identification: No issues identified.

Distribution map:



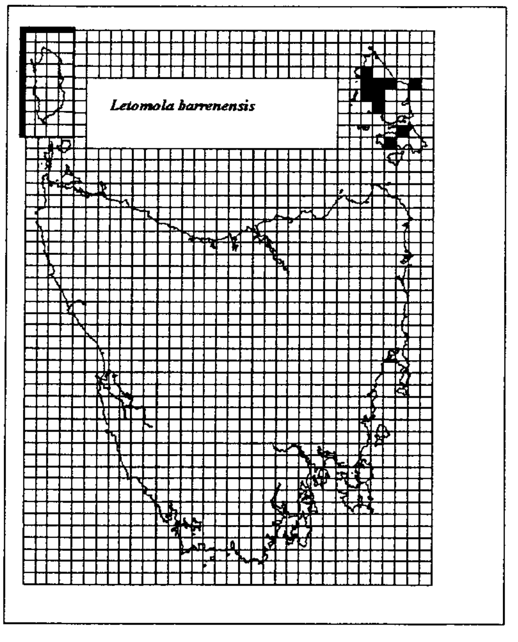
Discussion: This species is known only from several dead specimens (none fresh), collected in archaeological digs at a single site, Hibbs Lagoon on the west coast. Searches in nearby areas such as Birch Inlet and the Lower Gordon River have not yielded any specimens. It is assumed that this species is a local endemic, possibly an extant karst endemic or possibly an extinct species. If the latter, it probably became extinct before European settlement as there has not been significant habitat alteration in the area.

Letomola barrenensis (Petterd, 1879) (Plate 22c)

Taxonomy: No issues identified. (Note: this was excluded from this genus without reallocation by Stanisic (1990) but included by Smith (1992), and its placement needs to be reconsidered.)

Identification: Although this was recorded from the Burnie area by Petterd (1879) this is the sole mainland Tasmanian record, and there is no specimen as evidence. This record is therefore rejected – it may have been the similar-looking *Geminoropa hookeriana*.

Distribution map:



Discussion: This species is known from 10 grid squares in the Furneaux Group. It is locally abundant there, and occurs both in coastal scrub and wet forest gullies, although not reliably. This species is treated as an island endemic.

Thryasona marchianae (Legrand, 1871) (Plate 22e-f)

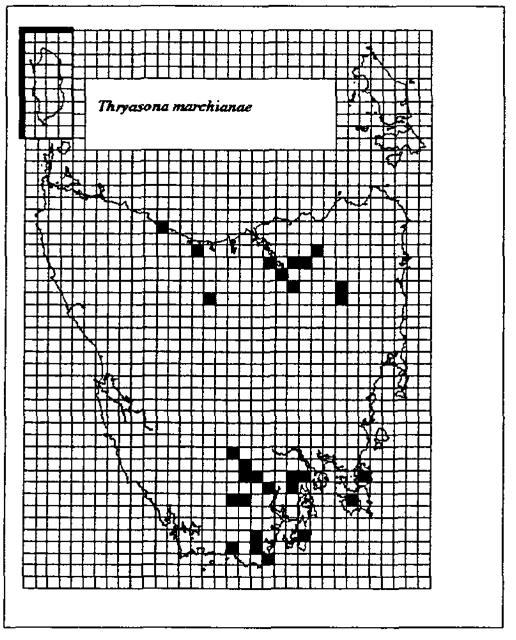
Taxonomy: **(Elevation from synonymy)**

> "Shell discoid, broadly and perspectively umbilicated, thin, translucent, glossy, pale horny-yellow, irregularly finely striated throughout, very finely marked with irregular transverse horn streaks; whorls 4.5 to 5, convex, very gradually increasing in size; spire flat; suture wide, and rather deeply impressed, last whorl scarcely descending in front; aperture oval; periostome simple, thin; margins approaching; columellar margin not dilated or reflected. Variety a – obsoletely rayed with chestnut. Diameter, greatest 0.19, least 0.16, height 0.08 of an inch [4.8, 4.1, 2.0mm]" (Legrand 1871, sp. 25)

This species was listed as a synonym of *Thryasona diemenensis* by Smith and Kershaw (1979) without giving reasons. *T. diemenensis* is far larger (adults 7-13 mm at 4.5-5.5 whorls) and has a different sculpture consisting of irregular radial ribs with interstices of small irregular, triangular diagonal corrugations. *T. marchianae* has a sculpture of rough irregular low striations and regular spiral lines. Another difference is that in *T. diemenensis* the umbilicus wall forms a sharp angle with the base, whereas in *T. marchianae* the entry to the umbilicus it is rounded. Finally *T. marchianae* is extremely glossy. The regular spirals are far more prominent on southern specimens than northern ones, and the southern specimens are also slightly larger and less tightly coiled (adults to 5.2 mm at 4.6 whorls compared to northern specimens to 4.7 mm at 5.4 whorls). Given the gap between the two centres of records for the species, it is possible that these are actually separate species, especially as there is no difference in habitat type. However, as *T. marchianae* has been synonymised with *T. diemenensis* for the past two decades, specimens from localities in between may have been missed because they were treated as juvenile *T. diemenensis* and not collected. Because of the differences in adult sculpture, this species and the following species should actually be placed in a new genus rather than in *Thryasona*.

Identification: No issues identified.

Distribution map:



Discussion: This species is known from 28 grid squares, although it has probably been under-recorded because it was erroneously considered synonymous with *T. diemenensis*. Records occur in two clusters, one in the central north and north-east (11 grid square records) and one in the south and south-east (17 grid square records). The frequency of records for the level of search intensity is about the same in each cluster – 1.9% and 2.1% of grid square species records, respectively. Between the two clusters is a gap measuring 130 km north-south and including 567 grid square species records. This unusual distribution may reflect a former eotlian species where the north and south halves have been separated by a past process, such as glacial vicariance or loss of sufficiently wet habitat. This is supported by the species' habitat preferences – known sites are usually in rainforest, mixed forest and very wet eucalypt forest, habitat types which are scarce and disjunct in the apparent gaps between the two centres of distribution.

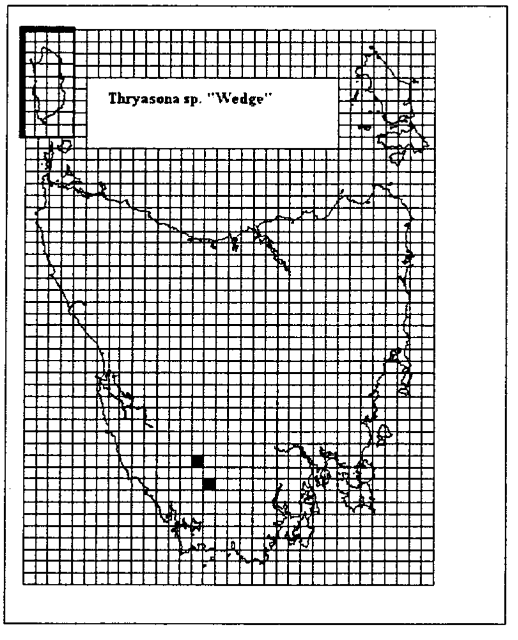
Thryasona sp. "Wedge" (Plate 22g-h)

Discussion: **(Brief diagnosis)** Small charopid, adults 3.5-4.5 mm wide at c. 4.5 whorls, protoconch of fine regular radial riblets, adult sculpture of rough irregular radial corrugations and strong regular slightly wavy spiral lines. Umbilicus small (D/U 6.5-7.5), shell extremely glossy, colour uniformly red-brown.

This species resembles *T. marchianae* but differs in the protoconch (*T. marchianae* smooth), the width of the umbilicus (*T. marchianae* D/U<3.5), the slightly smaller size and the shell colour.

<u>Identification:</u> No issues identified.

<u>Distribution map:</u>



<u>Discussion:</u> This recently discovered species is known from only two localities about 25 km apart in the south-west, McPartlan Pass and near Scotts Peak, both of which has been subject to high-intensity pitfall trapping for invertebrates. Pitfall trapping using preservative has effectively trapped large numbers of mobile ground-dwelling native land snails in several parts of the state. *T.* sp. "Wedge" is recorded from several different habitat types, with most specimens from buttongrass, but some from tea-tree scrub and rainforest. Buttongrass generally supports low land snail diversity, presumably due to the acidity of soils it grows on and the limited litter cover it provides. It is likely that this species is more widespread but has been overlooked because of its very unusual habitat preferences and scarcity. It appears to be very

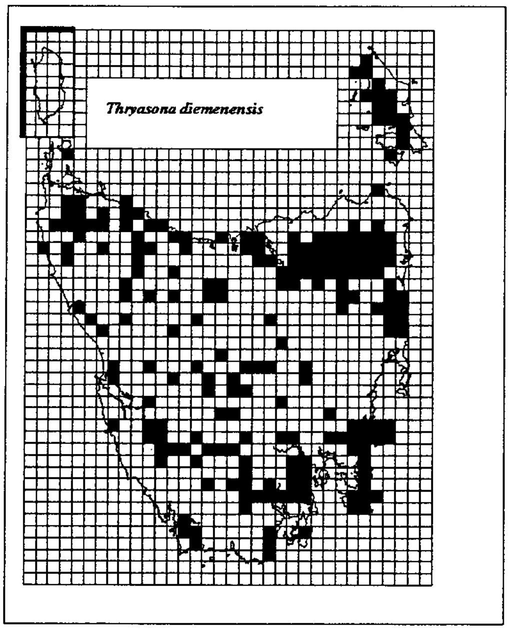
closely related to *T. marchianae*, but more searching is required to determine its geographic relationship with that species.

Thryasona diemenensis (Cox, 1868) (Plate 23c-d)

Taxonomy: No issues identified.

Identification: *T. marchianae* has often been identified as this species (see under *T. marchianae*).

Distribution map:



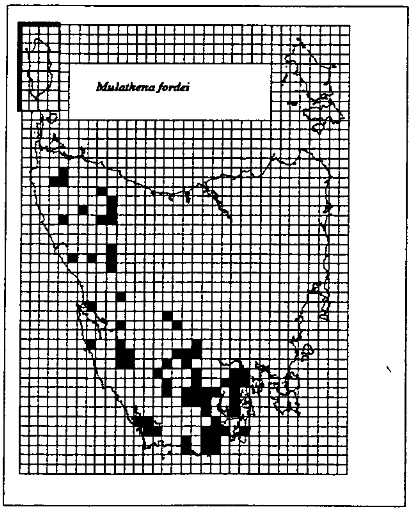
Discussion: This is one of the commonest snails in the state, and is recorded from 209 grid squares, accounting for 5.3% of grid square species records statewide excluding King Island (where it is not recorded). The only point of biogeographic interest regarding this species is its apparent absence from a gap including the east coast and northern midlands – a gap that while very poorly sampled (mean 2.39 species records per grid square) still includes 175 grid square species records. As the species has successfully colonised the rest of the state, including many areas that were well away from wet forest glacial refuges, the lack of such refuges on the east coast is not a convincing explanation for the absence of *T. diemenensis* from this region. More probably, the species is absent from the area because the present-day environment is unsuitable. The most likely reason is low rainfall, although the corellation between the low rainfall zone on the east coast and the area of the species' absence is not perfect.

Mulathena fordei (Brazier, 1871) (Plate 22d)

Taxonomy: There is considerable variation in this species including the height of the spire, shell width, strength of adult sculpture and degree of keeling, but despite the large number of 19th century synonyms of this species, there is no evidence that would yet warrant splitting this species. Small specimens sometimes recorded in the central west and north-west and tending to have low adult sculpture may merit further investigation.

Identification: This has been recorded twice well out of its apparent range, at Big Sassy Creek (Coy, 1993) and near Ben Nevis in the north-east (record by other collector mentioned by Brian Smith). The first is suspected of being a mislabelling as a trip to the area by the author yielded no specimens. The second is not assessed as the author has not seen the specimen. Human translocation of the species outside its natural range is a likely cause.

Distribution map:



Discussion: This is a relatively common endemic species with 68 grid square records (records from Victoria are of some superficially similar *Flammulops*-like forms). The records are entirely in western and southern Tasmania, giving the species a typical wotlian range. It is scarcer in the north of its range and it is not clear whether it reaches the north coast.

Flammulops cf. *excelsior* (Hedley, 1896) (Plate 23a-b)

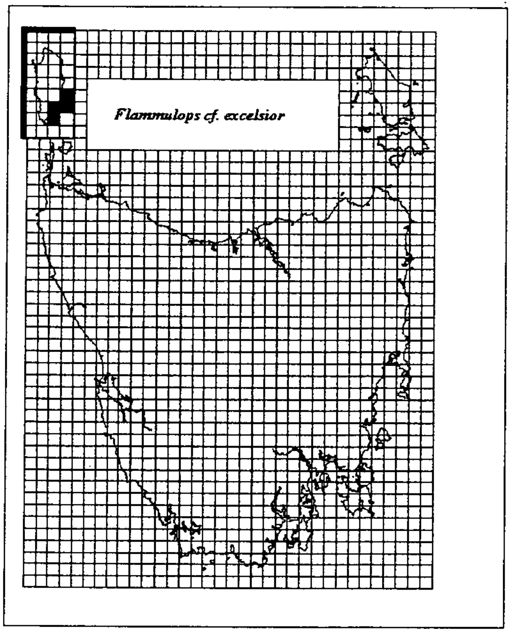
Taxonomy: **Brief diagnosis:** Medium-sized charopid, adults 6.5-8.5 mm wide at 4.3-5.0 whorls, turbinate, rounded body whorl (very slight keel rarely), elevated spire, umbilicus closed, very wide aperture. Protoconch very small (c. 1.6 whorls), with numerous (c. 25) very low spiral traces, adult sculpture of rugose irregular radial corrugations, sometimes appearing as distinct sharp rough ribs on later whorls, interstices rugose with low irregular spiral grooves, colour yellow to brown with wide wavy red radial flares, present on both surfaces.

The protoconch immediately distinguishes this species from *Mulathena* at genus level, and the sculpture, shape and flamed coloration led to immediate comparisons with the Great Dividing Range species *Flammulops excelsior*. However, that species is not only larger but also has fewer whorls. More importantly, Brian Smith (*pers comm*) states that the radula is not consistent with *Flammulops* and is more consistent with *Mulathena*, suggesting that this King Island species either belongs to a monospecific genus or else is related to the Victorian species described as *Helix fordei macoyi* Petterd 1879 and *Thalassohelix translucens* Gabriel 1934.

Identification: No issues identified.

Discussion: This species is recorded only from 4 grid squares on King Island, where it is locally very common but occurs patchily in a range of scrub and wet forest habitats. As anatomical evidence (Brian Smith, pers comm, based on radula comparisons with *Flammulops excelsior* and *Mulathena fordei*.) suggests that its resemblance to the true *Flammulops excelsior* is one of shell feature convergence only, it is considered endemic to Tasmania, and is therefore treated as an island endemic.

Distribution map:



Stenacapha savesi (Petterd, 1879) (Plates 24g-h, 25a)

Taxonomy: **(Elevation from synonymy)**

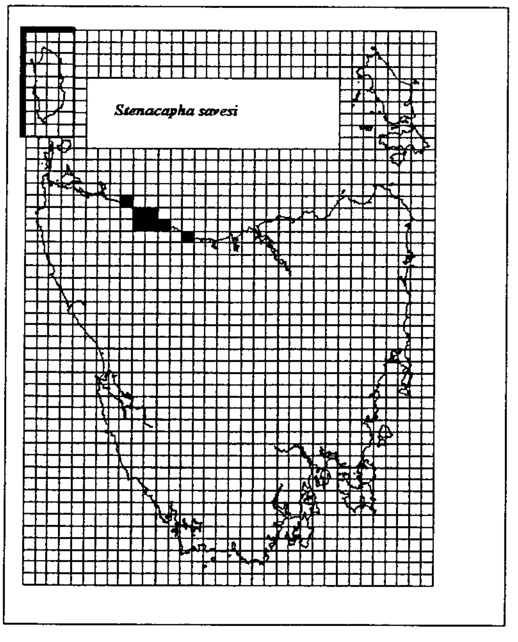
> "Shell umbilicated, depressed, very thin; shining, horny-yellow, occasionally almost white; prominently, obliquely ribbed throughout, ribs occasionally somewhat moniliform; interstices with fine striae and decussate, the latter more perceptible on the upper whorls than in the last; spire flattened, small, apex projecting, whorls 5.5 to 6, flatly convex; suture impressed, very rapidly increasing in size, last large, not descending in front; periphery rounded; base sculptured as above, but becoming finer as it approaches and enters the umbilicus, which is moderately open and funnel shaped; aperture diagonal, ovately-lunar; peristome simple, thin, margins approximating and joined by a thin, shining, smooth callus; columellar margin a little dilated. Diameter, greatest 11, least 9; height 5 mil" (Petterd, 1879, sp. 13)

The most prominent distinction between this species and *S. hamiltoni* is a sculptural difference: the presence of low hair-like spikes along the ribs of specimens in good condition (see Plate 21a). This is most prominent on small specimens to about 7 mm;

by the full adult size of 11-12 mm (which is quite rarely reached, suggesting that specimens probably reach sexual maturity well before the shell finishes growing) the spikes have normally been worn down. The species is also typically somewhat smaller for a given number of whorls than *S. hamiltoni* – a specimen at 4.5 whorls would be 5-6 mm wide compared to 7-11 mm for *S. hamiltoni*. The rough appearance of specimens that have lost all the spikes is still considered a distinguishing feature by Petterd and Hedley (1909): "The coarse sculpture and thin texture distinguish this species which peculiarities are remarkably constant ..." (p.298). However, *Stenacapha hamiltoni* specimens from localities well outside the known range of *S. savesi* sometimes look similar in this respect, the real difference being that the hair-like spikes never occur on specimens from these areas.

Identification: No issues identified.

Distribution map:



Discussion: This endemic species is known from 7 grid squares in a 50x20 km strip along the central north-west coast, between Ulverstone and Rocky Cape. At some sites it is extremely common, and it clearly has a substantial environmental tolerance, as it occurs in very disturbed sites such as Burnie Park (a bushland remnant surrounded by housing). Because it has only been informally recognised as a valid species again in the last few years, it may have been under-recorded, and its range may be somewhat larger than known. Because the surrounding area is very well sampled, it is clearly a local endemic, however there is no obvious explanation for its limited range.

Stenacapha ducani (Legrand, 1871) (Plate 23e-f)

Discussion: **(Elevation from synonymy)**

> "Shell widely umbilicated, convexly depressed, transversely, finely, obliquely, granularly striated, and longitudinally regularly striated with slightly waved striae, thin, transparent, pale yellow-brown; whorls 6, rounded; suture deep; spire slightly raised; peristome simple, thin, straight, margins approached; columellar margin not dilated or reflexed. Diameter, greatest 0.78, least 0.62; height, 0.50 of an inch. [19.8, 15.7, 12.7 mm]" Legrand (1871, sp. 56)

Petterd (1879) was not satisfied with the validity of this species, believing that it, along with the forms described as *hamiltoni* Cox 1868, *stephensi* Cox 1868, *plexus* Legrand 1871, *savesi* Petterd 1879, *kingi* Brazier 1871 and *langleyana* Brazier 1876, were probably all the same species. He also wrote "I have carefully examined a large number of specimens, and find they exactly agree in form and structure to the typical form from Mount Wellington; the only difference is the great size of *ducani*." Petterd and Hedley (1909) subsequently listed all these names as synonyms of *hamiltoni* with the exception of *savesi*.

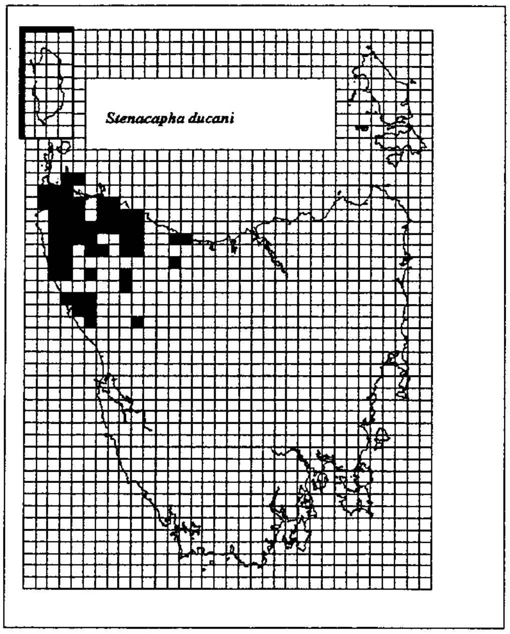
The wide level of variation in *Stenacapha* makes it difficult to select potentially distinct species but a series of specimens from the north-west of the state are compatible with the description of *S. ducani* and distinct from all other *Stenacapha* by generally having both more whorls (adults c.5.2 - 6.3) and being larger (12-23 mm) than *S. hamiltoni*. Occasional *S. hamiltoni* have up to 5.3 whorls but these are exceptionally large specimens (13-15 mm) from central northern Tasmania; in general *S. hamiltoni* reach 7-12 mm at 4.4-5.0 whorls. There is also a consistent sculptural feature in *S. ducani*, in that all specimens with over 5.4 whorls from the north-west Tasmanian mainland have very low adult sculpture. The radial riblets on the early whorls are never especially pronounced and on the later ribs they are invariably reduced to irregular corrugations with the spiral interstices becoming the most obvious sculptural feature. While this sometimes happens in what appear to be normal *S. hamiltoni* as well, it is significant that something common in *S. hamiltoni* (the retention of regular-looking bold ribs on the later whorls) has never been seen in hundreds of the larger northwestern specimens referred to *S. ducani*.

The differences between *S. ducani* and *S. hamiltoni* might be attributed to local variation, but points against this include: (a) in the area between Devonport (4644) and Ulverstone(4444) very large specimens having the typical *S. hamiltoni* sculpture are replaced by *S. ducani* with a gap between the twov of at most 20km, with no apparent intergrading; (b) Within the range of *S. ducani*, specimens with typical (and in cases very strong) *S. hamiltoni* sculpture occur alongside *S. ducani,* even displaying microsympatry at some sites (where *S. ducani* is typically abundant) but in these cases the two species are very easily differentiated based on sculpture and whorl count for a specific size; (c) Although detailed study of the animals is in progress and has not been completed (Brian Smith, pers. comm.), the author expects that there will be differences. The colourful *S. ducani* animal, which has a reddish foot, is quite distinctive, and it is also noticeable that *S. ducani* when being preserved retains a large air pocket inside the shell. *S. hamiltoni* does not display this feature.

Differentiating small and juvenile *S. ducani* from the range of variation here included in *S. hamiltoni* is difficult and may be impossible on shell features alone. In general small specimens appearing to be *S.ducani* (for instance low-sculptured forms from north-west environments where there are no strongly-ribbed forms and where there are many definite *S. ducani*) are marginally smaller than *S. hamiltoni* for a given number of whorls despite the larger size of adult *S. ducani* (eg 4.5 whorls: *S. ducani* 4.5-6.5 mm, *S. hamiltoni* 7-11mm; 4.75 whorls, *S. ducani* 6-8.5mm, *S. hamiltoni* 8.5-12.5 mm; 5 whorls, *S. ducani* 7.5-9.5mm, *S. hamiltoni* 9-14mm) but this is not alone sufficient to split the two species. The approach that has been taken here for north-west material is that if clear specimens of only one species are known from a locality, the other is treated as absent until proven otherwise.

<u>Identification:</u> No issues identified.

Distribution map:



Discussion: This endemic species is recorded from 53 grid squares in the north-west corner. Within its range it is responsible for 7.0% of grid square species records, a very high figure given the high intensity of searching within the area (mean 6.72 species records per square). It is an abundant species capable of thriving in a wide range of wet forest environments, including highly modified environments such as pine plantations. It may have a parapatric boundary with *Stenacapha* sp. "Hunter", with which it has never been recorded despite records within 3 km on Robbins Island and 10 km on Woolnorth. This species' boundary is not considered reducible to any other known pattern.

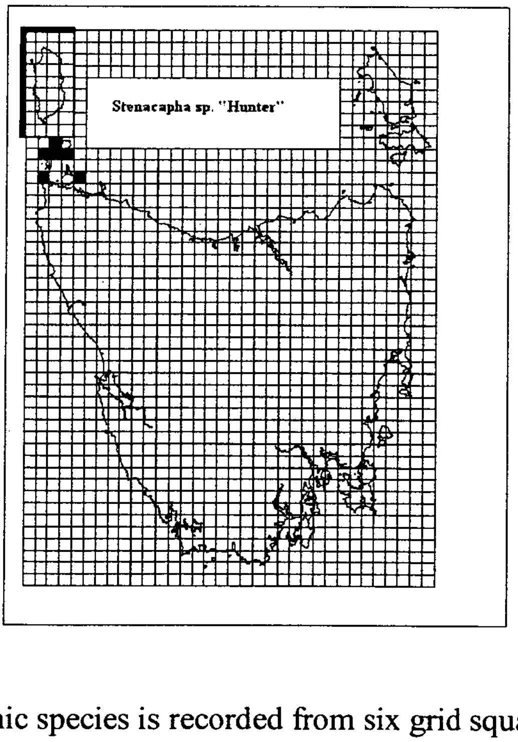
Stenacapha sp. "Hunter" (Plate 23g-h)

Taxonomy: **Brief diagnosis:** Medium-sized charopid, spire very tightly coiled (adults 5.5-9.0 mm wide at 4.9-5.6 whorls), spire slightly elevated, last whorl descending in front, umbilicus medium (D/U c. 5-6), almost perpendicular, deep. Protoconch of low radial riblets, adult sculpture of low close irregular radial riblets sometimes devolving to irregular corrugations on the later whorls, interstices with spiral lines which become more prominent on the later whorls. Colour tan to medium brown.

This is another north-western form distinguished primarily on shell size and tightness of coiling of the spire, and secondarily on the very consistent spire elevation in adults (usually absent in *S. hamiltoni* and *S. ducani* in this area.) It would again be tempting to treat this as a local variation except that in wet forest on South Hummock, Three Hummock Island (3251), it occurs alongside statistically normal *S. hamiltoni* in the same habitat without apparent intergrading (although *S. hamiltoni* is rare there). Also on Robbins Island (3349) this species occurs on the northern side of the western end of the island with *S. ducani* replacing it on the southern side only c. 2 km away. Juvenile *S. ducani* sometimes fall within the size range of this species but have a much more inflated final whorl and larger aperture.

Identification: No issues identified.

Distribution map:



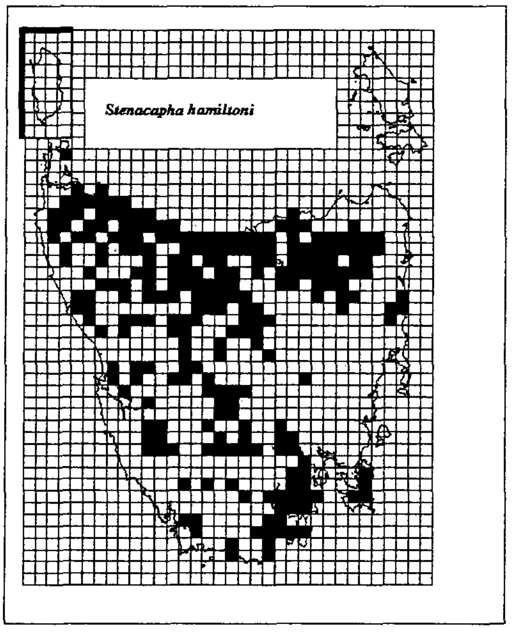
Discussion: This endemic species is recorded from six grid squares in the far north-west, covering Hunter Island, Three Hummock Island, part of Robbins Island and one site on the adjacent Woolnorth area at the extreme north-west tip of the mainland. It appears to have a parapatric boundary with *S. ducani* as discussed above. This may reflect past conditions in the Hunter Group area, which would not have supported wet forest during colder and times (and indeed barely does so today). The very large and thin-shelled *Stenacapha ducani* may have struggled to survive in such an environment, possibly through a lack of adequate litter and log shelters, and possibly because its shell size was unsuited to such conditions. Therefore the existence of a localised replacement would not be surprising. This species could be considered as an "island endemic" (overlooking the presence of the species at Woolnorth), but is probably best considered as a likely parapatric replacement for *S. ducani.*

Stenacapha hamiltoni (Cox, 1868) (Plate 24a-f)

Taxonomy: Even with the above three species removed, this remains a confusingly variable taxon that is probably really a species complex, but is here treated as a single species. Variation in this species includes size, umbilicus width, aperture shape, number of whorls attained, elevation of spire (slightly elevated to slightly sunken in extreme, typically inland north-western, cases), and particularly the strength and (apparent) regularity of adult sculpture, with the radial ribbing in some specimens so clearly divided into higher and lower ribs that it gives the appearance of a regularly-ribbed species with radial interstices. The regularity of the ribbing on any form tends to collapse on the later whorls, making it impossible to make a firm distinction between "regularly" and "irregularly" sculpted specimens. Petterd (1879) considered a form found at Table Cape (3946) and Circular Head (3548) to be distinct and named it *wynyardensis*, writing "the prominent close-set riblets and the distinct difference in the colouration of the upper and lower surface at once separate it from [*S. hamiltoni*]". There is certainly a recognisable "form" in this area which is more strongly sculpted than normal and has the animal coloration mentioned, but it is impossible to separate it absolutely on shell features; furthermore, similar specimens occur sporadically in other parts of the state, so there is a need for more specimens to be collected to attempt to determine if *wynyardensis* is an anatomically distinct species. Inland north-eastern specimens under the name *kingi* (Petterd, 1879) have also been considered as a potentially distinct species, but also fall within the normal size range of *S. hamiltoni.* Brian Smith (pers. comm.) comments that a confusing range of variation in anatomy is also encountered, paralleling the confusion encountered in shell features. This suggests that genetic analysis will be necessary to fully resolve whether *S. hamiltoni* is one or many species.

Identification: Records from King Island by Johnston (1888) are neither replicated nor substantiated since, and are therefore rejected. Many records have been referred to other species of *Stenacapha.*

Distribution map:



Discussion: This endemic snail is one of the state's commonest species with records from 249 grid squares. Like *Thryasona diemenensis* it is absent from a large section of the east coast and northern midlands. Indeed, the gap for *Stenacapha hamiltoni* is even larger, including squares with 389 grid square species records (it accounts for 7% of grid square species records within its known range). Again, rainfall deficit is suggested as the most likely explanation for this gap in the range of such a widespread snail, which can be found and is often abundant in almost any environment within its range.

Stenacapha vitrinaformis (Legrand, 1871) (Plate 25e-f)

Taxonomy: **(Elevation from synonymy)**

(Syn. *Helix tabescens* Legrand, 1871)

> "Shell imperforate, flatly depressed; yellow brown, thin, horny, translucent; irregularly streaked with lines of growth longitudinally; shining; very finely striated with waved striae, above and below; whorls 4.5, rapidly increasing in size, flat above, last much dilated, not descending in front; spire not raised; peristome straight, simple, thin, aperture proportionally very large, lunately rounded; columellar margin expanded and impressed covering the umbilicus. Diameter, greatest 0.38, least 0.28, height, 0.78 [sic – error, should be 0.18?] of an inch [9.6, 7.1, 4.5? mm]"- Legrand (1871, sp. 58)

This snail has a confused taxonomic history. It was described by Legrand (1871), along with another similar species, *tabescens*, which appears to have been based on juvenile specimens. However Legrand figured neither species. Petterd (1879) wrote "I collected the type specimen in company with *H. fordei* (Brazier), to which shell it has a resemblance. The nearest to it in Australia is *H. fernshawensis mihi,* from Victoria, from which it mostly differs in its more depressed form." It is very clear from the comments about sculpture and the number of whorls that *vitrinaformis* is not a *Helicarion* but rather a loose-whorled charopid (something even clearer in Legrand's description of *tabescens*, which based on shell shape as described alone is clearly not *Mulathena fordei*). Petterd (1879: 55) added "In the "Science Gossip" for March 1879, Mr Legrand states that the type specimens of this species were got by a Mr. Longley. I believe he is in error." Despite Petterd clearly believing he had collected the type himself and making comments about its relationships on this basis, Petterd and Hedley (1909) wrote:

> "In "Additions" to "Coll. Mon", Legrand observes that it is "without doubt a *Helicarion*." Because the name was preoccupied by Mousson, Petterd (Mon., p. 55) proposed to call it *H. buttoni*. The species has not been figured and we are not aware that either a type or an authentic specimen now exists. Under these circumstances it may be abandoned." (pp.301-2)

The proposed renaming was unnecessary and invalid as the species supposedly preoccupying the name was in a different genus (Smith, 1992).

Legrand's comment about the species being a *Helicarion* was not only probably based on gross shell shape rather than sculpture, but also may not even have been based on a correct specimen given Legrand's confusion about the collection of the "type" (which by 1909 was already lost). However Petterd and Hedley's decision to consider it a *Helicarion* caused later authors to synonymise it under *Helicarion cuvieri*. In fact, the description well matches a species with an inflated last whorl, closed umbilicus, and sculpture similar to that of *Stenacapha ducani*. Such a species is relatively common in parts of Mount Wellington (an extremely well-sampled locality), and spectacularly distinctive (live adults especially) and it is most unlikely that the early collectors would have missed it or failed to describe it. The name *vitrinaformis* is used with caution, however, because of questions of its validity owing to the fact that it has not been previously figured, nor is there any known type, and there is doubt whether a type was ever deposited.

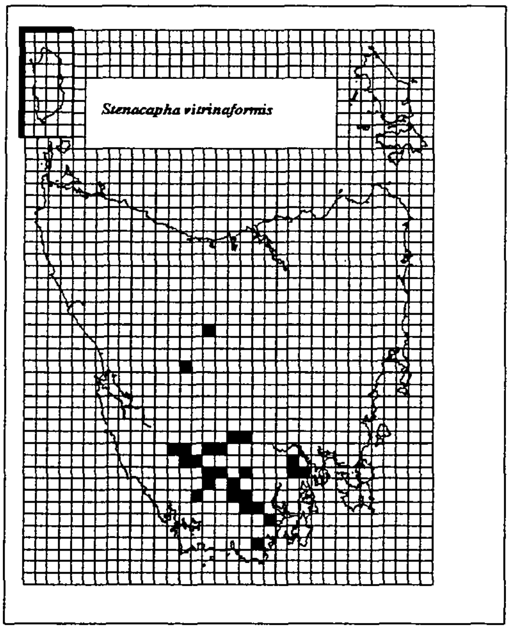
Aside from the taxonomic confusion, this is a distinctive species, but there is considerable variation in shell size, with specimens from some locations (eg Mt Wellington, Hartz Mountains, Western Arthurs, Serpentine Dam) much larger than normal (shell width to 14 mm). The placement of this species in this genus is questionable due to the very large differences in shell form.

<u>Identification:</u> No issues identified. In some reports this species is called *Stenacapha* sp. "Wellington".

<u>Discussion:</u> This endemic species has an unusual distribution, being recorded from 25 grid squares of which 23 are in the south of the state and the remaining two are high-altitude records from the state's centre. Within the core of its range it accounts for 3.3% of grid square species records. There is a gap of approximately 60 km between its core range and two grid squares with outlying records. These are grid square 4436 (Walls of Jerusalem), from which a single specimen is known, and grid square 4233 (near Lake St Clair) where it has been frequently recorded. Assuming the species has a continuous range, then in the northern part of its range it accounts for only 1.1% of

grid square species records, but this figure does not reflect the likelihood that the species has been under-recorded because of incorrect identifications of Lower Gordon survey material. If some of the specimens recorded, presumably incorrectly, as *Elsothera* (variously cited as *E. ricei* and "*E.* cf. *limula*") during this survey are this species then the gap and the perceived variation in abundance both disappear. This would also extend the species' known range westward. The species is common in extremely moist environments, whether these are very wet forests, damp situations in alpine environments, or buttongrass plains (in which it is one of very few common species). The species clearly has a range not closely similar to that of any other species, but the limits of that range require more precise determination.

Distribution map:



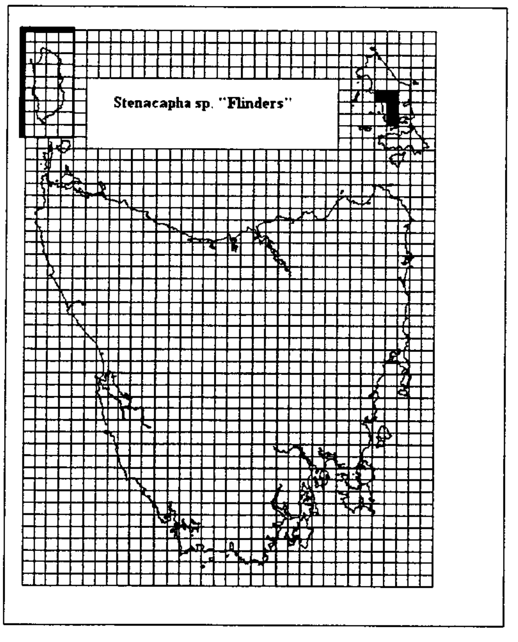
Stenacapha sp. "Flinders" (Plate 25 b-d)

Taxonomy: **Brief diagnosis:** Large charopid, adults c. 14-18 mm wide at 4.6-5.0 whorls, spire flat, body whorl rounded and deep, umbilicus medium (D/U c. 6), protoconch of cross-cutting shallow grooves at roughly diagonal angles to the spire producing a lattice-like appearance, adult sculpture of irregular rough ribs (on early whorls) devolving to corrugations, interstices of rough irregular striae to triangular diagonal structures (similar to *Thryasona diemenensis*), colour reddish brown to dark brown.

This species is distinguished immediately by the protoconch, which is totally different from anything else in Tasmania, or indeed anything in the Charopidae anywhere to the author's knowledge (Plate 25b, cross-cutting indistinct). Although it has been treated as a *Stenacapha* a new genus is definitely required. The adult sculpture resembles *Thryasona diemenensis* and the species may be a distant relative of *Thryasona* despite the superficial resemblance to *Stenacapha ducani*.

Identification: No issues raised.

Distribution map:



Discussion: This endemic species is recorded from 4 grid squares on Flinders Island, where it occurs exclusively in wet forests. As stated above, this is an extremely distinctive species, one that is very likely to be a relic of an otherwise extinct lineage. It may occur on Cape Barren Island as well, but wet forests on Cape Barren Island have never been searched. This species is treated as an island endemic.

Charopidae sp. "Swallet" (Plate 25g-h)

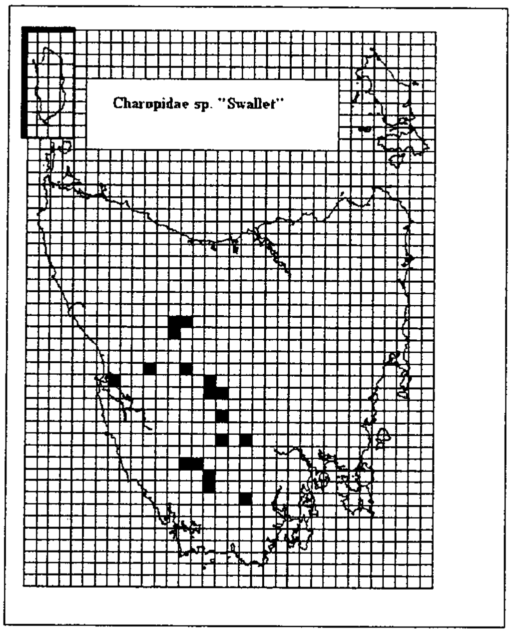
Taxonomy: **Brief diagnosis:** Medium-sized charopid shell, adults 2.7-3.6 mm wide at 3.9-4.5 whorls, low turbinate with elevated spire, periphery more or less rounded (but can appear keeled because of sculpture) with broad, dense semi-triangular sharp protruding plates (not spines) particularly prominent on body whorl (often missing or misshapen in poor specimens), adult sculpture resembles *Magilaoma penolensis* but always strongly and sharply ribbed, protoconch of regular strong radial riblets extending all the way to the apex, shell rayed with red and white flames, these often equally or more prominent on the underside of the shell.

This species superficially resembles *M. penolensis*, but given the difference in the protoconch (that of *M. penolensis* is smooth; the faint spirals referred to by Smith and Kershaw (1979) are not apparent on any Tasmanian specimen), it is probably a case of convergent evolution. As well as the difference in the protoconch (which is absolutely consistent), the plates in place of spines, and the presence of prominent rays on the underside of the shell, this species differs in whorl count (*M. penolensis* varies but often reaches over 5.0 and in some cases close to 6.0 whorls), shell size (*M. penolensis* can attain 4.5 mm) and in lacking a genuine keel.

Identification: No issues identified.

Discussion: This is a fairly uncommon endemic species with 17 grid square records. It occurs in the inland west of the state, the closest record to the coast being Teepookana Reserve (square 3632) where it occurs within 1km of Macquarie Harbour, but over 10km from the open ocean. This species occurs predominantly in very wet environments, including rainforests, subalpine woodland to an altitude of 980m, and wet eucalypt or tea-tree forests. At this stage there are not enough records to say how far north it extends, the northernmost records being in the Pelion Valley area, but it is treated as a wotlian species on the basis of its known eastern boundary, with the reservation that it may be absent (possibly because it is replaced by *M. penolensis*) through much of the far north-west.

Distribution map:



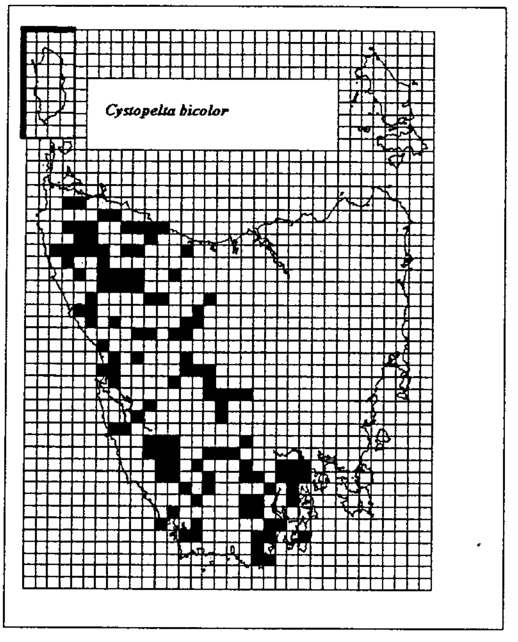
Family Cystopeltidae

Cystopelta bicolor Petterd and Hedley, 1909 (Not figured)

Taxonomy: No issues identified. The simplest way to differentiate this species from *C. petterdi* is the colour of the slug. *C. bicolor* is usually medium brown to green with small irregular white dots, the foot is apple green to blue-green. Rare specimens have a blueish or even blackish visceral hump. *C. petterdi* is generally grey to yellow (in some cases olive green). There are irregular black to purple lines, streaks or spots. In some areas bright pale yellow specimens with bright purple spots are seen. The foot is greyish.

Identification: No issues identified.

Distribution map:



Discussion: This endemic slug is recorded from 122 grid squares, entirely in the west and south of the state. Within its known range it accounts for 5.6% of grid square species records, a high figure given that it is both a slug (and therefore very rarely recorded from dead specimens) and also a frequently arboreal species that is easily undercounted. The species has a wotlian range with a parapatric boundary with *Cystopelta petterdi.* However this boundary has been extensively disrupted by habitat alteration and some of the fine-scale detail of its location before European settlement may have become lost. The closest mapping of the boundary has been in the Oldina State Forest (grid square 3845) but this has been predominantly in pine plantations that have replaced nearly all the native bushland in this forest block. In this area, the two species have been recorded less than 1 km apart. Another close proximity between the two species is at Isandula (grid square 4243) where the known gap is 4 km. The boundary appears to follow the northwest coast closely for a distance of 50 km or so. East of this it dips sharply to the south. Both species are recorded in square 4338 (Arm River) but *C. bicolor* records surround the sole *C. petterdi* record, based on a single specimen, here. Mesibov (pers comm.) suggests that accidental introduction of *C. petterdi* to the site of the record, Maggs Mountain (a site noted for invertebrate introductions and translocations during logging), is the likely cause of this find, which is 20 km outside the known range of *C. petterdi*. Log trucks accessing this area would presumably have come from Launceston or Deloraine, both within the range of *C. petterdi.*

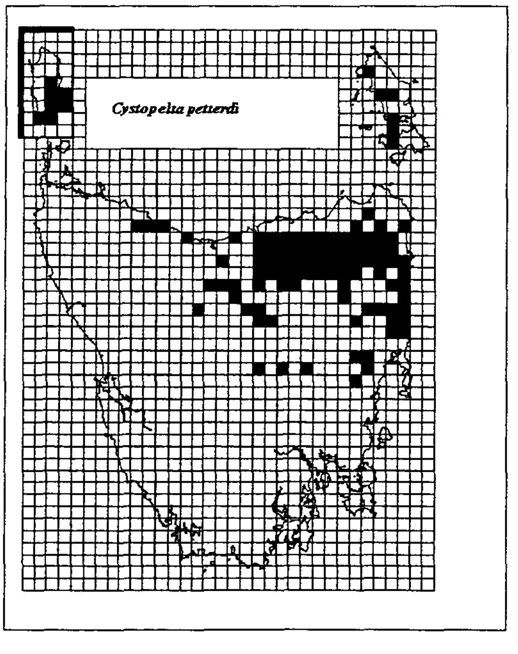
Both species are unrecorded from a large area in the south-east, consisting of everything between the River Derwent (on the eastern shore) and the 31N line, including Maria Island and the Tasman Peninsula. This gap contains 457 grid square species records for all species, so both *Cystopelta* are extremely likely to be completely absent from most of it. This gap is considered to be due largely to present conditions (possibly rainfall), as there is no reason why either species of *Cystopelta,* presently both successful in subalpine woodlands and both recorded at altitudes exceeding 1000m ASL, would be dependent upon glacial forest refuges for their survival.

Cystopelta petterdi (Tate, 1881) (Not figured)

Taxonomy: No issues identified.

Identification: No issues identified.

Distribution map:



Discussion: Like *C. bicolor,* this is a common slug with records from 106 grid squares. It accounts for 7.2% of all grid square species records within range. Whether this slug is endemic to Tasmania or extends to Victoria is debatable (Smith and Kershaw, 1979; Smith, 1992). In any case, superficially similar forms occur in Victoria, which is not the case for *C. bicolor*.

The geographic relationship between this species and *C. bicolor* has been described above. This snail displays an eotlian boundary, but like many other eotlian species, does not extend south to Hobart. It is the only eotlian species present on King Island. The southern boundary of this species, just north of Little Swanport, is considered likely to conform to the Little Swanport break (Mesibov, pers comm.)

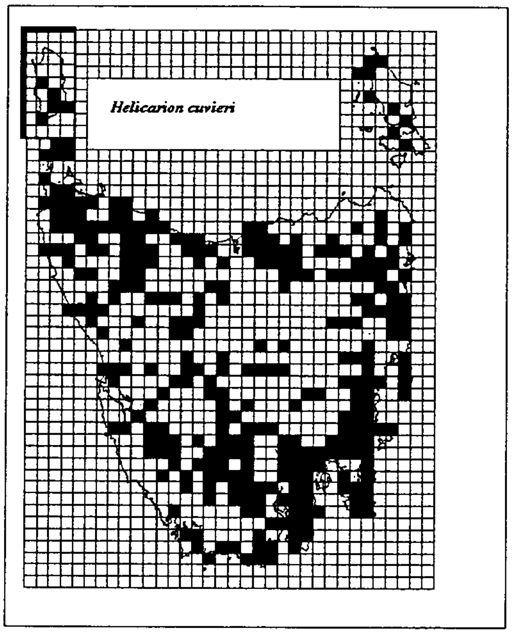
Family Helicarionidae

Helicarion cuvieri Ferussac, 1821 (Plate 26a)

Taxonomy: There is major variation in the colour of the animal among different locations, but this is uncorellated to any variation in the shell (*Helicarion* shells display very few diagnostic features) The late Ron Kershaw (pers. comm.) believed northern and southern *Helicarion* were probably different species based on anatomical analysis, but this work was never finalised or published. Specimens from the Arthur-Pieman forests in the north-west (c. 3243) are very brightly coloured, while on Flinders Island a dark blue-black specimen has been photographed, and on King Island the living animal has a reddish colour compared to Tasmanian mainland *H. cuvieri*. Comprehensive anatomical and genetic studies are needed to determine whether this is one or many species.

Identification: No issues identified.

Distribution map:



Discussion: This is one of the commonest species statewide with a total of 318 grid square records and no significant gaps. The only doubts over its statewide status are taxonomic. Until anatomical and genetic research is conducted on this species, it is therefore not likely to supply useful biogeographic information in a Tasmanian context.

Helicarion rubicundus Dartnall and Kershaw, 1976 (Plate 26b)

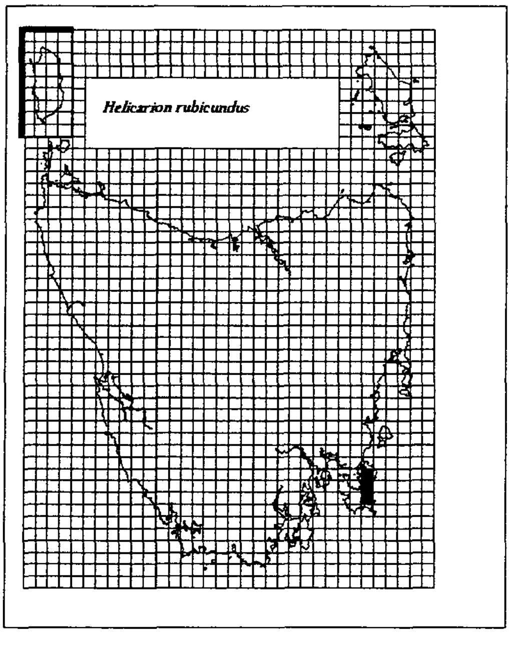
Taxonomy: No issues identified.

Identification: Some specimens of *H. cuvieri* from well outside the range of *H. rubicundus* and displaying superficial similarities (like large size or bright coloration) have been misidentified as this species.

Discussion: This species occupies 3 grid squares on the Forestier Peninsula and a small part of the adjacent Tasman Peninsula. As a result of its presence on Tasmania's threatened species list, it has been subject to fine-scale range surveying (see Otley et al, 1999). This has shown that the species is essentially confined to wet forests. Although over 160 sites in various forest types have been searched, there has not been a single record in dry forest. The species also appears to be limited in its ability to disperse any significant distance through such boundaries, especially on the Tasman Peninsula where the species is confined to a 3 km x 5k m area of wet forest and suitable wet forests occur on the other side of the ridge which apparently blocks the species' dispersal.

This species' large size and bright coloration make it unusual in the south-eastern Australian Helicarionidae. It also displays an unusually complex habitat preference for a Tasmanian snail, with juveniles frequently living in rolls of eucalypt bark, but adults moving into more durable shelters such as logs. While the species' present-day distribution can be explained by its apparent inability to disperse through unsuitable habitat, this does not explain how it came to be in such a restricted area initially. Kirkpatrick and Fowler (1997) inferred that a eucalpyt forest glacial refuge existed on the Forestier Peninsula. Surrounding conditions for a distance of about 50 km would have been generally inhospitable for the species.

Distribution map:



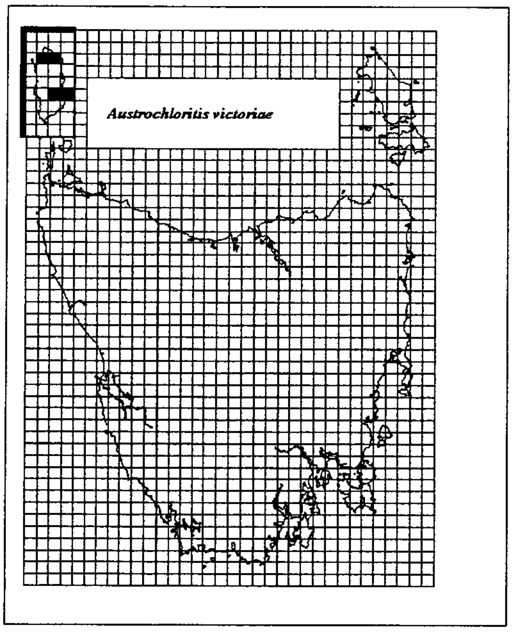
Family Camaenidae

Austrochloritis victoriae Cox, 1868 (Plate 26c-d)

Taxonomy: There is some variation within the King Island populations (the specimen pictured in Plate 26c-d is the large "yellow form" found around Naracoopa (2557); most specimens are reddish). However, this is not considered significant. The King Island populations require further study to determine whether they are the same species as Victorian *A. victoriae.*

Identification: No issues identified.

Distribution map:



Discussion: This species is recorded from 4 grid squares on eastern King Island, although populations are unlikely to still exist in one of those due to habitat clearance and degradation. It is also widespread in southern Victoria (Smith and Kershaw 1979). This species is therefore classified as a toehold species in Tasmania, pending taxonomic research into the King Island population.

4.2 ILLUSTRATIONS OF SPECIES

The following pages contain images of each of the species considered valid in this thesis, with the exception of *Allocharopa* sp. "Ravens Hill" and the slugs *Cystopelta bicolor* and *C. petterdi*. These images are provided first to illustrate some features described in the text, and second so that other sources can verify (or discredit) the author's identifications of material.

Images were mostly captured using a hand-held digital camera looking down a microscope lens, with results of very variable quality. It is very difficult to get the placement of the camera exactly correct and some images remained poor despite repeated attempts. Exposure errors also occurred in some cases, and while this has generally been corrected, indications of shell colour should be treated with caution where the background is unusually dark or dim compared to the other images. Some images were captured using the hand-held camera without the microscope. The images of *Roblinella roblini* were taken using the program NIH Image through a television microscope at the Tasmanian Museum and Art Gallery, and Dr Brian Smith took those of *Victaphanta* sp. "W Arthurs" by an unknown method.

In lieu of scale bars, the width of each specimen is given at the bottom of the page. In each case the letters a,b,c... refer to the images counting from the top and reading from left to right. In some cases unusual forms of a species have been illustrated because of their relevance to discussion of variation.

Plate 1: a. *Succinea australis*, 9.2 mm high, Lake Flanigan, King Island; b. *Pupilla australis,* 3.1 mm high, Humbug Point; c,d. *Victaphanta lampra,* 22 mm, Ikes Creek, Roses Tier; e. *Victaphanta milligani*, 15.6 mm, Togari Block; f. *Victaphanta* "W Arthurs", 21 mm, Mt Weld (photo: Brian Smith).

Plate 2: a,b. (same as 1f); c,d. *Tasmaphena sinclairi*, 17.5 mm, Mystery Creek Cave; e,f. *T. sinclairi* (variant), 15 mm, Champion Park (Forth River); g,h. *Tasmaphena ruga*, 9.7 mm, Huon Gully, Risdon Brook Dam

Plate 3: a,b. *Tasmaphena quaestiosa*, 17.3 mm, Weilangta; c,d. *Tasmaphena* sp. "Whinray", 7 mm, Trousers Point, Flinders Island; e,f. *Austrorhytida* sp. "Raffertys", 11.5 mm, Pennys Lagoon, King Island; g,h. *Tasmaphena lamproides,* 20.3 mm, Christmas Hills Road

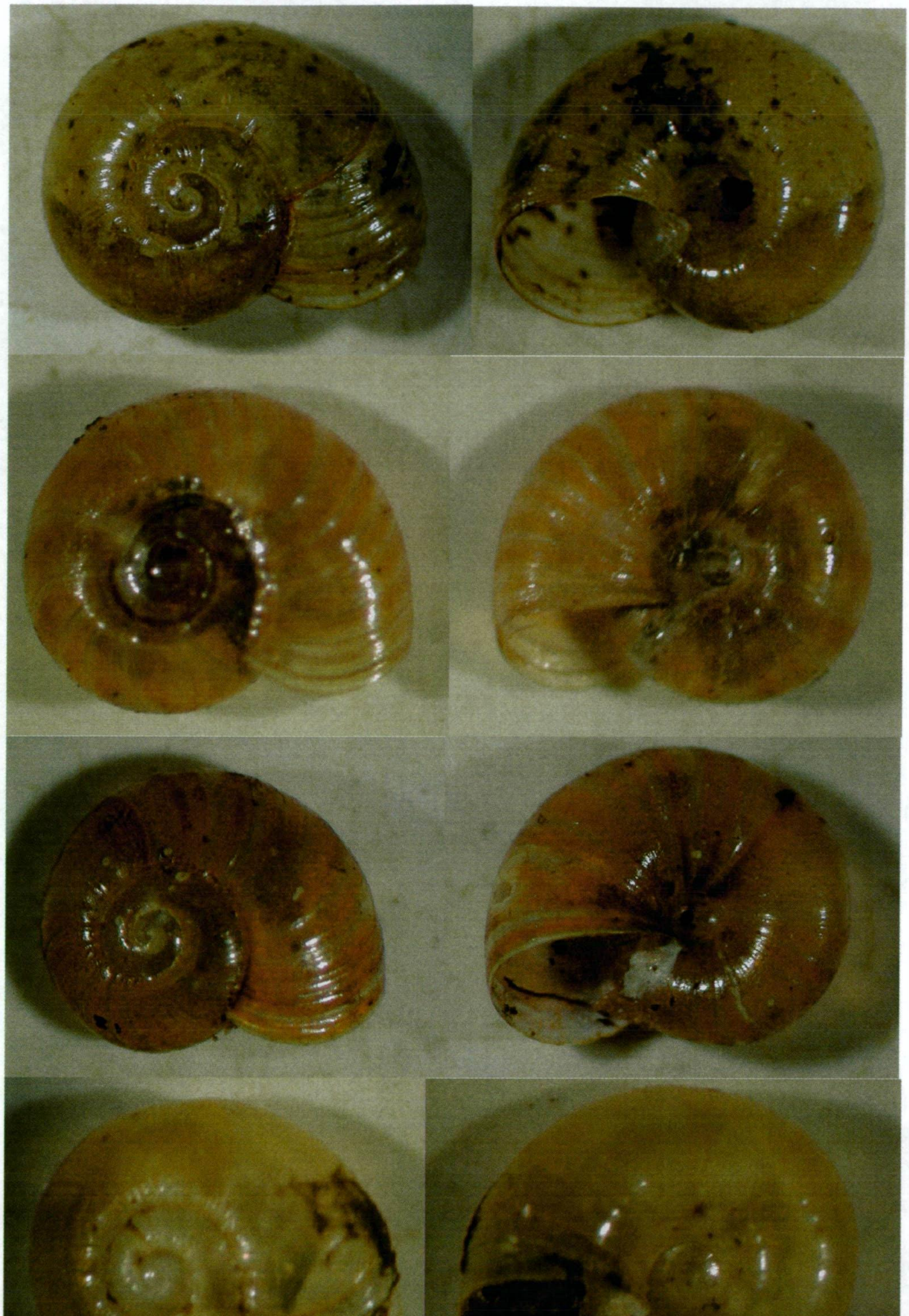


PLATE 4: a,b. *Prolesophanta nelsonensis,* 2.8 mm, Dromedary; c,d. *Prolesophanta* sp. "Togari", 2.7 mm, West Takone; e,f. *Prolesophanta* sp. "Francistown", 2.8 mm, Mt Mangana, Bruny Island; g,h. *Prolesophanta* sp. "Strzelecki", 4.3 mm, Old Chum Dam, Pioneer.

Plate 5: a,b. *Prolesophanta dyeri* (variant), 2.5 mm, Blackman River; c,d. *Prolesophanta* sp. "Marriotts", 4.7 mm, Tahune Park; e.*Caryodes dufresnii* (wet forest), 39 mm high, Tobys Hill Rd, Cygnet; f. *C. dufresnii* (dry forest), 24.5 mm high, Alum Cliffs, Kingston; g. *C. dufresnii* (variant), 20mm high, Bouchers Creek, Prossers Forest

Plate 6. a,b. *Anoglypta launcestonensis* (Blue Tier form) 29 mm, Little Mt Michael; c,d. *A. launcestonensis* (Yellow form) 31.5 mm, southern Mt Victoria; e,f. *A. launcestonensis* (Bronze form), 32 mm, Blue Tier; g. *A. launcestonensis* (normal) 30 mm, Rattler Range; h. *Bothriembryon tasmanicus,* 26.5 mm high, Bishop and Clerk, Maria Island

Plate 7: a,b. *Paralaoma caputspinulae*, 1.7 mm, Tin Pot Creek; c,d. *P. halli*, 1.3 mm, Trevallyn Dam; e,f. *P. mucoides*, 1.8 mm, Romilly Street ; g,h. *P. sp.* "Hartz", 2.3 mm, Hartz Peak (actual colour darker and less bronzed than shown)

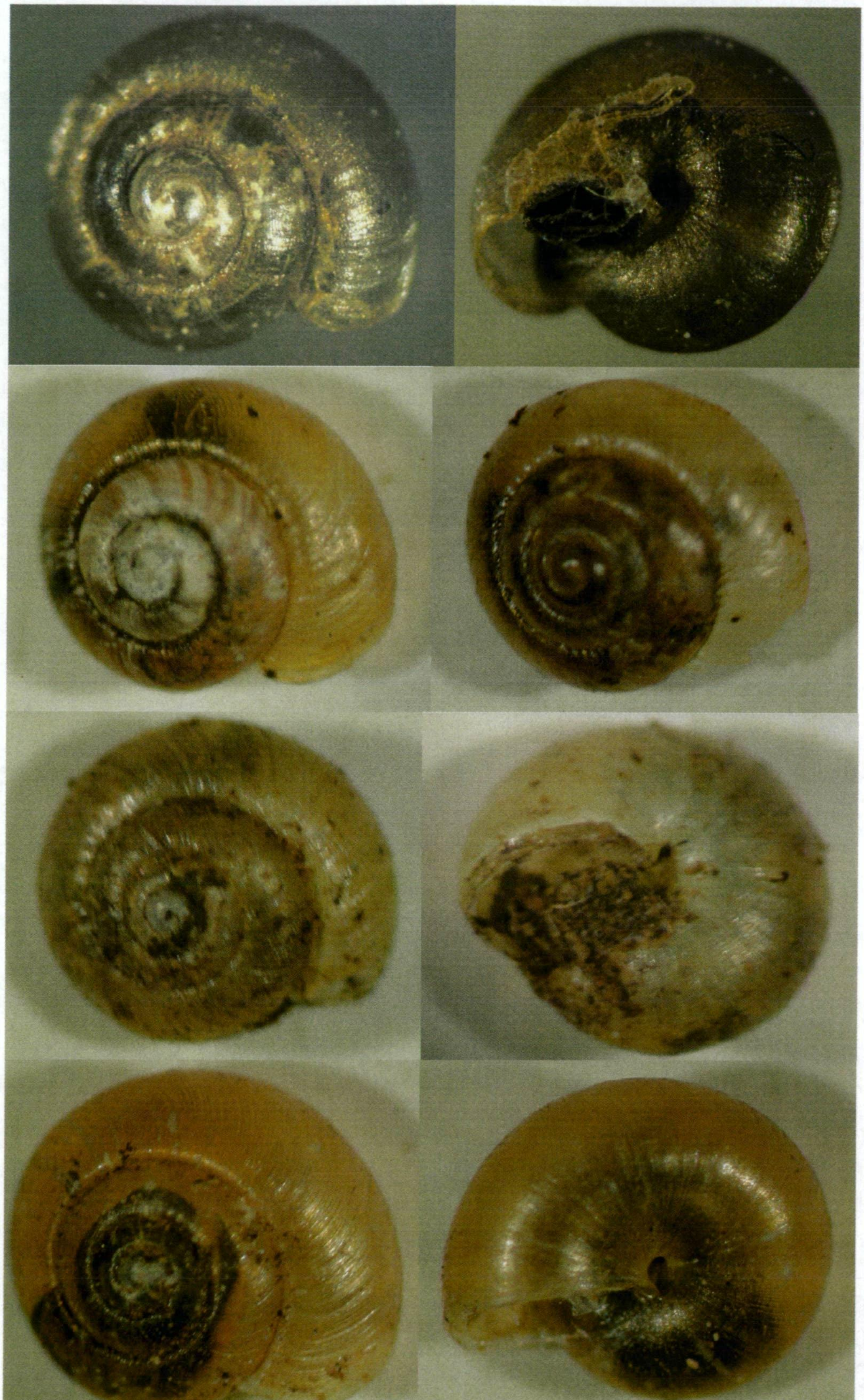


Plate 8: a,b. *Pasmaditta* sp. "Blue Tier", 1.8 mm , Blue Tier (actual colour less bronzed than shown); c. *Pasmaditta jungermanniae,* 2.7 mm, Cataract; d.*Pedicamista coesa,* 3.8 mm, The Nut, Stanley; e,f. *Pedicamista* sp. "Chisholm", 2.3 mm, Choveaux Rd, Oonah; g,h: *Pedicamista* sp. "Bull Hill", 3.3 mm, Bull Hill

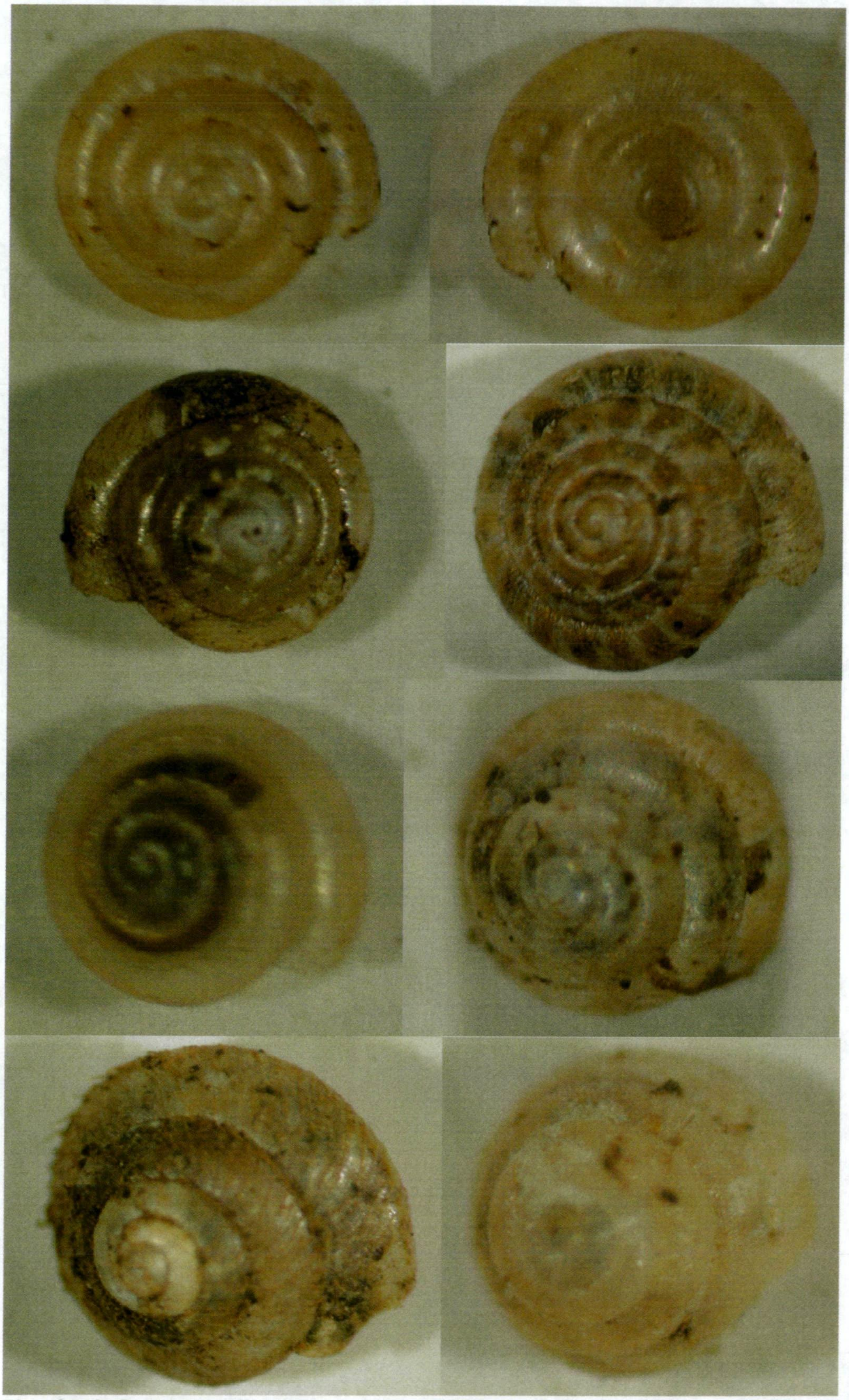


Plate 9. a,b. *Laomavix collisi*, 1.7 mm, Flagstaff Hill; c. *Miselaoma weldii*, 1.5 mm, The Nut, Stanley; d. *Pedicamista* sp. "Southport", 3.3 mm, Cape Bruny, Bruny Island; e. *Trocholaoma parvissima,* 1.0 mm, Snowy Knob; f. *T. parvissima* (large), 1.3 mm, Cataract Gorge; g. *Magilaoma penolensis* (spined), 4.3 mm, Roger River; h. *Trocholaoma spiceri*, 1.5 mm wide, 1.7 mm high, Mystery Creek Cave

Plate 10. a,b.*Planilaoma luckmanii,* 2.7 mm, Liawenee; c,d. *Planilaoma* sp. "Pelverata", 3.8 mm, Pelverata Falls; e,f. *Planilaoma* sp. "Breaksea", 2.0 mm, Breaksea Island (colour less red than shown in 10e); g,h. *Discocharopa lottah,* 2.5 mm, Cataract Gorge

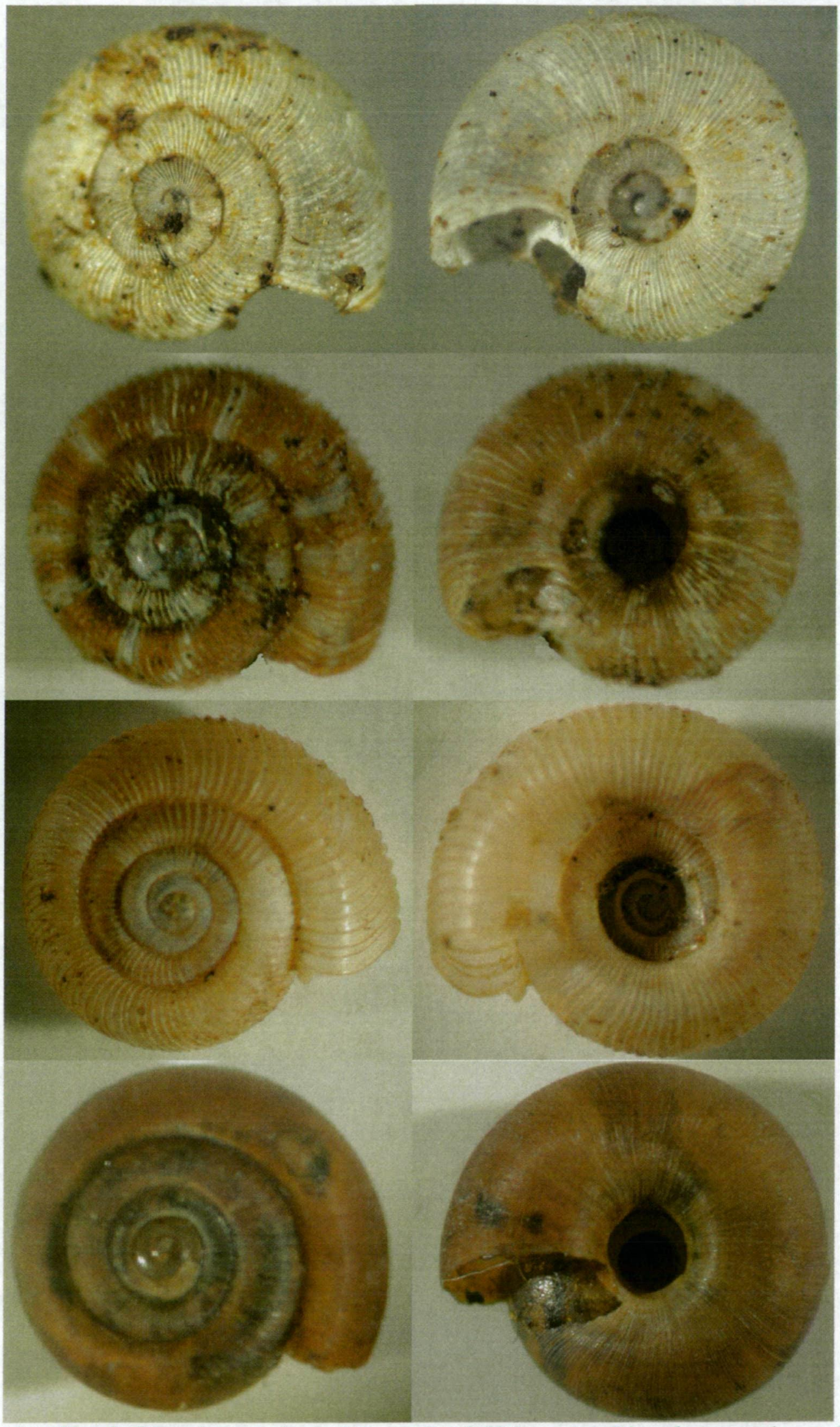


Plate 11: a,b. *Discocharopa vigens,* 2.4 mm, South Hobart; c,d. *Discocharopa mimosa,* 1.9 mm, Montos Creek, Ellendale; e,f. Charopidae sp. "Skemps", 3.9 mm, Skemps, Myrtle Bank; g,h. *Elsothera* sp. "Needles", 5.0 mm, Cynthia Bay, Lake St Clair

Plate 12: a,b. *Elsothera limula,* 3.7 mm, Retreat; c,d. *Elsothera ricei,* 3.8 mm, Kate Reed SRA, Launceston; e,f. *Allocharopa legrandi*, 2.0 mm, Snowy Knob; (NB *Allocharopa* sp. "Ravens Hill" not figured).

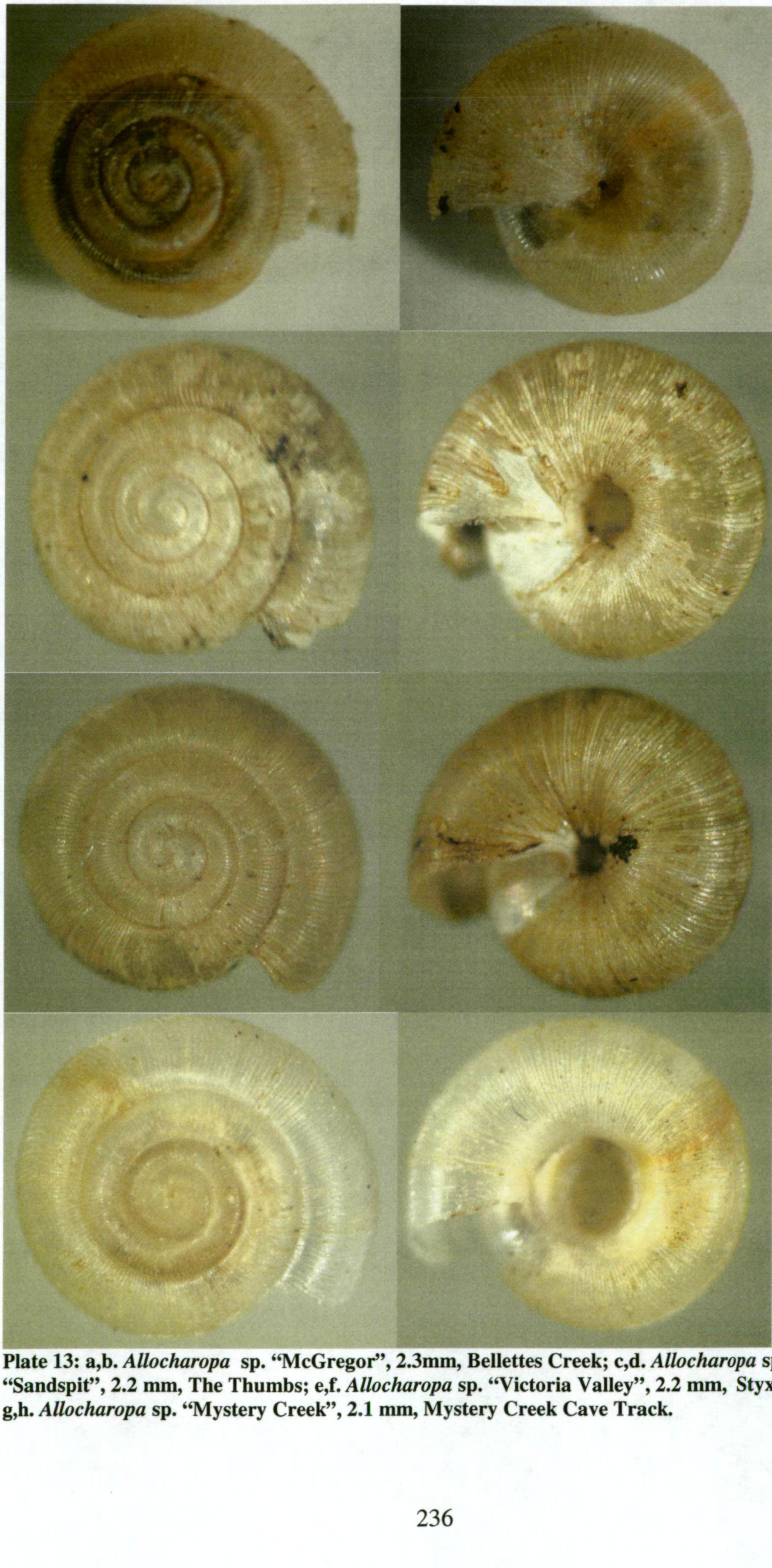


Plate 13: a,b. *Allocharopa* sp. "McGregor", 2.3mm, Bellettes Creek; c,d. *Allocharopa* sp. "Sandspit", 2.2 mm, The Thumbs; e,f. *Allocharopa* sp. "Victoria Valley", 2.2 mm, Styx River; g,h. *Allocharopa* sp. "Mystery Creek", 2.1 mm, Mystery Creek Cave Track.

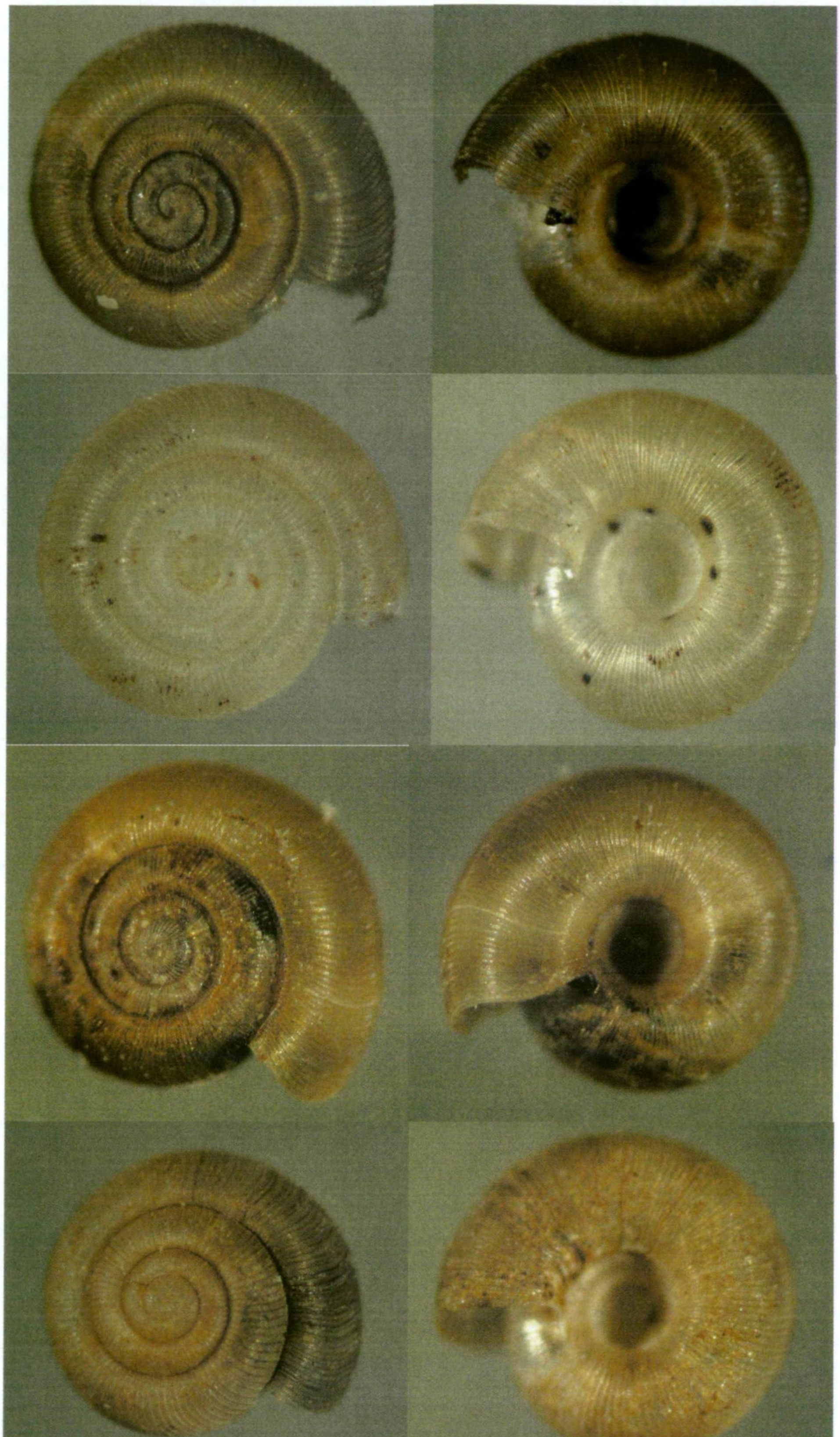


Plate 14: a,b. *Allocharopa* sp. "Christ College", 1.7 mm, Lambert Park; c,d. *A.* sp. "Douglas", 2.0 mm, Bishop and Clerk, Maria Island; e,f. *Allocharopa* sp. "Teepookana", 1.8 mm, Pine Landing, Gordon River; g,h. *Allocharopa* sp. "Junee", 1.7 mm, Junee Cave

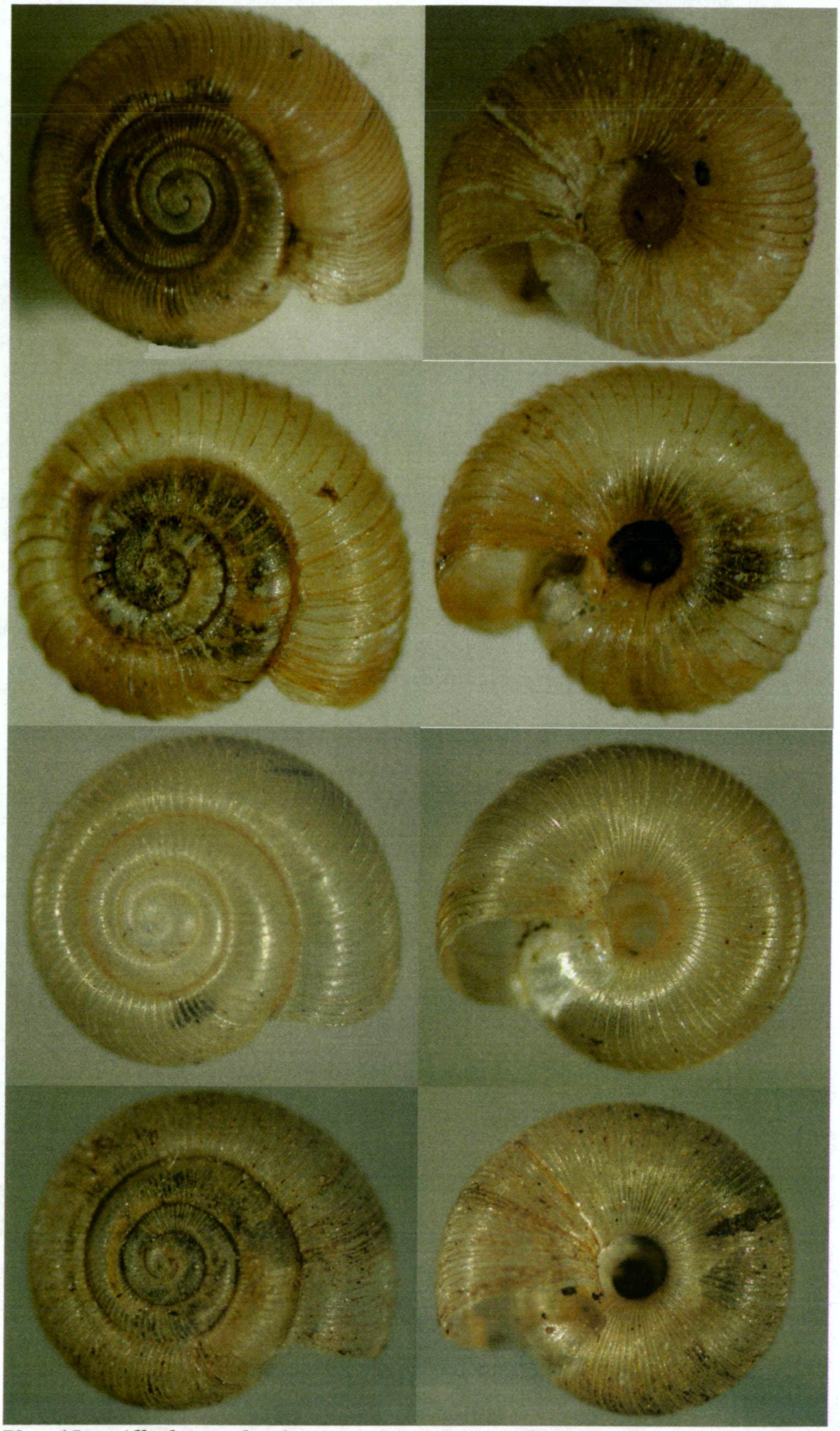


Plate 15: a. *Allocharopa kershawi* (northern) 2.1 mm, Trevallyn Dam; b. *A. kershawi* (southern), 2.4 mm, Barossa Hill; c,d. *Allocharopa* sp. "Wellington", 2.2 mm, Octopus Tree, Mt Wellington; e,f. *Allocharopa* sp. "Pelverata", 2.5 mm, Pelverata Falls; g,h. *Allocharopa* sp. "Dromedary", 2.3 mm, Mt Dromedary

Plate 16: a,b. *Allocharopa* sp. "Quarry", 2.2 mm, Moonlight Ridge; c,d. *Allocharopa* sp. "Franklin", 2.7mm, Pine Landing; e. *Allocharopa tarravillensis,* 2.4 mm, Naracoopa, King Island; f. *Pernagera kingstonensis*, 3.2 mm, Liawenee; g. *Pernagera architectonica,* 3.0 mm, Mt Wellington: h. *Pernagera* sp. "Waterfall", 3.4 mm, McGregor Peak

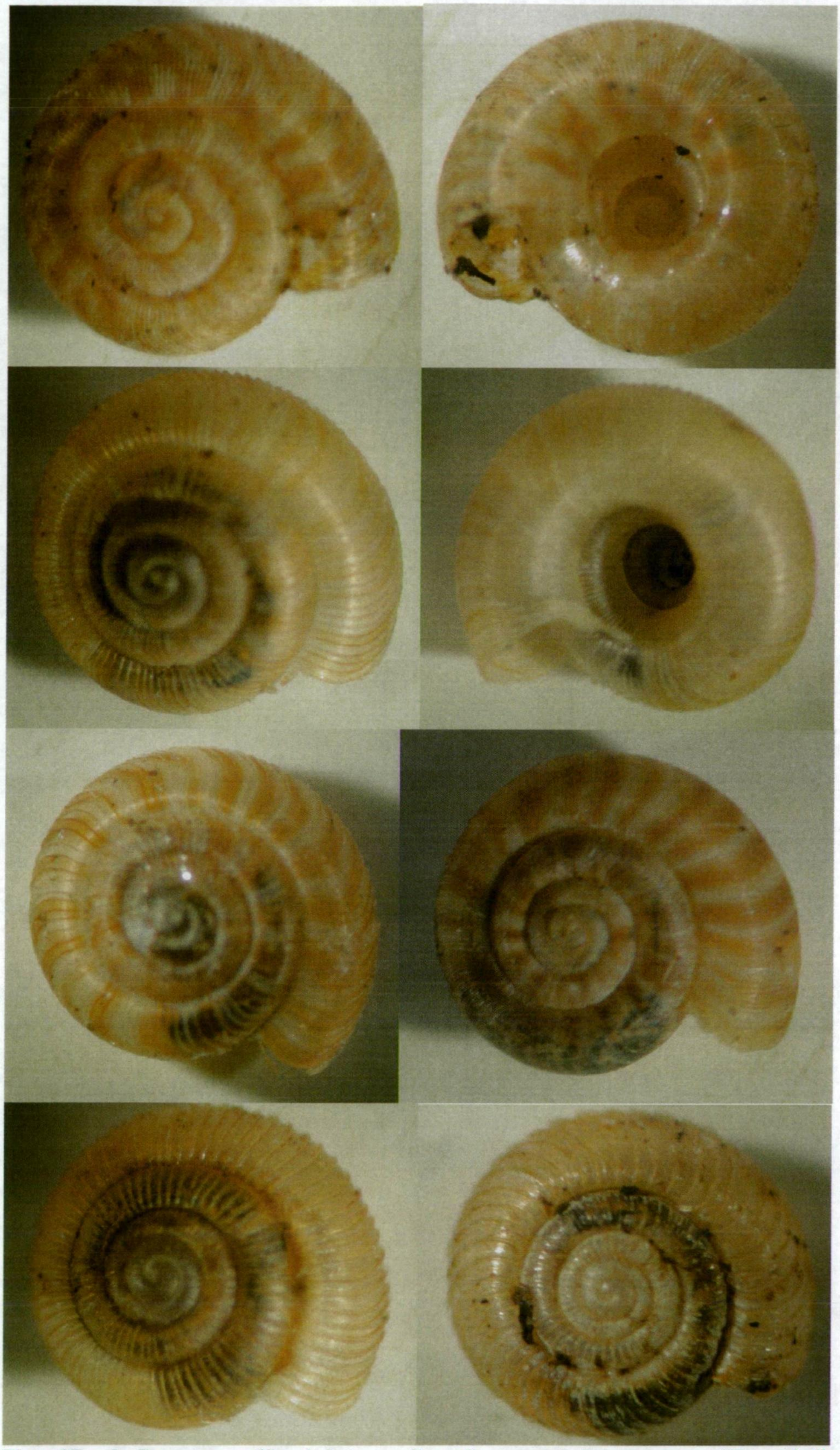


Plate 17: a,b. *Pernagera officeri,* 3.6 mm, Cape Bruny; c,d. *Pernagera* sp. "Paradise", 4.1 mm, Sand River; e. *Pernagera tasmaniae* 3.6 mm, Tunbridge Tier; f. *Pernagera* sp. "Waratah", 4.7 mm, Butler Road, Waratah; g. *Dentherona dispar,* 2.5 mm, Tahune Park; h. *Dentherona subrugosa,* 2.8 mm, Old Chum Dam, near Pioneer

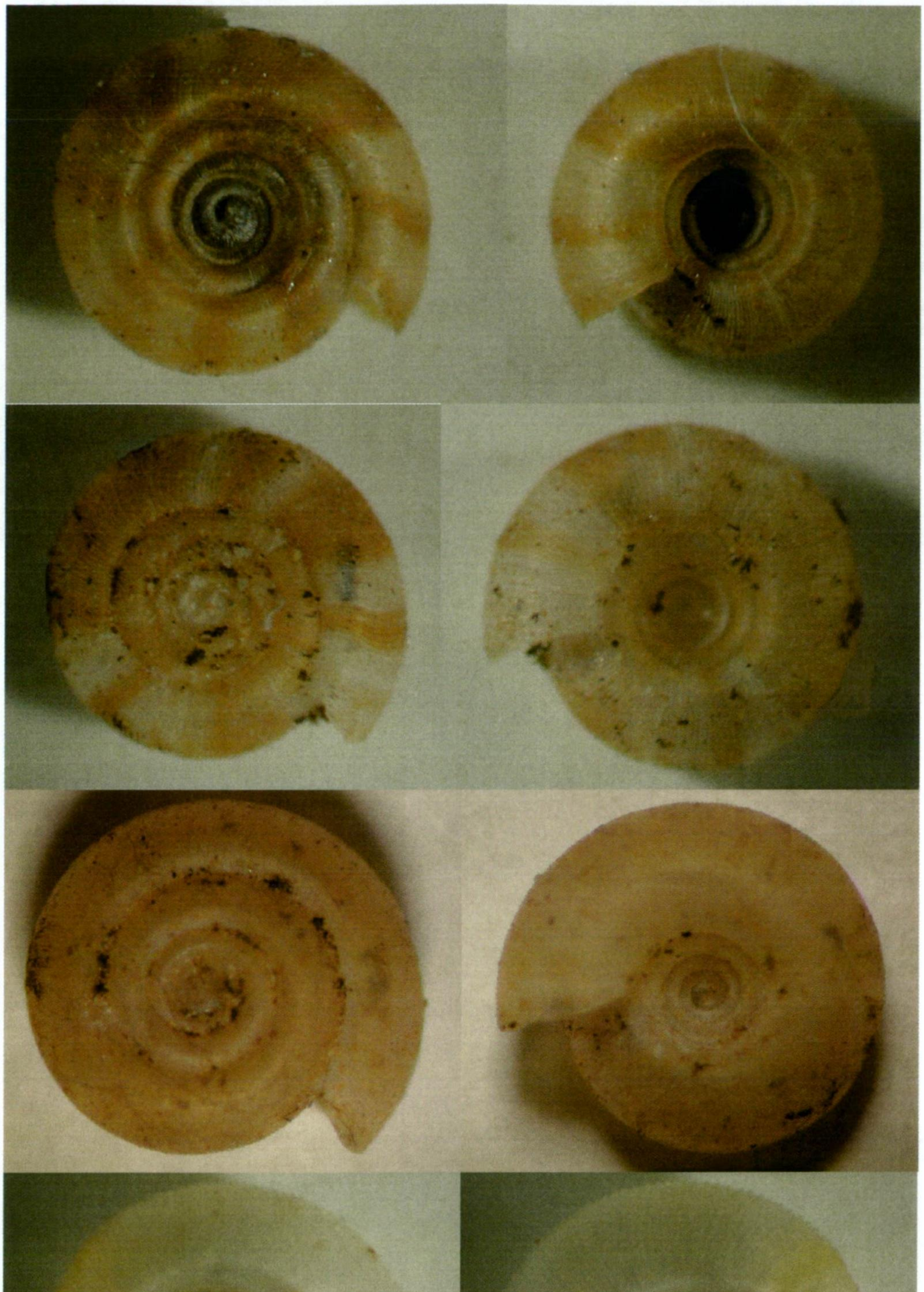


Plate 18: a,b. *Geminoropa hookeriana*, 2.1 mm, Quamby Bluff; c,d. *Geminoropa* sp. "Hastings", 1.8 mm, Hastings Caves; e,f. *Geminoropa* sp. "Moonlight", 3.0 mm, Hastings Caves; g,h. *Geminoropa antialba* (white form), 2.6 mm, Big Rock Creek

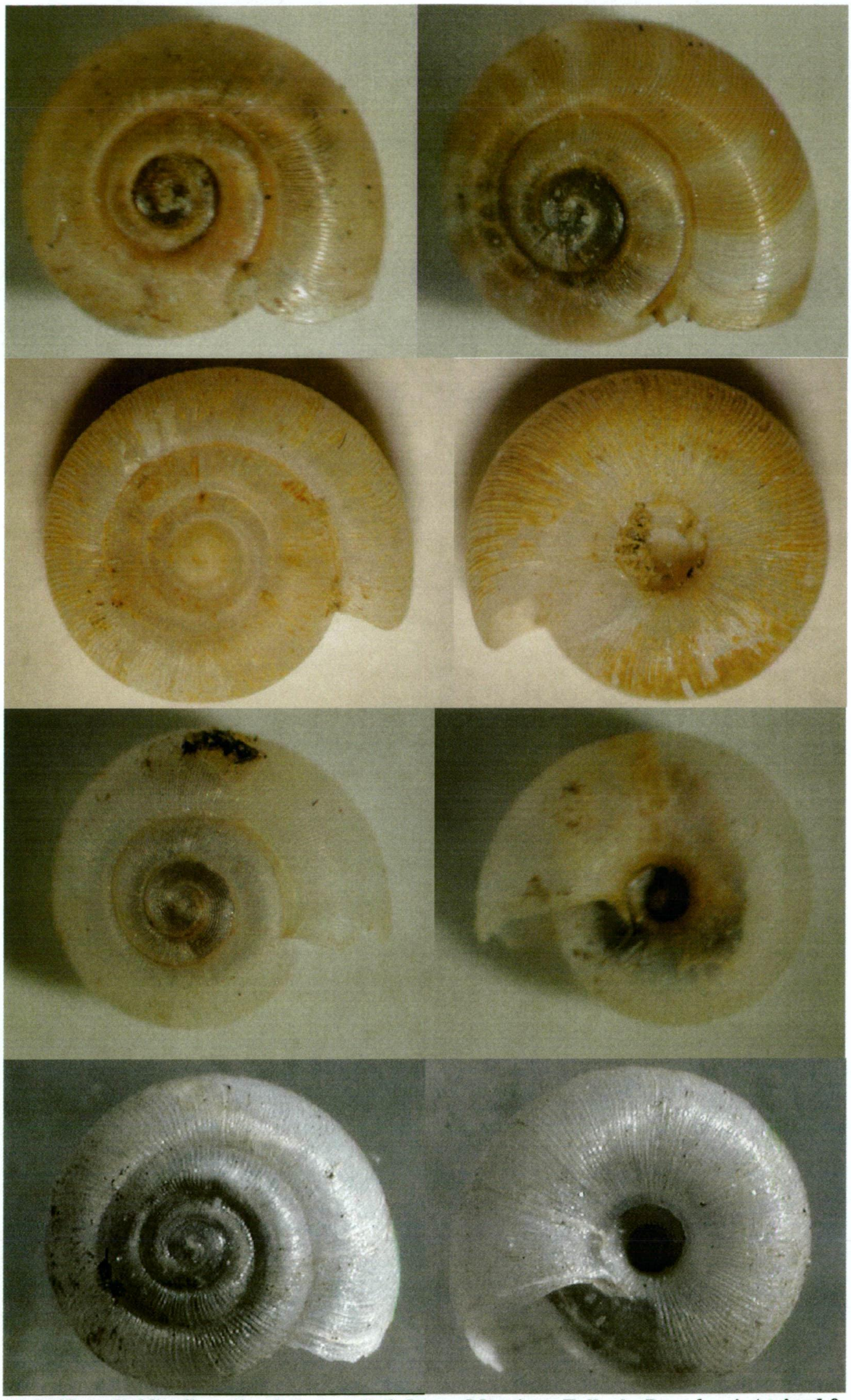


Plate 19: a. *Roblinella gadensis* (normal), 2.5 mm, Marriotts Falls; b. *R. gadensis* (striped form), 2.2 mm, Mt Wellington; c,d. *Roblinella* sp. "Bubs Hill", 3.7 mm, Bubs Hill; e,f. *Roblinella* sp. "Tahune", 1.7 mm, Mt Wellington; g,h. *Roblinella roblini,* Distillery Creek, 2.2 mm.

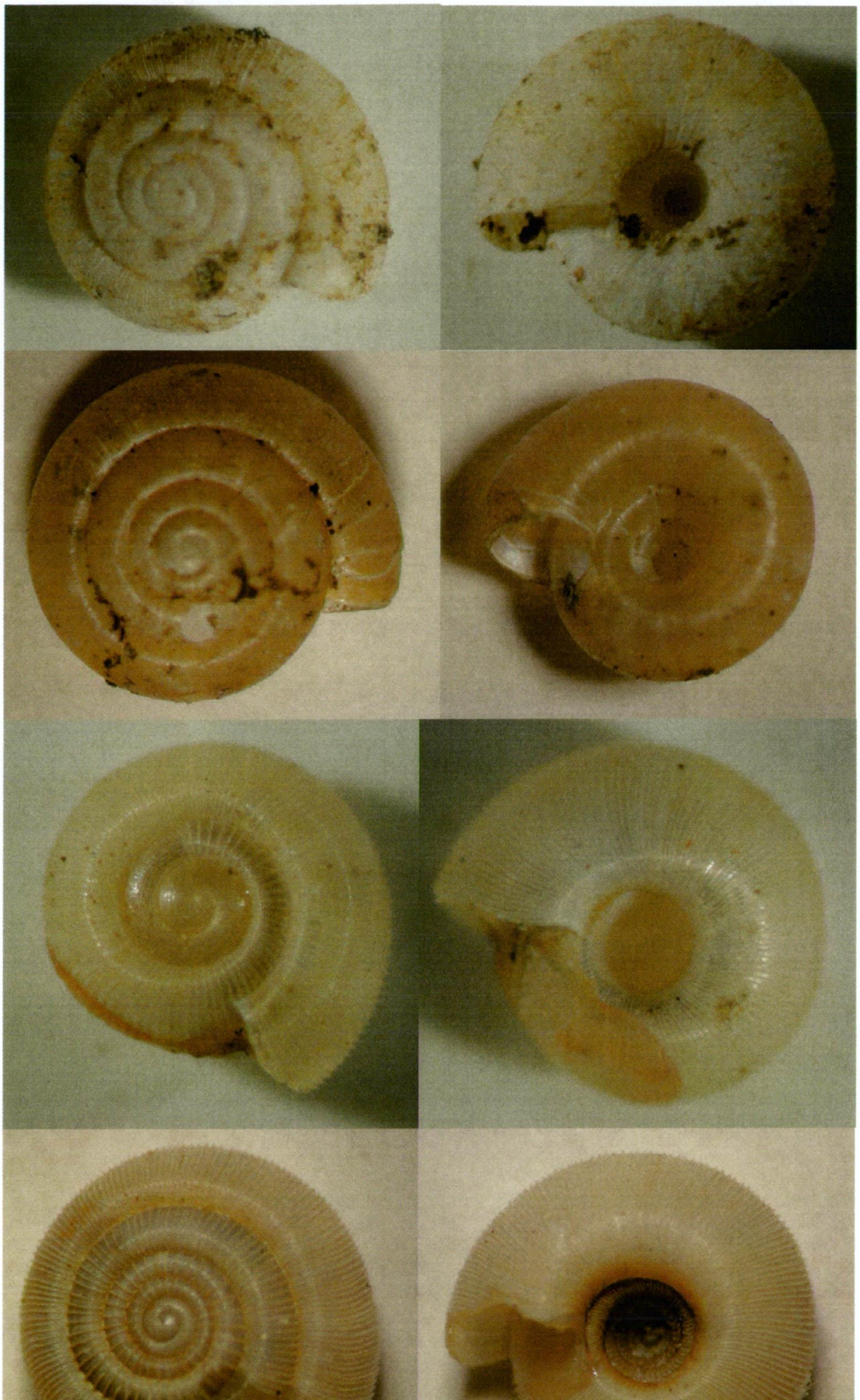


Plate 20: a,b. *Roblinella* sp. "Mystery", 3.0 mm, Mystery Creek Cave; c,d. *Roblinella agnewi,* 4.0 mm, Lost World, Mt Wellington; e,f: *Roblinella* sp. "Bishop", 2.1 mm, Bishop+Clerk, Maria Island; g,h. *Roblinella* sp. "Flash Tier", 4.5mm, Flash Tier

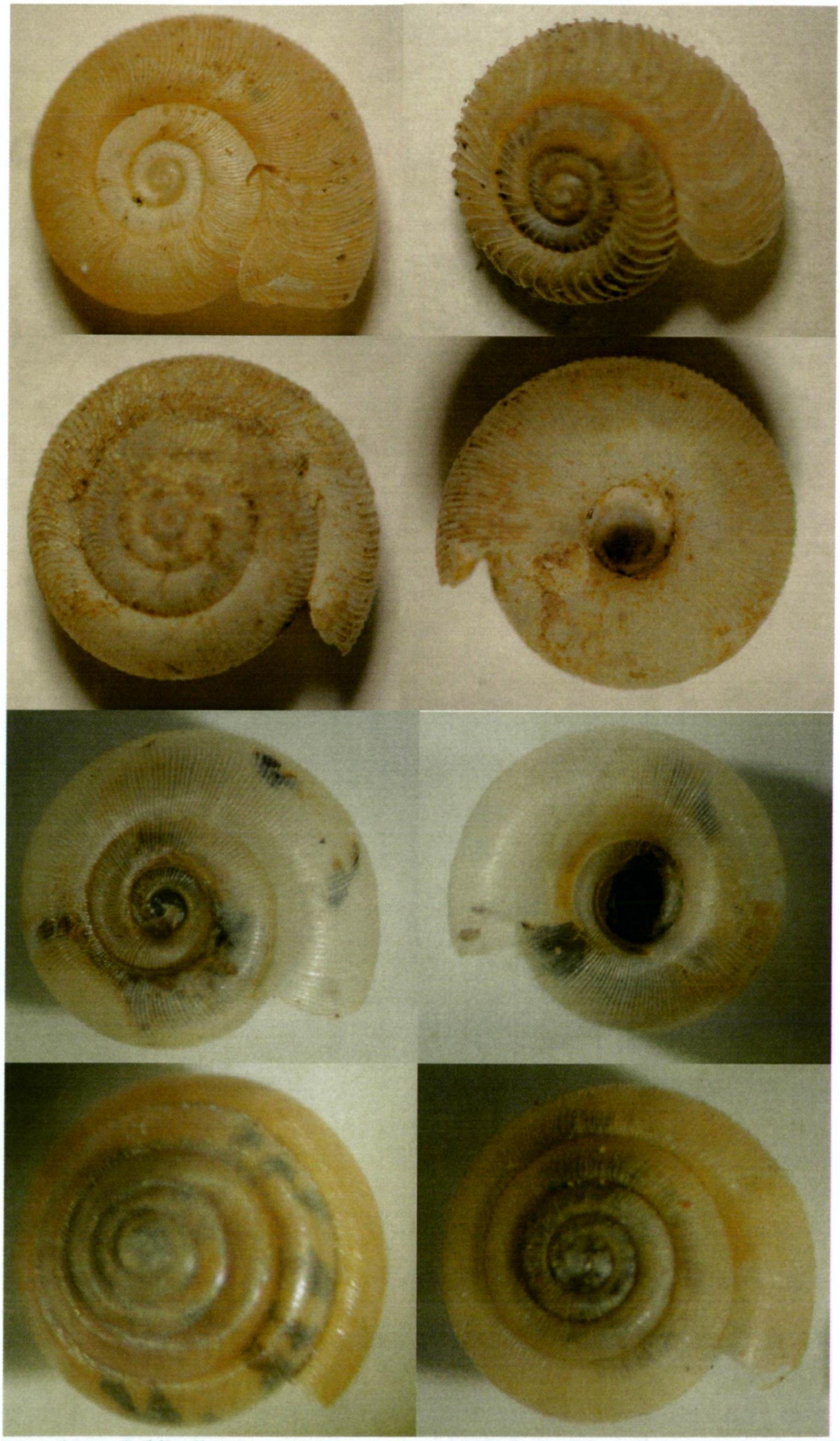


Plate 21: a. *Roblinella curacoae* (fine-sculptured), 6.6 mm, Mesa Creek (part of lip missing); b. *Roblinella curacoae* (northern coarse form – *mathinnae),* 5.7 mm, Loila Tier; c,d. *Roblinella curacoae* (?- Precipitous Bluff form), 4.3 mm, Cueva Blanca, Precipitous Bluff; e,f. *Pillomena dandenongensis*, 3.6 mm, Parers Creek, King Island; g. *Bischoffena bischoffensis,* 2.5 mm, Big Rock Creek; h. *Oreomava johnstoni,* 3.2 mm, Marakoopa

Plate 22: a,b. *Oreomava* sp. "Hibbs", 3.5 mm, Hibbs Lagoon; c. *Letomola barrenense*, 1.5 mm, Pats River, Flinders Island; d. *Mulathena fordei,* 8.0 mm, Hastings Caves road; e,f. *Thryasona marchianae,* 5.0 mm, McGregor Peak; g,h. *Thryasona* sp. "Wedge", 4.3 mm, near Wedge River

Plate 23: a,b. *Flammulops? cf. excelsior,* 6.8 mm, Parers Creek, King Island; c,d. *Thryasona diemenensis,* 9.7 mm, Julius River; e,f. *Stenacapha ducani,* 20 mm, Malompto Road, Christmas Hills; g,h. *Stenacapha* sp. "Hunter", 7.8 mm, Hunter Island

Plate 24. a,b. ***Stenacapha hamiltoni*** **(typical) 10.7 mm, Mt Wellington; c,d.** ***S. hamiltoni*** **(north-east form) 7.6 mm, Weld River; e,f.** ***S. hamiltoni*** **(north-west flat form) 11.6 mm, Lake Chisholm; g,h.** ***Stenacapha savesi,*** **6.2 mm, Burnie Park**

Plate 25: a. *Stenacapha savesi* (see 20 g,h.); b,c,d. *"Stenacapha"* sp. "Flinders", 14.3 mm, Walkers Lookout, Flinders Island; e,f. *Stenacapha "vitrinaformis"*, 12.2 mm, Collins Cap; g,h. Charopidae sp. "Swallet", 4.0 mm, Scotts Peak Dam

Plate 26: a. *Helicarion cuvieri,* 16.1mm, Dunkards Ck, Supply River; b. *Helicarion rubicundus,* 18.3 mm, Eaglehawk Neck; c,d. *Austrochloritis victoriae* (yellow form) 22.5 mm, Naracoopa, King Island

Plate 27. Sculptural detail: a. *Planilaoma luckmanii*, Knocklofty; b. *Pasmaditta jungermanniae*, Cataract Gorge

5. GENERAL DISCUSSION

5.1 COMMON TRENDS BETWEEN SPECIES

Conformity to shared or known patterns

This section lists species categorised into various forms of known patterns as assessed in Section 4. Species are divided into those that are likely to be "local endemics" or those that are not likely, or known not, to be "local endemics". A "local endemic" is a species that does not extend more than 100 km either N-S or W-E. In some cases, a combination of factors is suggested. For instance a species may have an eotlian western boundary but also have an East Coast gap. In this case, the species would be listed under both Tyler's Line and the East Coast gap, with "(part)" or a designation of a specific part, e.g. "(coastal)", after each listing. In some other cases, a species appears to belong to one of two incompatible classifications, but which one is not yet clear. In these cases a term like "possible", "probable", "suspected" will appear in brackets after the species' name under the relevant designations. In some cases, a species is just given with a qualifier under one heading if there is no obvious second candidate. At the end of each classification two totals appear, one for the number of species classifed solely under this category, one for the number of species that partly belong or may belong to that category. The term "possible/partial" is used for all the latter irrespective of category.

Widespread species (not local endemics) (57 species)

(a) Statewide (possibly excluding Bass Strait islands) in suitable habitat:
Succinea australis (possible), *Prolesophanta dyeri* (possible), *Caryodes dufresnii, Paralaoma halli, Pedicamista* sp. "Chisholm", *Laomavix collisi, Trocholaoma parvissima, Magilaoma penolensis, Discocharopa mimosa, Pernagera officeri* (coastal), *Roblinella gadensis, Helicarion cuvieri* (10 species + 3 possible/partial)

(b) East Coast gap absence:

Thryasona diemenensis, Stenacapha hamiltoni, Pernagera kingstonensis, Allocharopa legrandi (part) (3 species + 1 possible/partial)

(c) Widespread wotlian or eotlian (Tyler's Line dominant feature)
Wotlian: *Victaphanta milligani, Dentherona dispar, Geminoropa antialba* (probable), *Roblinella* sp. "Tahune", *Oreomava johnstoni* (possible), *Mulathena fordei, Cystopelta bicolor, Magilaoma* sp. "Swallet", *Allocharopa* sp. "Teepookana"
Eotlian: *Tasmaphena ruga, Planilaoma luckmanii, Elsothera ricei, Allocharopa kershawi, Dentherona subrugosa* (possible), *Thryasona marchianae* (possible), *Cystopelta petterdi, Prolesophanta nelsonensis* (partial), *Allocharopa legrandi* (part), *Pernagera officeri* (probable inland), *Paralaoma mucoides* (Total for both: 13 species + 7 possible/partial).

(d) eotlian with Western Tiers break (either north or south of break)
Victaphanta lampra, Elsothera limula, Pernagera tasmaniae, Pernagera architectonica (suspected), *Dentherona subrugosa* (possible) (3 species + 2 possible/probable)

(e) Toehold species:
Allocharopa tarravillensis (1 species)

(f) Eastern Tiers distribution:
Tasmaphena quaestiosa, Pernagera sp. "Paradise", *Allocharopa* sp. "Douglas" (3 species)

(g) Individual distribution (explanation not obvious)
Succinea australis (probable), *Pupilla australis, Tasmaphena sinclair , Prolesophanta* sp. "Strzelecki", *Prolesophanta nelsonesis* (partial), *Prolesophanta dyeri* (probable), *Bothriembryon tasmanicus, Bischoffena bischoffensis, Oreomava johnstoni* (possible), *Stenacapha ducani, Stenacapha vitrinaformis* (9 species + 2 possible/partial)

(h) Unclear
Prolesophanta sp. "Marriotts", *Pedicamista coesus, Elsothera* sp. "Needles", *Allocharopa* sp. "Franklin", *Roblinella curacoae, Trocholaoma spiceri, Paralaoma*

caputspinulae, Paralaoma sp. "Hartz", *Thryasona marchianae* (possible) (8 species + 1 possible/partial)

<u>Known or probable local endemics (49 species):</u>

(a) Karst endemic:
Geminoropa sp. "Hastings", *Geminoropa* sp. "Moonlight", *Roblinella* sp. "Bubs Hill", *Roblinella* sp. "Mystery", *Allocharopa* sp. "Mystery", *Allocharopa* sp. "Quarry", *Oreomava* sp. "Hibbs Lagoon" (possible) (6 species + 1 possible/partial)

(b) Scree endemic:
Roblinella agnewi, Roblinella sp. "Flash Tier" (possible), *Planilaoma* sp. "Pelverata", *Allocharopa* sp. "Dromedary" (possible), *Allocharopa* sp. "Pelverata", *Allocharopa* sp. "Ravens Hill" (possible) (3 species + 3 possible/partial)

(c) Toehold species:
"Tasmaphena" lamproides, Miselaoma weldii, Pillomena dandenongensis, Austrochloritis victoriae (4 species)

(d) Localised mosaic species:
Victaphanta sp. "W Arthurs" (possible), *Prolesophanta* sp. "Togari", *Prolesophanta* sp. "Francistown", *Pedicamista* sp. "Southport" (possible), *Allocharopa* sp. *"Wellington", Stenacapha* sp. "Hunter" (probable) (4 species + 2 possible/partial)
(Note: Several more *Allocharopa* may be localised mosaic species but there is no evidence of close boundaries to confirm this at this stage.)

(e) Island endemic:
Tasmaphena "whinrayi", *Austrorhytida* sp. "Raffertys", *Roblinella* sp. "Bishop", *Letomola barrenense, Flammulops* cf. *excelsior, "Stenacapha"* sp. "Flinders", *Paralaoma* sp. "Breaksea" (possible) (6 species + 1 possible/partial)

(f) Glacial/gorge refuge endemic (based on specific comments in Chapter 4 – broad methods of inferring that more species may have had this origin are discussed later in this Section)

Anoglypta launcestonensis, Pasmaditta jungermanniae (possible), *Roblinella roblini* (possible), *Pasmaditta* sp. "Blue Tier" (possible) (1 species + 3 possible/partial)

(g) Alpine endemic

Pedicamista sp. "Bull Hill" (possible), *Victaphanta* sp. "W Arthurs" (possible) (2 possible)

(h) Tasman/Forestier Peninsula Group

Helicarion rubicundus, Allocharopa sp. "McGregor", *Pernagera* sp. "Waterfall" (3 species)

(i) Individual range – explanation not obvious

Pedicamista sp. "Southport" (possible), *Pedicamista* sp. "Bull Hill" (possible), *Discocharopa vigens*, Charopidae sp. "Skemps", *Pernagera* sp. "Waratah", *Geminoropa hookeriana* (suspected combination of known factors), *Stenacapha savesi, Allocharopa* sp. "Christ College" (6 species + 2 possible/partial)

(j) Unclear range

"Discocharopa" lottah, Oreomava sp. "Hibbs Lagoon" (possible), *Roblinella roblini* (possible), *Thryasona* sp. "Wedge", *Allocharopa* sp. "Victoria", *A.* sp. "Junee", *Pasmaditta* sp. "Blue Tier" (possible), *Planilaoma* sp. "Breaksea" (possible), *Allocharopa* sp. "Ravens Hill" (possible), *Allocharopa* sp. "Dromedary" (possible), *Roblinella* sp. "Flash Tier" (possible) (5 species + 7 possible/partial)

<u>Summary comments</u>

One difference between the local endemic species and the more widespread species is that the local endemic species display a greater diversity of types of distribution, whereas a few patterns account for a much higher proportion of widespread species. None of the above patterns for local endemics encompass more than 15% of the locally endemic species. Tyler's Line alone is significant for at least 22% of the widespread species. In the case of the widespread species, there is also a considerable overlap in range between some species covered by these summaries – a Tyler's Line species is generally either a widespread western species or a widespread eastern species, for instance, so many Tyler's Line species have very similar ranges to others in that group by definition. The summary categories for local endemics include various specific karst areas, islands, screes, toeholds and range extremities. Pairs or groups of local endemics having similar or overlapping distributions are rare, one exception being the Mystery Creek Cave / Moonlight Ridge area where there is a small cluster of karst endemics (5 known species). The ranges of widespread species, overall, tend to be more similar to each other than the ranges of locally endemic species are to other locally endemic species.

The proportion of species having individual or unclear boundaries is, however, similar (22-41% for local endemics, 30-35% for widespread species) for each group.

Conformity with invertebrate and non-invertebrate models:

This section assesses the extent to which the land snail distributions discussed above do or do not agree with other bioregionalisation-style models and concepts for Tasmania. This is not intended as an assessment of the adequacy of such models as ecological surrogates generally, because differences between snails and other models may indicate the peculiarities of snails as much as the peculiarities of groups involved in such modelling. However, if there are significant differences between snails and other groups used to construct models used in policy (such as IBRA) then policy implications could result in either of the following circumstances:

(i) Specific differences displayed by snails are reinforced by other groups, such as other invertebrates.

(ii) Differences displayed by snails are not reinforced by other groups in the same way, but other groups also display significant differences.

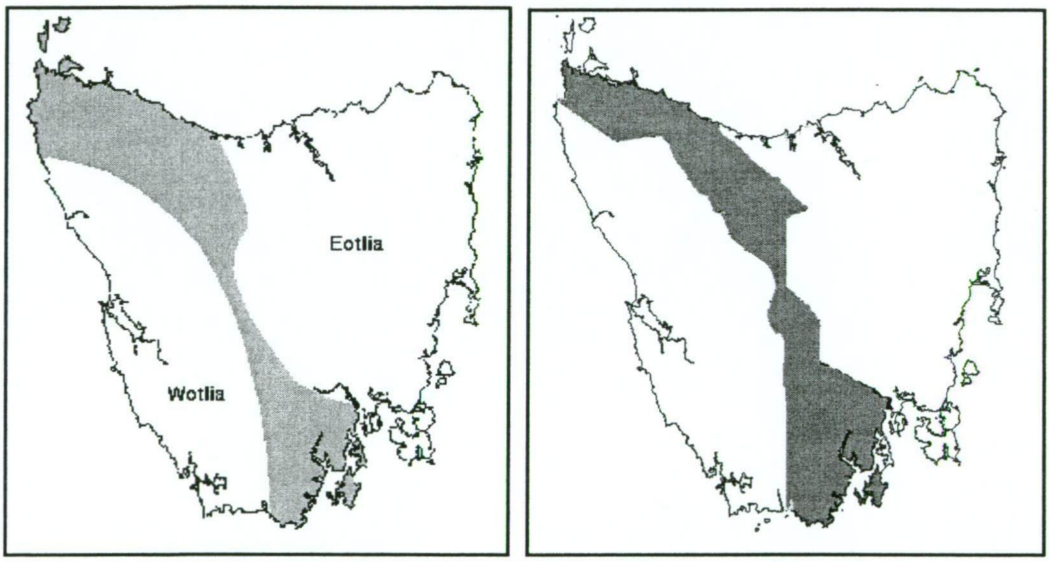
Tyler's Line

To assess the manifestation of Tyler's Line in the native snail fauna, boundaries of those species assessed as likely to be wotlian or eotlian (at least partially) were drawn onto a map of the state. Minimum convex polygon boundaries were used, but were applied cautiously in cases of a large gap where it was thought the boundary might be concave

Using these boundaries, minimal boundaries for the wotlian and eotlian categories were constructed. Each boundary line encompassed the minimum possible area while encompassing the ranges of all species in that category. The area between these two minimal boundaries was then defined as the "interzone", with some minor alterations to fill in small near-coast gaps produced by the marginal collecting sites being generally slightly inland. The resultant "minimum interzone" for land snails from this project is shown in Fig 5.1(B) with Mesibov's (1996a) interzone for invertebrates in general in Fig 5.1 (A)

In comparing these maps, the size of the relative species sets is an important issue. The land snail data set for this project includes only 24 Tyler's Line species from one subset of the invertebrate fauna, whereas the species set used by Mesibov includes invertebrates from 14 different groups. Therefore it would be expected that Mesibov's data set would include a larger range of eotlian and wotlian distributions and hence a slightly larger overlap between eotlian and wotlian sets of distributions. In the narrow "bottleneck" shown in the centre of Fig 5.1(A), which Mesibov calls the Tyler's Line Break, Mesibov lists 20 invertebrate species thought to have their boundaries in the area, only two of them snails. This project has increased the number of snails for which there is sufficient data to classify them as conforming to Tyler's Line, but there are still far more species used in producing Fig 5.1(A), which are not snails.

As expected, there are areas where the use of a small subset of the fauna fails to verify the existence of such an extensive interzone. The extreme north-west is one of these, with the most widespread eotlian snail in that area, *Planilaoma luckmanii*, being so rare in the north-west that its range there is not fully known. The central "bottleneck" appears to be supported for snails – but on closer inspection, based on present records there is one gap about 5km wide between the eotlian and wotlian species in part of the predicted bottleneck area (Fig 5.2). This potential gap coincides with an extremely poorly sampled area (grid squares 4435 and 4434, both of which have no land snail records). This area (containing Clarence Lagoon and Lake Lenone) is accessible only through private property on poor roads, or by overnight walking, most of it off tracks. On its own, bearing in mind that snails are only a subset of invertebrates generally, the lack of full verification of an overlap in this area does not prove that one does not exist or that the pattern for snails differs significantly from the pattern for other invertebrates. There are also some areas where snail data show that the Tyler's Line interzone could be wider for snails than for other invertebrates so far assessed.



(A) (B)

Fig 5.1 (A) Tyler's Line interzone hourglass for invertebrates generally (supplied by Dr R. Mesibov for this project, modified slightly from Mesibov (1996a)). (B) Tyler's Line minimum interzone hourglass for land snails from this project. Grey shading indicates the interzone area in which both wotlian and eotlian species are present.

Other evidence does, however, show that the Tyler's Line Break is less clearly supported by snails than by other invertebrates. Figure 5.2 shows the distribution of sites where wotlian and eotlian snail species are recorded in the vicinity of Mesibov's

(1996a) estimated location of the Tyler's Line break. Nine wotlian and six eotlian snails are recorded on the map area. At least one of the wotlian snails extends further eastwards than other invertebrates obeying the Tylers Line break were thought to do. If snails obeyed the predicted break exactly, only "W"s would be present significantly west of the break, and only "E"s east of it, with a mixture of "W"s, "E"s and "B"s in the break area.

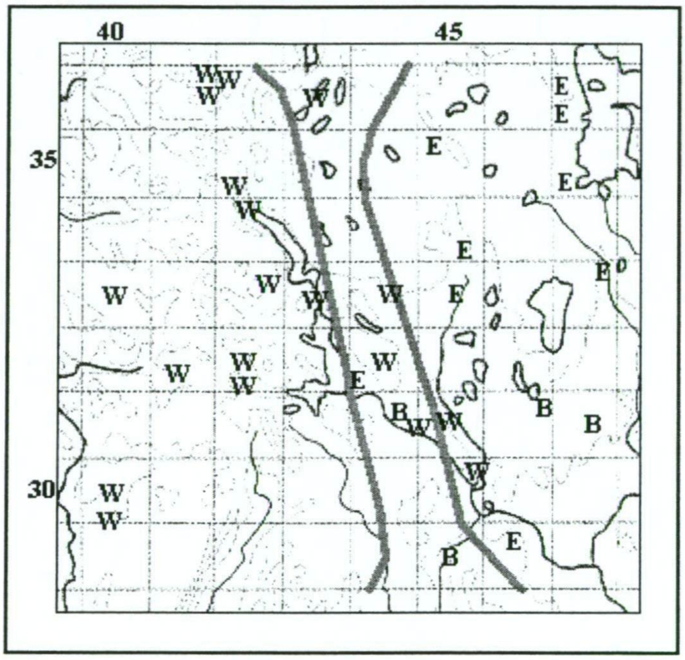


Fig 5.2 Snail sites with records of eotlian or wotlian species compared to Tyler's Line Break (grey) as shown approximately by Mesibov (1996a). E = at least one eotlian species, no wotlian species. W = at least one wotlian species, no eotlian species, B= both eotlian and wotlian species (at least one of each).

Fig 5.2 shows that there is a small area in which wotlian snail species extend through the Tyler's Line Break for other invertebrates. There are two cases (Glenmark – square 4631 and Victoria Valley Falls – square 4731) of a wotlian species occurring over 10km east of the predicted break. In both cases this is the slug *Cystopelta bicolor*. Two further cases are roughly on the edge of the predicted break.

It may seem unusual that *C. bicolor* is the wotlian species that disrupts the tightness of the Tyler's Line break given that it is one of the species originally cited by Mesibov as adhering to it. The most likely reason is not simply lack of collecting but also the unreliable recordability of *C. bicolor*. Being a slug, this species does not leave a dead shell that would allow for records in dry times when all live specimens were sheltering or arboreal. *C. petterdi* can still be recorded in such conditions because of the distinctive form of its faeces (fine rounded pyramid-like coils), but *C. bicolor* faeces are not visually distinctive and the species can only be recorded by finding live (or very freshly dead) specimens. In the area where these records were made, it is not common. It is also possible that the species' boundary could have been artificially extended by disturbance in the area.

The remaining boundaries appear to be very similar to those for invertebrates generally, with the western boundary of the interzone in the south closely following the transition between wet eucalypt forest and buttongrass plains/rainforest, and with the eastern boundary in the north following the Mersey Break. Overall, despite slight local differences and areas of uncertainty, the similarity between the "interzone" patterns for snails and invertebrates generally is remarkably strong.

The point made by Mesibov (1996a), that given species within broad distributional zones rarely occupy the whole zone exactly, is very well demonstrated for snails. Fig 5.3 shows the known boundary lines for the various eotlian and wotlian snail species. These are approximate minimal boundaries only, and boundaries appearing to go in the "wrong" direction generally reflect this. To some degree, differences in boundaries between two species will disappear with more sampling, but even taking this into account many species remain quite individual in their distributions, with only some areas where several species appear to have the same boundary. One of these, which has not been previously reported, is the Derwent River in the south, which many wotlian species extend north to but do not cross. This pattern is also displayed by species with individual distributions that are not wotlian, including *Stenacapha vitrinaformis*, and the southern populations of *Roblinella curacoae* and *Thryasona marchianae*.

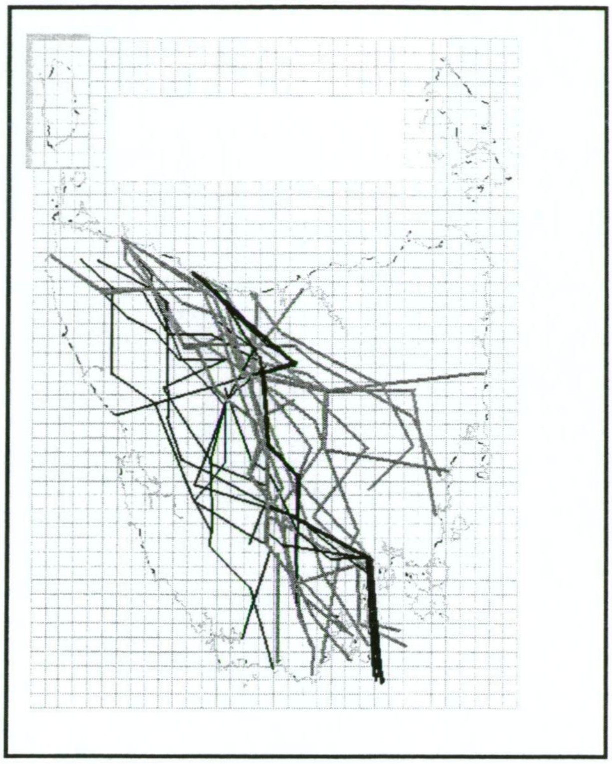


Fig 5.3 Minimum boundary lines for eotlian (dark grey) and wotlian (black) land snails. State outline and grid shown in pale grey to improve visibility of boundary lines.

Western Tiers

The existence of a probable land snail break along the Western Tiers face is a significant difference between land snails and other invertebrates, as this was not highlighted or even discussed as a break by Mesibov (1996a). The face of the Tiers did, however, form a break in the IBRA bioregionalisation of Peters and Thackway (1998).

The degree of conformity between land snail results and the boundary of the Northern Slopes IBRA bioregion is strong. Five snail species were assessed as having boundaries along the Western Tiers face, three being species occurring to the north of the Western Tiers face: *Victaphanta lampra, Dentherona subrugosa* and *Elsothera limula*. Also there are two species occurring south of the Western Tiers face but not significantly north of it: *Pernagera tasmaniae* and *Pernagera architectonica,* although the latter has not yet been recorded right up to the Western Tiers face.

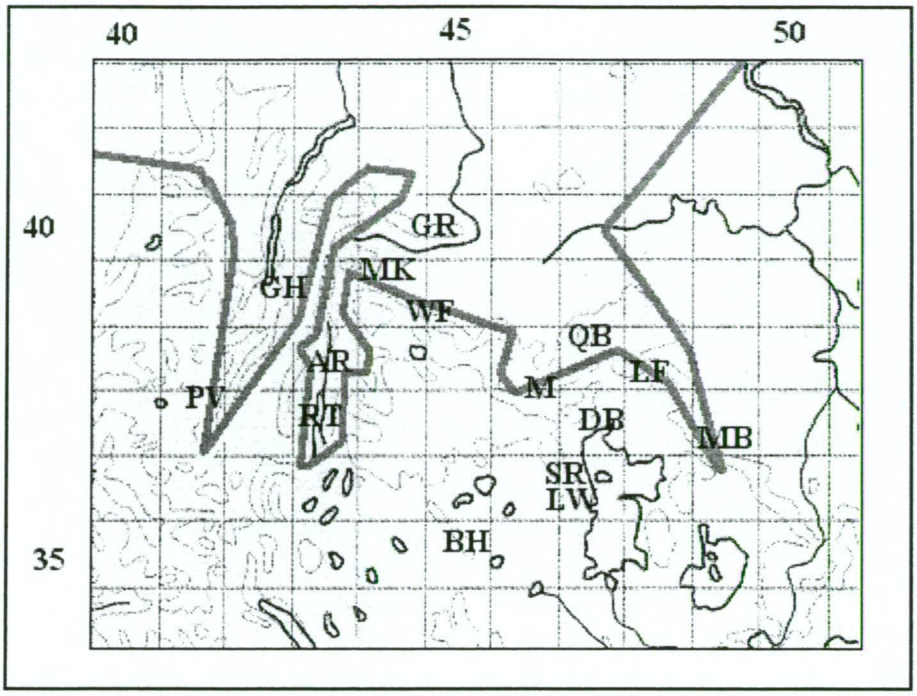


Fig 5.4 Central northern Tasmania near the Great Western Tiers showing well-searched sites and approximate location (grey) of boundary of "Northern Slopes" bioregion of Peters and Thackway (1998). Key to sites: GR Gog Range, MK Marakoopa Cave, GH Gads Hill, WF Westmoreland Falls, QB Quamby Bluff, AR Arm River, LF Liffey Falls, M Meander, PV Pelion Valley, RT Rowallan Track, DB Dells Bluff, MB Mt Blackwood, SR Split Rock, LW Liawenee, BH Bull Hill.

Of the sites shown in Fig 5.4 (all of which have been well searched), *Victaphanta lampra* occurs at Gog Range, Marakoopa, Gads Hill, Meander and Liffey Falls. *Dentherona subrugosa* occurs at Gog Range, Westomoreland Falls, Quamby Bluff and Mount Blackwood. *Elsothera limula* occurs at Gog Range, Meander, Quamby Bluff and Mount Blackwood. These records are all north of or very close to the bioregional break. *Pernagera tasmaniae* occurs at Liawenee, Split Rock, Quamby Bluff and Marakoopa, sites either well south of or only marginally north of the bioregional break, and *Pernagera architectonica* occurs at Bull Hill and Split Rock which are well south of the break. Additional species that may be influenced by the break also stick to or do not cross it – *Cystopelta petterdi* at Gog Range, Quamby Bluff and Liffey Falls (a record near Arm River is considered to be an introduction), *Oreomava johnstoni* at Marakoopa, Westmoreland Falls and Quamby Bluff, and

Geminoropa hookeriana at Gog Range, Marakoopa, Quamby Bluff and near Liffey Falls.

It is absences rather than presences that most disrupt conformity with the proposed bioregional break. The Arm River and Rowallan Track sites are wet forest sites within the Upper Mersey Valley, one of the two long valleys that cut into the surrounding mountain plateau. These sites were searched for 210 and 135 minutes respectively, yielding 10 and 11 species respectively. The three species occurring north of the Tiers face are naturally common in suitable habitat (which both sites included) and to fail to find them (as well as naturally occurring *C. petterdi* and *O. johnstoni*) at either of these well-searched sites strongly suggests that the north-of-Tiers group does not extend into the Upper Mersey. This perception is reinforced by the presence of *Cystopelta bicolor* at both Arm River and Rowallan Track, and *Dentherona dispar* at the latter.

The classification of this valley as part of the Northern Slopes bioregion appears to be ecologically genuine, at least for trees, and therefore the difference between the snail results and the bioregional modelling suggests a genuine difference in how snails respond to the area.

<u>Bass Strait</u>

The bioregionalism of King and Flinders Islands is not discussed extensively in Mesibov (1996a). Peters and Thackway (1998) modelled these islands as part of the "King" and "Flinders" zones, respectively, each with a toehold in the adjacent corner of the state. Smith (1996) treated them as part of a single region but distinct from the rest of the state.

The most easily addressed issue is the comparison between the large islands. *Succinea australis, Laomavix collisi, Pernagera officeri, Magilaoma penolensis, Paralaoma caputspinulae, P. halli, Cystopelta petterdi* and *Helicarion cuvieri* (noting the doubt over whether populations on either island are that species) can be disregarded as they are all widespread in Tasmania and present on both islands. King Island's remaining species (*Prolesophanta dyeri, Allocharopa tarravillensis,* *Austrorhytida* sp. "Raffertys", *Pillomena dandenongensis, Austrochloritis victoriae, Flammulops cf. excelsior*) and those of Flinders (*Paralaoma mucoides, Pupilla australis, Prolesophanta* sp. "Strzelecki", *Thryasona diemenensis, Stenacapha* sp. "Flinders", *Letomola barrenense, Tasmaphena* sp. "Whinray") are all different. The two islands therefore essentially have almost completely distinct land snail faunas by Tasmanian standards.

Neither island's snail fauna is similar to the adjacent Tasmanian mainland. Of the species recorded on King Island but not Flinders, only two of six (*P. dyeri* and *A. tarravillensis*) occur within the mainland part of the IBRA King Bioregion, and of the Flinders Island species not occurring on King, only four of seven species reach the mainland part of the Flinders Bioregion. Furthermore, at least 23 species present in the Tasmanian mainland portion of the King Bioregion, and 9 present in the Flinders Bioregion (the actual figure in the latter case is probably much higher but the mainland portion of the Flinders Bioregion is undersurveyed) do not reach the islands of the same name. The distinctions between these islands and each other, and also between the islands and the adjacent Tasmanian mainland, are as great as any other boundary distinctions in the Tasmanian land snail fauna.

The Hunter Group fauna was discussed by Bonham (1997b) and considered to be a depleted subset of the adjacent mainland fauna. This was before the diagnosis of *Stenacapha* sp. "Hunter", which occurs across most of the Hunter Group but is apparently confined on the mainland to the adjacent Woolnorth Point tip. It remains the case that at least fifteen species recorded from the adjacent mainland were not found on the Hunter Group in a ten-day survey, including such common and widespread species as *Caryodes dufresnii, Pernagera kingstonensis, Victaphanta milligani,* and *Cystopelta bicolor.* Excluding the biogeographically uninformative species, there are only seven Hunter Group species in common with the mainland, one of which is *Stenacapha* sp. "Hunter". This means that even the Hunter Group is very significantly different from the adjacent mainland.

The IBRA Bioregions generally

There are various methods of assessing the ability of a bioregionalisation to predict the distributions of different groups. The most obvious one is to create a computer-modelled bioregionalisation for that group, which has not been done for reasons discussed in Chapter 1. Another is to look for breaks occurring within units in the predicted bioregionalisation, which has been done above in the most severe cases (King and Flinders Islands). A third way is to assess whether bioregion boundaries predict actual species boundaries, and this will be examined here.

Excluding the 7 species recorded only from Bass Strait islands there are 99 species present on the Tasmanian mainland. Of these, at least eleven are so widespread that they are not biogeographically informative, while 42 are local endemics, which are generally (but not always) unsuitable for testing boundaries because their ranges are so small.

Commenting on the boundaries for the more informative species (those neither statewide nor very localised) is often difficult because some bioregions are much better sampled than others. With the exception of the Launceston region in its far north, the Northern Midlands Bioregion is almost unsampled, for example. There are only twelve species that display strong potential conformity with any IBRA bioregional boundary (one of these also being a local endemic):

Tasmaphena sinclairi: This species is not recorded from the Northern Midlands zone despite being present up to the edge of the adjacent Northern Slopes / Central Highlands zones. Likely to be an artefact of insufficient surveying in the Northern Midlands.

Tasmaphena ruga: Absent from the Central Highlands and Southern Ranges bioregions despite being widespread through the South-East bioregion. Likely to be meaningful at least in the Southern Ranges case as level of surveying there is high.

Paralaoma mucoides: Likely to closely follow Southern Ranges / West boundary.

Prolesophanta dyeri: Not recorded from South-East Bioregion despite being present in Central Highlands nearby (one site) and Southern Ranges Bioregion. Probably an artefact of insufficient searching – see comments in Chapter 4 under this species.

Planilaoma luckmanii: Range boundary closely matches Southern Ranges / West boundary although possibly slightly to the east of it.

Elsothera limula: As well as comments about this species above concerning Northern Ranges / Central Highlands break, species also may follow Northern Ranges / West boundary and also possibly Ben Lomond / South-East boundary (the Fingal Valley).

Allocharopa kershawi: By occurring in the Hobart region but not further south-west, and also by occurring on North Bruny Island but not South Bruny Island, this species appears to approximate the South-East / Southern Ranges boundary. Despite this, the exact boundary on Hobart's western shore is far more restricted and the distribution of the species in the Upper Derwent is completely unknown.

Allocharopa legrandi: Boundary in south-west of range may match West / Southern Ranges boundary but more records near the southern end of boundary are needed to confirm this.

Allocharopa sp. "Teepookana": Known distribution very closely matches West Bioregion but with a small amount of overlap into Southern Ranges and King Bioregions.

Pernagera tasmaniae: As well as comments about this species above concerning Northern Ranges/Central Highlands break, conforms to the South-East/Ben Lomond boundary.

Dentherona dispar: Closely follows the South-East / Southern Ranges boundary except at the upper end of the Southern Ranges boundary, where it crosses it by occurring at Wayatinah.

Dentherona subrugosa: Absent from the Northern Midlands bioregion and may therefore conform to the Northern Midlands/South East boundary, although absence from Northern Midlands is largely attributable to lack of searching in suitable habitats.

Geminoropa hookeriana: A local endemic that appears to follow the Northern Ranges/Central Highlands break (see above).

Geminoropa antialba: Possibly follows the Northern Slopes / West boundary, although that boundary is relatively short and records are not numerous in the area.

Cystopelta bicolor: Approximately follows South-East/Southern Forests boundary although extending at least slightly into South-East zone in the Mount Wellington area.

The list above shows that not only do very few widespread species display conformity with the bioregional boundaries, but also the degree of conformity in the strongest cases is seldom absolute and frequently insufficiently verified, and that bioregions are not apparently effective predictors of any known boundary for at least 75% of sufficiently widespread species. There are 11 cases of very close correspondence between an IBRA boundary and a species boundary, and a further 12 cases of reasonably close but problematic or unclear correspondence. At least seven species display very close correspondence.

Invertebrate bioregions and faunal breaks

It is difficult to compare the bioregions of IBRA with the provisional invertebrate bioregions of Mesibov (1996a) (Fig 5.5) because the way in which they are presented is very different. Mesibov employed twelve bioregions, one of which consisted of a series of nested boundaries and was described as "problematic". The exact boundaries of these bioregions were also not defined in areas where they are considered tentative. King and Flinders Islands were not included in the twelve bioregions. Also, the concept of fauna breaks used in this work includes cross-cutting faunal breaks which allow for overlapping bioregions – the Southern Forests, for instance, were placed in bioregion G (which consists of "Southeast Tasmania around the lower Derwent area" and also in bioregion H ("Southwest Tasmania plus the Wellington Range"). This applies only in parts of the state. The concept of allowing some areas to be part of more than one "bioregion" is an insightful one, but it could also be argued that this essentially creates an extra "bioregion" which is a hybrid of two others.

Comparisons can be more easily made using breaks between zones, although again there are large gaps for these. There are more boundaries in Mesibov (1996a) than in the IBRA (approximately 28 and 16 respectively, counting any unique combination of separated bioregions as one break, for instance the boundaries of Plomleys Island with bioregions A, B, C and J each count as one break) so it would be expected that more species would obey at least one break.

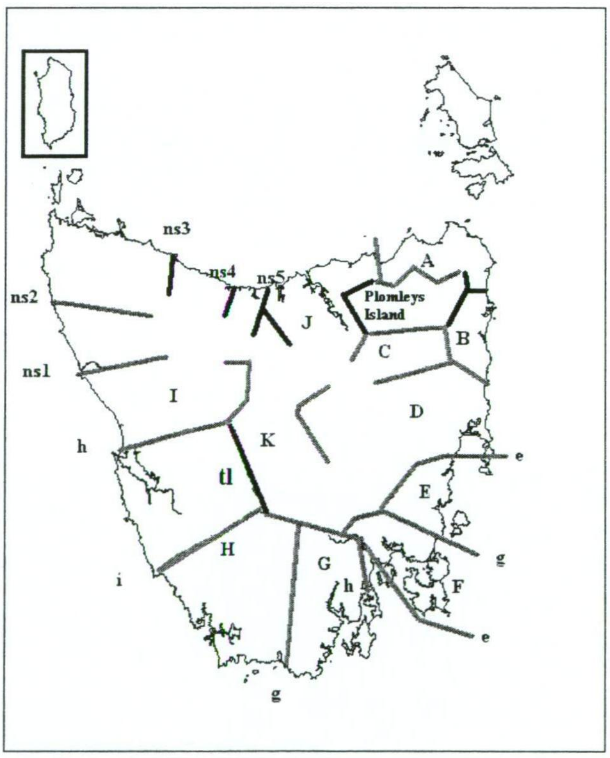


Fig 5.5 General provisional invertebrate bioregions and breaks adapted approximately from Mesibov (1996a) (letters explained in text where relevant). Black lines show strongly supported faunal breaks, grey lines weakly supported faunal breaks. Capitals show bioregions, lower case letters show faunal breaks An extra label tl = Tyler's Line Break, has been added.

The following species display or may display conformity with one or more of these boundaries:

Victaphanta milligani: May follow Tyler's Line break (tl) although this is unclear towards the southern end because of limited collecting.

Victaphanta lampra: Southern boundary exactly matches Little Swanport break (northern end of line e, which is drawn on Fig 5.5 slightly north of now known location (Mesibov, pers comm.))

Tasmaphena ruga: Not recorded from Plomley's Island despite records nearby in bioregions A (inlet), B, C and J, therefore likely to be one of many widespread species absent from Plomley's Island. There are insufficient records to assess whether it is widespread enough to occupy the full area of bioregions A, B, C and J, however. Also closely follows eastern end of boundary h (which is the same as IBRA Southern Ranges / South East boundary).

Prolesophanta nelsonensis: Very likely to follow Tyler's Line break (tl). Boundary with *P.* sp. "Strzelecki" very closely matches boundaries between bioregions B and J and bioregions A, Plomley's Island and C.

Prolesophanta sp. "Strzelecki": See above.

Prolesophanta sp. "Togari": Range appears to be very similar to that of the velvet worm *Ooperipatellus cryptus*, which is bounded by the north-western lines ns2 and ns4.

Prolesophanta dyeri: As commented for the IBRA bioregions, attributing any range boundary to this species is impossible because of its natural scarcity. If there are any breaks in its range, boundaries it could follow include J/Plomley's Island (East Tamar Break), and the southern end of line h.

Anoglypta launcestonensis: Endemic to Plomley's Island and therefore obeys breaks between that zone and four surrounding bioregions.

Planilaoma luckmanii: Closely follows Tyler's Line break (tl). May also follow other breaks such as line ns2, and southern part of line g, and also even boundary between F and E, but insufficient evidence to assess these possibilities.

Elsothera limula: May conform to Fingal Valley break separating bioregions C and D, but collecting in the latter is too limited to confirm.

Elsothera sp. "Needles": May conform to Tyler's Line break (tl) but too few records to confirm.

Allocharopa kershawi: As eastern end of boundary h is almost identical to Southern Ranges / South-East boundary in IBRA, same comments apply.

Allocharopa legrandi: East Coast gap boundary may match boundaries between Plomley's Island and bioregions B and C but more collecting is needed to determine if this is the case.

Pernagera tasmaniae: Conforms to Tyler's Line break (tl)

Pernagera sp. "Waterfall"/ *P. sp.* "Paradise": Boundary between these two species is likely to conform to break between bioregions E and F (Forestier Peninsula / east coast boundary).

Dentherona dispar: May conform to boundary between bioregions I and K, also likely to conform to Tyler's Line break (tl).

Geminoropa hookeriana: Western boundary conforms to Mersey Break (line ns5).

Roblinella sp. "Tahune": Closely follows eastern part of line h, although extending just over it in Mt Wellington area.

Oreomava johnstoni: Western boundary conforms to Mersey Break (ns5).

Thryasona marchianae: May be absent from Plomley's Island. South-western boundary follows western portion of line g.

Thryasona diemenensis: East coast gap appears to follow boundary between regions B (and possibly C) and D.

Mulathena fordei: Closely follows line h (eastern end) and possibly Tyler's Line break (tl)

Stenacapha hamiltoni: East coast gap appears to follow boundary between regions B and D, possibly C and D, and E and F.

Stenacapha vitrinaformis: Closely follows line h (eastern end).

Cystopelta petterdi: Southern boundary matches Little Swanport break (line e).

Helicarion rubicundus, *Pernagera* sp. "Waterfall" and *Allocharopa* sp. "McGregor" : Boundary matches boundary between bioregions E and F.

In total, 27 species have at least one boundary that correspond to or may correspond to a Mesibov (1996a) boundary. Of these 17 are involved in at least one strong correspondence (for a total of 22 strong correspondences) and the total number of partial or problematic correspondences is 30.

These results are compared to those for the IBRA bioregions in Table 5.1 below. In each case, raw results have been divided by the number of boundaries to give a rough indication of how efficient each model is. It would be expected that a model which uses more boundaries will successfully explain more distributions, all other factors being unchanged.

<u>Table 5.1 Comparison of IBRA and Mesibov (1996a) in ability to predict snail boundaries and efficiency in predicting snail boundaries in four categories – number</u>

of species showing strong correspondence, number of species showing at least some or possible correspondence, number of strong correspondences, number of partial or possible correspondences. Figures in brackets are results divided by the number of boundaries to give an indication of the explanative efficiency of each model.

Regionalisation	Boundaries	Strong - species	All - species	Strong - total	Weak - total
IBRA	16	7 (0.44)	15 (0.94)	11 (0.69)	12 (0.75)
Mesibov (1996a)	28	17 (0.61)	27 (0.96)	22 (0.78)	30 (1.07)

The exercise of assessing conformity to boundaries is subjective in the absence of any formal statistical test for conformity. However, the comparison of explanative success per boundary suggests that the 12 preliminary invertebrate bioregions of Mesibov (1996a) were more successful in predicting snail boundaries, even on a per-boundary basis, than the nine bioregions of IBRA. The difference in per-boundary predictive efficiency varied from 2% to 43% across the four indicators shown in Table 6.1.

The reasons that the Mesibov (1996a) bioregions are somewhat more successful both in the number of boundary predictions and the efficiency of boundary predictions per modelled boundary, chiefly concern two areas of the state. The first of these is the north-east where the patterns of invertebrate biogeography are quite complex in a way not seen with other biota. As Mesibov (1996a) comments on a previous draft of the IBRA for Tasmania:

> "The intricacies of invertebrate regionalisation in the Northeast are lost in the 'Ben Lomond' IBRA bioregion ..." (p. 19)

The second area is the Tyler's Line break. The boundaries of several species (*Dentherona dispar, Roblinella sp.* "Tahune", *Roblinella curacoae* (southern group), *Mulathena fordei,* and possibly *Stenacapha vitrinaformis*) closely follow the southern side of the Derwent River all the way to its source at Lake St Clair, crossing it barely, if at all. These boundaries are captured adequately by the invertebrate model, but cut through the IBRA Southern Ranges Bioregion boundary. Similarly, boundaries for wotlian species reaching the Tylers Line break, often cut straight through the western protrusion of the IBRA "Central Highlands" boundary.

Location of local endemics

While some attempt has already been made to divide local endemics into types, it is also important to examine the geographic distributions of particular kinds of local endemics.

Karst endemics: Of the six definite karst endemics, five species are known from a comparatively small area of the state in the far south. This area includes the Hastings, Lune River and Precipitous Bluff karsts. This area also supports a form of *Roblinella curacoae* which may be a distinct species. This concentration of karst endemics, albeit in a well-searched area, is surprising compared to the rest of the state in which only a single karst endemic (*Roblinella* sp. "Bubs Hill") is recorded.

Toehold endemics: The IBRA modelling showed toeholds on both the north-east and north-western tips of the state, and the north-east toehold is known in a range of fauna and flora groups (Mesibov 1996b). Despite this, all four Tasmanian toehold local endemic snails occur in the north-west (two on King Island and two on the north-western mainland); additionally, *Allocharopa tarravillensis* is a toehold species that is too widespread to be a local endemic. There are links between the Furneaux Group and the north-east specifically, but these species (*Prolesophanta* sp. "Strzelecki" and *Pupilla australis*) are too widespread to be considered simply toeholders.

Localised mosaic species: All species assigned to this category occur in the north-west or south-east, excepting one possible species in the south-west.

Island endemics: These occur mainly on the large Bass Strait islands, with one apparently on Maria Island and one possibly on Breaksea Island.

Glacial refuge endemics: The few species for which even a weak direct case of refuge endemism might be made mainly occur in the north-east. However an indirect case for many more glacial refuge species may be possible (see below).

Scree endemics: These occur on dolerite, and all known or suspected cases occur in the south-east of the state, from the central east coast to the Huon Valley.

With such a variety of types of endemicity, and such a small number of species attributable to each, another issue is whether particular areas of the state have more local endemics than others generally.

Fig 5.6 shows the locations of the centres of the ranges of each of the 49 Tasmanian local endemics:

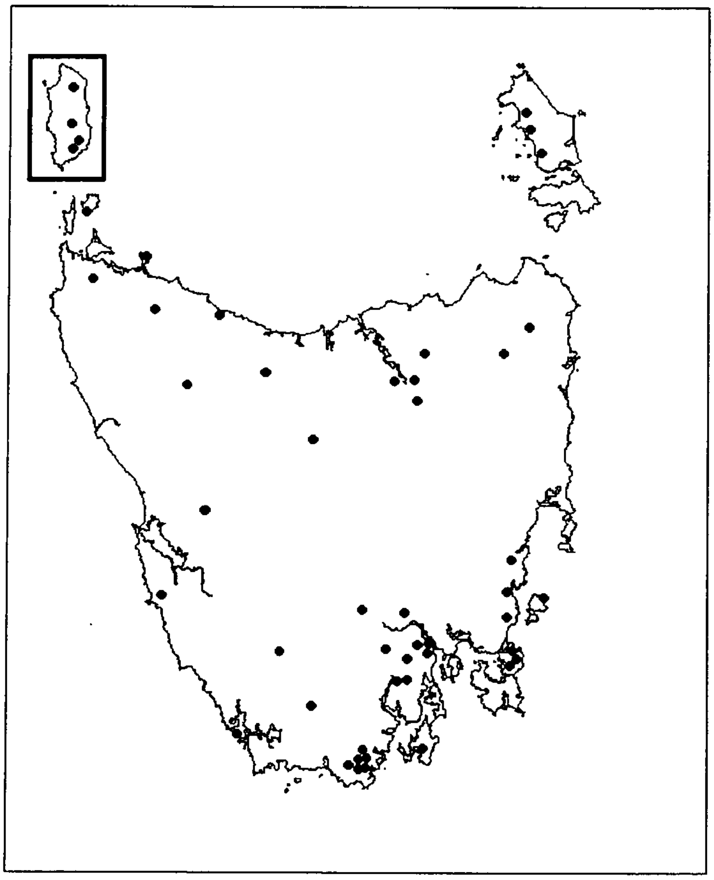


Fig 5.6 Range centroids for each of the 49 Tasmanian native land snail species that are locally endemic within Tasmania. In cases where centroids are extremely close together (<2 km apart), use of distinct dots above overstates distance between them.

It would be desirable to have a statistical method to assess whether clusters of local endemics in certain small areas genuinely demonstrate that this area has more locally endemic species than any other. The difficulty with such a method is that beyond very broad definitions of "areas" of the state, to draw a line around a given potential small cluster and then assess that for statistically significant clumping, is likely to be invalid even if a significant result is returned. Any cluster actually tested would need to be treated as if it was one of a very large number of simultaneous tests, which would in turn reduce the p-value required for a significant result and render one very unlikely. The clustering of local endemics can therefore only be easily assessed using very broadly drawn boundaries. For these purposes, the state has been split into five sections: all islands as a single section (as islands are an easily defined geographic type known to give rise to endemics, and this could be potentially misleading if included with a particular section of the mainland), and a section each for each of the four corners of the state. Squares with grid references up to and including 45E have been classified "west" and squares with grid references up to and including 33N have been classified "south" for these purposes. The clustering of local endemics for each category has then been measured not against land area, but against search effort as represented by grid square species records. The ratio of local endemic range centres to grid square species records has then been used as a rough indicator of the likelihood of a local endemic being found in the area for a given search effort.

Clustering is suggested, not surprisingly, in the King Island and Furneaux Group local endemics. King Island includes 4 local endemics (8.2% of all local endemics) despite having only 85 grid-square species records (2.0% of total) and the Furneaux Group includes 3 (6.1%) despite having only 117 grid square species records (2.7%). Records from other well-searched island groups appear to support the idea of islands as centres of endemism. The Hunter Group has one species that is almost endemic to the group from only 41 grid square species records, Maria 1 from 40, and Bruny Island (85 grid square species records) has all but one known record of *Pedicamista* sp. "Southport". In all, islands are the range centres of 11 (22%) local endemics, 9 of which are recorded solely from islands, but have only 392 (9.1%) grid square species records. To a degree the use of grid square species records as surrogates understates the search effort on the Bass Strait islands, which have a naturally low species diversity (in the author's records, mean species per locality counts are 4.9 for King

Island, 4.3 for the Hunter Group and 3.7 for Flinders Island compared to 6.3 for the state as a whole), but the concentration of range centres of local endemics remains substantial even when the grid square species record numbers for the Bass Strait island groups are artificially increased by 49% (based on differences in mean species per locality surveyed counts elsewhere) to give an artificial figure of 512 (11.6%) grid square species records to compensate for this.

The results for the four quarters of the state and the category "islands" are given below in two forms – firstly the total number of local endemics, secondly (in brackets) the total number of wet-forest-dependent local endemics that are not karst endemics. The importance of this is explained below.

Dividing the mainland of the state into four quarters, the results are as follows:

South-East	1212 GSSR	21 (15) local endemics
North-East	1092 GSSR	6 (4) local endemics
South-West	472 GSSR	4 (1) local endemics
North-West	1104 GSSR	7 (5) local endemics
Islands	392 (artificially 512) GSSR	11 (6) local endemics

Figures in brackets on the right are the number of species that are wet forest endemics and are not known karst endemics. The distribution of such species between the four mainland quarters is weakly statistically significant when measured against an expected distribution based on grid-square species records (chi-squared = 9.960, df = 3, p = 0.0189 (two-tailed)). The difference between the mainland of the state and the category "islands", is weakly significant for all endemic species (chi-squared = 5.840, df = 1., p = 0.0192 (two-tailed)), but not significant for wet forest-dependent endemics. The grid-square species record figure was modified as discussed above in these tests.

Many reservations about these correlations are necessary. These include: that they are *post hoc* in nature; that similar grid-square species records totals from areas with similar actual diversity do not necessarily reflect equivalent search efforts; that differences in search personnel between areas may alter the relationship between seach effort and number of local endemics found; that the south-east quarter includes the arguably island-like Tasman and Forestier Peninsulas, which have three wet forest local endemics (if these are removed the difference between mainland quarters is not significant on current data); and that the higher numbers of available specimens in some areas of the state may have led to more new species being identified. Therefore these correlations are only flagged as matters for further investigation at this stage.

The coastal concentration of local endemics visible on Fig 5.6 is potentially misleading on a statewide basis because records for all species are coastally concentrated. Only 1370 of 3882 (35.3%) of mainland Tasmanian grid-square species records occur in squares that have their centres more than 20km from any coast. Therefore the significance of having many of the local endemics on the Tasmanian mainland close to the coast is unclear. Indeed, only in the south-east quarter are records of local endemics clearly concentrated around the coast.

The possibility of concentration of wet forest endemism in the south-east is relevant in view of the paleoclimatic reconstruction given by Kirkpatrick and Fowler (1998). The majority of locally endemic snails on the Tasmanian mainland proper (31 of 38 species) are known or likely to be wet forest specialists, with only seven (*Pedicamista* "Bull Hill" and *Victaphanta* sp. "W Arthurs" alpine, *Miselaoma weldii* coastal, *Discocharopa vigens* and *Allocharopa* sp. "Christ College" sometimes found in dry forest, and *Discocharopa lottah* and *Thryasona* "Wedge" both unclear) not fitting this pattern. Kirkpatrick and Fowler's reconstructions (see Chapter 2.2) predicted that the west coast generally, south to about the 26 line, would have contained mostly expansive wet forest (rainforest in the central west, eucalypt in the north-west). The north-east would also have contained expansive wet forest, mostly eucalypt forest, south to about Freycinet Peninsula. Species that preferred wet forest in these habitats could have been dispersed widely across these environments, so local endemics would be less likely. The central north would have been dominated by woodland and grassland, which would have confined wet forest snails to localised wet gullies, providing some chance of local endemics in deep gorges for that reason. The eastern coast between Freycinet Peninsula and the Tasman Peninsula would have displayed similar characteristics to the central north. The south-east from the Derwent River south was a mosaic of rainforest and eucalypt forest, alpine areas and woodland – an ecologically complicated area that would have presented more challenges to species' attempts to colonise the entire area while allowing for species to survive in localised and disjunct patches of suitable habitat. Finally, while the south-west would have included some rainforest patches, the surrounding country would have been predominantly alpine and conditions would have probably been harsh. The centre of the state would have consisted of inland cold dry woodland and alpine vegetation without significant wet forests, and would also not have been conducive to local wet forest endemics.

The distribution of wet forest endemic snails is consistent with the above scenario (noting the reservations above about statistical significance), as the south-east, which would be expected to be the area with the highest diversity of wet forest local endemics, in fact has more than twice as many non-karst wet forest local endemics per grid square species record than any of the other three corners of the state. Not all wet forest local endemics would necessarily have had their ranges affected by glaciations to a significant degree (this applies for any area), but the distribution of locally-endemic wet forest snails can be said to be broadly consistent with the Kirkpatrick and Fowler (1998) reconstruction at this stage.

An alternative or additional explanation for the possible concentration of local endemics in the south-east is the abundance of dolerite screes in this area compared to elsewhere in the state. If screes themselves are conducive to local endemism more or less irrespective of glacial history, then the difference between the south-east and the rest of the state in terms of proportions of local endemics ceases to be significant. More searching of poorly-searched dolerite scree areas elsewhere in the state is therefore desirable to assess whether dolerite scree endemism is confined to the near-coastal south-east, or occurs more widely, and indeed whether those species currently classed as dolerite scree endemics ever occur on other substrates or landforms.

If the higher diversity of local endemics in the Tamar Valley area and in the south-east can be explained by glacial history, this does not mean that every local endemic must have a range that can be closely associated with a modelled glacial refuge location. Species' distributions need not remain still over such a period of time. The example of *Anoglypta launcestonensis* probably expanding to fill the entirety of

Plomley's Island from a small rainforest refuge in only 18 000 years demonstrates this. Only where a species continues to be confined through a lack of suitable habitat to disperse through, or through very limited dispersal ability (possibly as a result of overspecialisation during prolonged confinement), would it be expected to remain in its exact refuge. Complex interaction between species from different refuges (not only including snails) could also be expected as species expanded outwards when conditions improved. Species once very localised might become widespread, while species formerly widespread might become marginalised by a complex combination of ecological pressures including both changing conditions and the impact of other species. All that could be expected is that if an area was likely to support more localised species at the time of the last glaciation, it is also more likely to have more localised species now, assuming a significant survival rate.

Furthermore, the often large taxonomic differences between some of the locally endemic species involved suggest that these are taxa that have been differentiated for a long time, and the most recent glaciations did not necessarily cause the evolution of these species, but rather were just the last in a long series of major alterations to their ranges. Species may have gone through several cycles of geographically similar contractions into refuges and subsequent expansion during successive glaciations. This particularly applies to distinctive and localised endemics with (apparently) very short ranges, such as *Pasmaditta jungermanniae*, *Roblinella* sp. "Flash Tier", and *Planilaoma* sp. "Pelverata".

An issue in any attempted reconstruction is the significance of the karst endemics. The area of karst in the south-east corner is comparatively small compared to other parts of the state – yet the south-east has most of the known karst endemics in the island. This is not solely an artefact of search effort, as searching in other karsts such as the Florentine Valley, Victoria Pass, Mt Cripps and Mole Creek karsts, has also been considerable. Systematic investigation of all significant karsts remains desirable to determine if local clusters of karst endemics occur elsewhere in the state.

Despite the potential for reconstructions of the habitat to explain clustering of local endemics to some degree, there remains a background rate of local endemic occurrence that available habitat reconstructions will not explain. *Pernagera* sp.

"Waratah", for example, occurs in just a portion of an enormous expanse of rainforest, within an area that would have been alpine during the last glaciation, yet it is not an alpine-adapted species.

5.2 RESERVATION AND CONSERVATION PRIORITIES

The Tasmanian reserve system, including approximately 40% of the state's land area (although approximately 40% of the reserved area is theoretically subject to mining exploration and possible mines; in practice this is rare) has developed in an *ad hoc*, predominantly scenery-based fashion until very recently. In recent decades, and in particular during the Public Land Use Commission and Regional Forest Agreement processes, reservation has become more focused on issues of geographic and habitat-type representativeness. Habitat reservation based on the occurrence or projected occurrence of threatened-listed invertebrates has also become more common, especially in the forestry sector. However, no attempt to assess the adequacy of the reservation system for invertebrates on a systematic basis has ever been made, beyond theoretical claims about whether the system is or is not likely to be adequate.

This section attempts to assess how effective the reserve system is as a conservation mechanism for those species that can be considered to depend upon conservation, and to also assess which species are the most urgent priorities for further reservation. The extinction of any Tasmanian species occurring in a forest setting and having anything but a very small range is unlikely with or without reservation in the short to medium term, because of the existence of networks of small reserves such as streamside reserves and habitat strips and the natural exclusion of logging from areas where logging is unviable. Nevertheless it is plausible that logging policies will lead to long-term declines in local species diversity and in abundance for many species, and it is possible to construct cumulative scenarios leading to eventual extinction if a species' range is small enough (this could even apply to some of the less localised of the locally endemic species). As well as native forest clearfelling (to which some species respond with rapid reinvasion and population booms, while others recover tardily – author's data) conversion of forest blocks to fast-growing short-rotation plantations of pines and eucalypts is a widespread and accelerating land use. Research on the impact of this on Tasmanian land snails has been scarce - Bonham, Mesibov and Bashford (2002) being the sole published example thus far.

Various criteria are available for assessing species to determine whether they are of potential conservation concern. In some threatened species assessment processes, such as those of IUCN (2000), reservation levels (the proportion of each species' habitat that is reserved) are not taken into account except in as much as they may impact upon decline rates. A species declining at a sufficient rate may qualify for listing even if large and clearly viable populations are reserved. In other processes, adequate reservation constitutes one of many potential waivers that may preclude the listing of a species, and if the species meets certain conditions and does not meet any waiver, then it may qualify for listing. The Tasmanian state-level criteria (Scientific Advisory Committee, 1995) are useful for this purpose because the lowest level of assessment (Rare) combines indices of potential conservation concern with waivers to exclude species that are merely localised but not otherwise at risk. A taxon may qualify for Rare status if it:

> "r1: extends less than 100x100 km
> r2: occupies 20 or less 10x10 km Australian Metric Grid Squares
> r3: ... not r1 or r2, but [has] very small or localised populations wherever [it occurs]"

Taxa may then be excluded if they are considered not at risk (in which determination reservation levels are almost invariably relevant), or if they are not "threatened by on-going processes occurring over sufficient of their range to suggest that they would satisfy the indicative criteria for vulnerable unless the threatening process was abated." (The criteria for Vulnerable are similar to those of IUCN (1994) except that the "three generation" rule is not used.)

Here the Rare-level criteria above were used to screen species for potential conservation concern because of their localised or scarce nature. The 49 species listed as local endemics in Section 5.1 all meet criterion r1. Although a further ten species (*Pupilla australis, Tasmaphena quaestiosa, Prolesophanta* sp. "Marriotts", *Pedicamista coesus, Elsothera* sp. "Needles", *Allocharopa* sp. "Franklin", *Pernagera architectonica, Geminoropa antialba, Bischoffena bischoffensis, Magilaoma* sp. "Swallet", *Pernagera* sp. "Paradise", *Paralaoma* sp. "Hartz", *Allocharopa* sp. "Douglas", *Allocharopa* sp. "Teepookana") have 20 or less known grid square records, all are firmly expected to exceed this number with more study and hence do not meet criterion r2. Aside from several of the species that also meet criterion r1, a single species, *Prolesophanta* sp. "Marriotts", is considered to possibly meet criterion r3.

The 50 species evaluated as potential concerns were then grouped as follows:

- Whether there was any known threat to the species that would not be removed if all populations were reserved.
- Whether the existing reservation level based on known populations was:
  (a) full or nearly full (>90%) reservation
  (b) not full or nearly full, but full reservation would not significantly increase species' survival chances
  (c) significant, but full reservation would significantly increase species' survival chances
  (d) insignificant or nonexistent

For the purposes of choosing between (b) and (c) it was assumed that the alternative to full reservation was complete loss of the species from all presently unreserved areas.

The results of these groupings are as follows:

<u>**No known threat that could not be combated by reservation**</u>

Reservation level group (a) (see above): *Victaphanta* "W Arthurs", *Pedicamista* "Bull Hill", *Geminoropa* "Hastings", *Roblinella* "Bubs Hill", *Roblinella* "Mystery", *Roblinella* "Bishop", *Oreomava* "Hibbs", *Thryasona* "Wedge", *Allocharopa* "Mystery Ck", *Allocharopa* "Quarry", *Planilaoma* "Breaksea", *Pasmaditta* "Blue Tier", *Allocharopa* "Ravens Hill",

Group (b): *Austrorhytida* "Raffertys", *Anoglypta launcestonensis, Pedicamista* "Southport", *Allocharopa* "Wellington", *Geminoropa hookeriana, Geminoropa* "Moonlight", *Stenacapha* "Hunter"

Group (b) or (c) (insufficient data to determine which): *Tasmaphena* "Whinray" *Prolesophanta* "Togari", *Prolesophanta* "Francistown", *Prolesophanta* "Marriotts", *Planilaoma* "Pelverata", *Allocharopa* "Pelverata", *Pernagera* "Waratah", *Pillomena* *dandenongensis, Letomola barrenensis, Stenacapha savesi, Allocharopa* "Dromedary", *Pernagera* "Waratah", *Allocharopa* "Junee", *Allocharopa* "Victoria Valley", *Allocharopa* "Sandspit", *Allocharopa* "Christ College"

Group (c): *Tasmaphena lamproides,* Charopidae "Skemps", *Flammulops* cf. *excelsior, Stenacapha* "Flinders", *Helicarion rubicundus, Allocharopa* "Mc Gregors",

Group (d): *Roblinella* "Flash Tier"

<u>Threats that could not be combated by reservation alone exist</u>

Group (a): *Miselaoma weldii, Roblinella agnewi*

Group (a) to (c) (insufficient data to determine which): *Pasmaditta jungermanniae* (probably (a)) , *Austrochloritis victoriae* (probably (b)), *Discocharopa lottah* (probably (b))

Group (d): *Discocharopa vigens* (probably)

Group unknown: *Roblinella roblini*

Threats identified under "other known threats" included insufficient population size, climate change, overburning, and weed and feral invertebrate encroachment.

It is remarkable that only two species that are not feared to be already extinct is not known to be reserved. Also, while species are assigned to group (c) based on the assumption that the lack of further reservation would eventually eliminate them from unreserved land, in some cases (especially *Flammulops* cf. *excelsior*) the species is so hardy in marginal bushland situations such as gullies in road verges, that the assumption is probably invalid. Therefore a group (c) classification is not sufficient to establish the species as under actual threat. Overall, this assessment suggests a good level of reservation for Tasmanian snails generally, with 23 of the 50 species considered to be sufficiently reserved, 8 of 50 insufficiently and the remaining 19 unclear. With more data it is likely that most of these remaining 19 would be found in more reserves and be considered sufficiently reserved. However, this assessment may give an unduly favourable picture of the true situation, because private land has been proportionately under-surveyed, meaning that a local endemic that occurred exclusively on private land would probably have escaped detection. Also, unreserved public land may be slightly undersurveyed compared to reserved land.

It is not possible to objectively compare the value of searching for a species believed possibly extinct in the hope of saving it but with limited chances of finding it, with the value of reserving an extant species. Nonetheless the following, partially subjective, order of management priorities for the known species is suggested:

1. Reserve known live population of *Discocharopa vigens* and locate and reserve more live populations, if any.
2. Locate, and in at least some cases, reserve live populations of *Roblinella* sp. "Flash Tier".
3. Attempt to locate, and reserve wherever located, live populations of *Roblinella roblini.*
4. Survey for presently unknown unreserved populations of *Pasmaditta jungermanniae*, *Discocharopa lottah,* and *Austrochloritis victoriae* and reserve those that are significant.
5. Reserve more populations of *Charopidae* sp. "Skemps", *Tasmaphena lamproides, Helicarion rubicundus, Stenacapha* sp. "Flinders" and *Allocharopa* sp. "McGregor".
6. Examine reservation levels of species for which reservation level is unclear and consider further reservation where likely to be effective.

6. CONCLUSIONS

6.1 BIOGEOGRAPHY

The Tasmanian land snail fauna is one of high diversity at the genus level, but comparatively low diversity at the species level. Some very localised species are very distinctive. These factors suggest either long-term conditions lending themselves to prolific speciation but also frequent extinction, or conditions leading to the marginal persistence of elements that became extinct elsewhere. It is possible that the harshness of the majority of the Tasmanian climate during glaciations, has contributed to a high natural attrition rate within what have at times been more diverse genera. It is also possible that species have in many cases evolved relatively rapidly in response to demanding conditions without diversifying greatly in the process.

To the degree that multiple-species genera exist, a range of biogeographic patterns within genera is present. *Victaphanta*, *Cystopelta*, *Dentherona*, some *Allocharopa*, and most *Prolesophanta* (for example) display parapatry, which is also seen partially or probably in other genera, but sympatry including microsympatry occurs in *Elsothera, Stenacapha* and *Helicarion*, several *Allocharopa* and in both the radial-protoconch *Pernagera* and the non-radial protoconch *Pernagera* (these two groups being very probably different genera). In most of these cases, it is not clear how much environmental sorting there is between sympatric species. If species within these sympatric genera are in competition, this may indicate towards a fauna still responding to habitat changes in the relatively recent past, and not yet close to geographic stability (if such a thing exists).

Tasmanian snails seem to be more akin to other Tasmanian invertebrates than to Tasmanian vertebrates and trees in the way that they respond to the landscape and its history. This suggests that their poor dispersal capacity and (in most cases) forest-dependence are more significant in controlling their distribution than specifically snail-related factors such as high calcium requirements. Unlike mainland Australian environments, Tasmania does not possess many significant known present-day barriers to snail migration, apart from water bodies, and barriers like the Central Plateau, which may block the shortest route between two points for many species, but not all available routes. It helps here that most Tasmanian snails seem to be at least equally successful in closed wet eucalypt forest as in rainforest. A key factor in the habitat quality in closed wet eucalypt forest and riparian wet forest is the presence of the tree species *Olearia argophylla, Pomaderris apetala* and *Bedfordia salicina*, which provide a crumpled leaf litter with a high calcium content and support higher average specimen counts than forests lacking these trees (author's data). As a result, few areas of the state are without areas able to support reasonable land snail diversity, and dispersal for species with good dispersal capacity to all portions of the state is possible, unless a competitor is encountered. The lack of isolated and significant forest patches surrounded by unsuitable habitat has meant that the distribution of local endemics around the state is patchy, with likely patterns in causation and some approximate similarities in ranges, but relatively little tight clustering of localised species.

Given Solem's (1973) conclusions, the fauna of the Bass Strait islands is surprisingly depauperate at species level, especially in comparison to the two major islands closer to the Tasmanian mainland, Bruny and Maria Islands (31 and 19 species respectively despite being smaller than King and Flinders Islands). While the Bass Strait islands were connected to Tasmania and the mainland, it appears that the Bassian Rise would have been cold and arid, and whether the connection assisted the migration of any but the hardiest snails is questionable (this is the likely answer to Smith and Kershaw's (1979) question concerning the failure of the genus *Caryodes* to migrate north). Despite the presence of eucalypt forest on the islands, Kirkpatrick and Fowler (1998) projected that the rainfall on each during the last glaciation was only around 400-600 mm per year – equivalent to the driest areas of Tasmania today. It appears that rainfall levels have an impact on the viability of many species, an impact that is very clearly independent of forest type – the East Coast gaps for *Stenacapha* and *Thryasona*, despite the presence of rainforest within these gaps ,being examples of this. Assuming that harsh conditions causing some extinctions and occurring too recently to have allowed for subsequent speciation, are the main causes of the low diversity on the islands, the main issue that remains is the origin of some of the forms present, in particular the extremely distinctive *Stenacapha* sp. "Flinders" – is this a relic, or a radical *in situ* specialisation?

Both rainforest and karst are far less important to most Tasmanian land snails compared with the general Eastern Australian context. This can be attributed to the mild and moist condition of much of the Tasmanian environment, together with the calcium-rich leaves of the wet forest tree species discussed above. Furthermore the habitat quality of the purest rainforests, especially pure myrtle forests, is compromised by the poor shelter qualities of the litter (author's observations) and the low floristic diversity. Even dry forests can support reasonable site diversity, with around one-sixth of the snail fauna being capable of living in them, but these are mainly common and widespread species, so the variation in species competition between different dry forest sites is low.

Finally, constructing broad bioregional zones is not an entirely productive exercise given that there would be few places in the state where one could travel 50 km without encountering the range boundary of a land snail species. Nonetheless, after commenting on other published bioregionalisations and how applicable these are to snails, it seems reasonable to offer a land snail bioregionalisation of the state (Fig 6.1) based around several of the major features that have been discussed. This snail bioregionalisation has been assembled with the aim of covering boundaries that are more or less common to many snail species while keeping the total number of units reasonably small. Some major features for other invertebrates have therefore been omitted, such as Plomley's Island and the Little Swanport Break, because these are not strong boundaries for a sufficiently large number of snail species. In total, 30 species have boundaries that are closely covered at least once in Fig 6.1, a further 8 are possibly or approximately covered, and the total number of boundaries closely predicted is at least 51, with a further 18 partial or possible. This bioregionalisation is about three times more effective in predicting snail distributions per boundary used than the bioregionalisations already discussed, showing the degree to which snail distribution patterns vary from those of other biota. The snail bioregions shown are not to be considered of equal, or indeed any, snail conservation value – for instance, region 10 has twelve local endemics confined to it, while region 8 has only two.

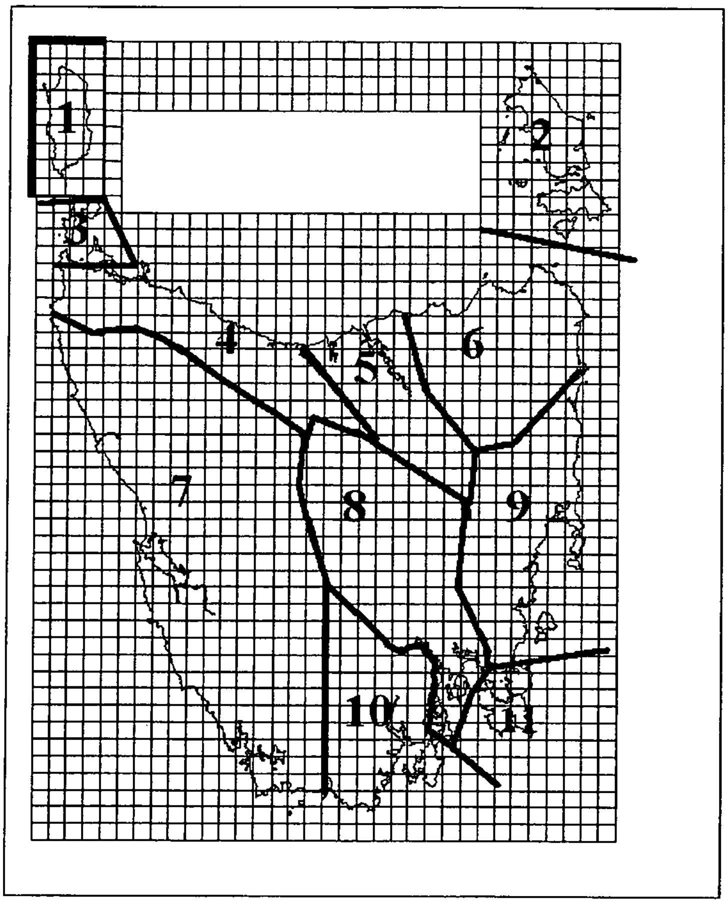


Fig 6.1 A proposed bioregionalisation of the Tasmanian native land snail fauna. 1: King Island, 2: Furneaux Group, 3:Hunter Group, 4: Northwestern Interzone, 5:Tamar Valley, 6: North-East, 7:West, 8:Plateau/South-East, 9:Eastern Tiers, 10:Southern Interzone, 11: Tasman/Forestier Peninsulas

6.2 CONSERVATION

Broad bioregionalisations such as IBRA are likely to be of limited use in Tasmanian snail conservation. This is not only because the response of Tasmanian snails to the environment is fundamentally different from that of the faunal and floral groups used in IBRA, but also because the bioregions are too large and uninformative about process to act as predictors of anything small-scale enough to produce a locally endemic snail. Not only is the distribution of locally endemic snails by bioregion uneven, but the proportion of a bioregion taken up by a given local endemic is likely to be so small that bioregional representation in reserve selection does not greatly increase the chance of securing such a species, compared with random reservation over the whole state. The snail species that can have their ranges effectively conserved through a bioregionalisation and representation approach like that implied by IBRA (or using bioregions specifically suited to snails) are those that typically have ranges of at least 50 km, and are reasonably common – these are unlikely to become serious concerns, although they may just qualify for listing as threatened in some cases.

Unfortunately it is not easy to devise a system that is informative enough about process to accurately predict locations of locally endemic snails. Apart from obvious cases such as island endemics and karst endemics (although even the frequency of these is affected by past events), the exact location of local endemics is not predictable with any accuracy because broad past properties of given areas may give rise to an increased chance of local endemics, but not sufficiently so to say that one or more will occur in any given area. An added complication is that the area most likely to produce local endemics based on past-process considerations, the coastal south-east quarter, has now been so well sampled that nearly all such local endemics have probably been found.

One conclusion that can be drawn is that a local endemic is likely to be a wet forest specialist species. This means that isolated areas of well-established wet forest, particularly near the coast, that have not been surveyed for snails in detail are worthy of attention. Wet forest pockets on Cape Barren Island and the southern Freycinet Peninsula are examples of areas that could easily conceal new species. These areas appear adequately conserved, but in the case of Cape Barren Island, frequent firing may still be changing the landscape. Other highly prospective areas include deep gullies running off the southern parts of the Eastern Tiers, all unsearched gullies of substantial depth in the Tamar Valley region (irrespective of nearby searching intensity) and major wet forest dolerite screes. Isolated karsts in the south-eastern corner, such as recently discovered karsts in the Styx Valley and Riveaux Creek areas, should also be searched for snails so that any local species can be given any extra protection necessary beyond the standard exclusions of logging from karst areas.

Short of surveying the state entirely (and it is common for new species to appear in areas that had already apparently been quite well-searched), the best method of ensuring the survival of unknown snail species would appear to be simply to ensure that the broad clearance of potential locally endemic snail habitat is prevented. All spatially isolated wet forest patches should receive conservation attention in a way that protects both the wettest and most topographically dissected portions of the forest, and also a range of adjacent forest types, until they have been surveyed for forest-dependent invertebrates. The combination of streamside reservation and habitat strips used by the forest industries is an example of this, but each patch of isolated forest needs to be considered on its merits to determine whether the extent of reservation is satisfactory for a hypothetical unknown species to be likely to survive. Isolated wet forests for the purpose of this suggestion may be considered to include remnant blocks of once more regionally extensive forest types, which may preserve remnant populations of once more widespread but still localised species. In some cases, the appropriate conservation response in the case of an isolated small wet forest patch with possible refugial connections, especially where accompanied by topographic dissection, would be to prevent any clearing of the forest block until it had been thoroughly surveyed.

Taxonomic progress is also a powerful tool in protecting invertebrates. During the course of this project, several species that may be of conservation interest were diagnosed or confirmed to be valid, including *Roblinella* sp. "Bishop", *R.* sp. "Flash Tier", *R.* sp. "Mystery", *R.* sp. "Bubs Hill", *Pedicamista* sp. "Bull Hill", *Discocharopa lottah, Roblinella roblini, Victaphanta* sp. "W Arthurs", *Planilaoma* sp. "Pelverata", *Stenacapha* sp. "Flinders". With more research any of these might qualify for listing on Tasmania's threatened species list, and many of them may be more threatened than some well-known species that are currently on the list. Now that they are known to be distinct species and their diagnostic features are established, work can begin (and in some cases has) on attempting to determine their ranges and conservation requirements. Very importantly, most of these species were not discovered in the field during the project, but were diagnosed (or re-diagnosed) based on material previously collected but overlooked. Indeed, *Thryasona* sp. "Wedge" and *Roblinella* sp. "Mystery" are the only two species reported in this project of which no known specimen was held in any collection prior to the project's commencement. Within other invertebrate groups, there is a clear value in targeting taxonomic work towards groups that are reasonably well-sampled but where there are many insufficiently clarified and "variable" species, as this project demonstrates that even a partial (shell features only) study of such species can result in progress. This also applies to snail groups where shell feature analysis was not sufficient to resolve cases of variation that suggested additional species. Systematic genetic and anatomical studies of some of these cases, including *Stenacapha hamiltoni, Helicarion cuvieri* and *Roblinella gadensis* among others, would have potential conservation benefits in potentially diagnosing localised and presently unknown cryptic taxa. Genetic and anatomical studies will also be required to verify some of the *Prolesophanta* and *Allocharopa* species discussed here.

The conservation of future refuges for very long-term conservation has also been widely suggested as a policy measure in response to modelling that demonstrates past refuges, and this study confirms findings from elsewhere that refuges have a role to play in protecting snail diversity. However, this in itself only suggests that in the long term it should be possible for fauna to retreat to the refuge, and for the refuge to be in a suitable floristic condition when they do. It does not mean that temporary disturbances (such as regenerated logging) will always be harmful.

Lastly, the value of access to large specimen sets is clearly demonstrated by the results of this work. There is potential conservation value in encouraging the full sorting of insufficiently processed specimen sets of invertebrates generally, and in ensuring that large specimen sets of invertebrates can be gathered by those sufficiently expert to (even partially) process them.

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8. APPENDICES

8.1 APPENDIX 1: LIST OF GRID SQUARE RECORDS IN MAIN DATABASE BY SPECIES

SPECIES	CELL LOCALITY	SOURCE
Succinea australis	2361 Cape Wickham 2372 6133	KB 12 Dec 96
Succinea australis	2360 Lake Flanigan 2380 6090	KB 12 Dec 96
Succinea australis	2357 Currie 2304 5752	KB 11 Dec 96
Succinea australis	5757 Wybalena 5752 5707	KB 24 Sep 00
Succinea australis	5857	Smith + Kershaw (1981)
Succinea australis	5856	Smith + Kershaw (1981)
Succinea australis	6055	Smith + Kershaw (1981)
Succinea australis	5753 Badger Island	Smith + Kershaw (1981)
Succinea australis	3548 Circular Head	Petterd (1879)
Succinea australis	3647	Smith + Kershaw (1981)
Succinea australis	5547 Waterhouse Point 5537 4780	KB 20 Sep 97
Succinea australis	5346 Bridport	Kershaw (QVM)
Succinea australis	4845 George Town	Petterd (QVM)
Succinea australis	3044 S of Arthur River	Kershaw (QVM)
Succinea australis	4444	Smith + Kershaw (1981)
Succinea australis	4844 Rowella 4889 4430	Brian Smith 1 Oct 94 (QVM)
Succinea australis	4944	Smith + Kershaw (1981)
Succinea australis	5344 Nabowla	Petterd (QVM)
Succinea australis	4443	Smith + Kershaw (1981)
Succinea australis	4643 Port Sorell	Oakden Collection (QVM)
Succinea australis	4943	Smith + Kershaw (1981)
Succinea australis	6143 Georges Bay	Petterd (1879)
Succinea australis	4942 Gravelly Beach	Kershaw (QVM)
Succinea australis	5042 Windermere	Kershaw 1992 (QVM)
Succinea australis	5642 vic. Ringarooma	Petterd (1879)
Succinea australis	6142 Humbug Point 6103 4292	KB 30 Aug 88
Succinea australis	3141 Sandy Cape	D. Obendorf 26 Nov 82 (QVM)
Succinea australis	5041 Trevallyn	Kershaw 1990 (QVM)
Succinea australis	6040 Hendersons Lagoon 6049 4070	KB 22 Sep 96
Succinea australis	5938 Tinmine Creek 5978 3835	Mesibov (Douglas-Apsley survey)
Succinea australis	5232 Oatlands	Legrand (1871)
Succinea australis	5130	Smith + Kershaw (1981)
Succinea australis	5428	Smith + Kershaw (1981)
Succinea australis	5126 Goulds Lagoon 5197 2653	KB 4 Apr 94
Succinea australis	5426	Smith + Kershaw (1981)
Succinea australis	5325	Smith + Kershaw (1981)
Succinea australis	5725 Lagoon Bay	Richardson et al (1991)
Succinea australis	5224 Queenborough	Petterd (1879)
Succinea australis	5324	Smith + Kershaw (1981)
Succinea australis	5424 Clifton Beach 5430 2404	KB 1984
Succinea australis	5524 Sloping Lagoon	Richardson et al (1991)
Succinea australis	5223	Smith + Kershaw (1981)
Succinea australis	5423 Calverts Beach 5404 2364	KB 4 May 86
Succinea australis	5321 Salt Water Creek	Museum of Victoria (QVM)
Succinea australis	5220 Lutregala Marsh 5246 2057	KB 10 Nov 90
Pupilla australis	5757 Wybalena 5752 5707	KB 24 Sep 00
Pupilla australis	5753 Preservation Island	Smith + Kershaw (1981)
Pupilla australis	6042 Humbug Point 6080 4255	KB 27 Oct 90
Pupilla australis	6040 Scamander dunes	George Davis 1971 (TMAG)
Pupilla australis	5833 Swansea	Petterd + Hedley (1909)
Pupilla australis	5933 Nine Mile Beach	Peter Mc Quillan 1998
Pupilla australis	5829 Plain Place Beach 5816 2945	KB 3 Sep 94
Victaphanta milligani	3248 Montagu River	Petterd (1879)

Victaphanta milligani	3147 Sunto Road 3145 4721	KB 6 Sep 00
Victaphanta milligani	3247 Togari Block 3274 4708	KB 7 Sep 92
Victaphanta milligani	3347 Jones Plain 3342 4704	KB 4 Oct 91
Victaphanta milligani	3447 Duck River	Petterd (1879)
Victaphanta milligani	3547 Black River 3563 4707	KB 3 Oct 91
Victaphanta milligani	3146 Bond Tier 3184 4641	KB 17 Sep 92
Victaphanta milligani	3246	Smith + Kershaw (1981)
Victaphanta milligani	3346	Smith + Kershaw (1981)
Victaphanta milligani	3546 East Creek 3508 4681	KB 21 July 99
Victaphanta milligani	3646 Crayfish Creek 3623 4672	KB 2 Oct 99
Victaphanta milligani	3145 Arthur/Frankland Jcn 3128 4503	KB 25 Dec 88
Victaphanta milligani	3245 Leensons Road 3277 4552	KB 24 Oct 98
Victaphanta milligani	3345 Malompto Road 3317 4588	KB 20 July 99
Victaphanta milligani	3445 Trowutta Cave 3410 4519	KB 24 Oct 98
Victaphanta milligani	3745 Meunna 3724 4519	KB 11 May 99
Victaphanta milligani	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Victaphanta milligani	3444 Milkshake Hills 3457 4482	KB 26 Dec 88
Victaphanta milligani	3744 West Takone 3721 4404	KB 13 May 99
Victaphanta milligani	3741 Magnet 3702 4108	Kershaw 7 June 86 (QVM)
Victaphanta milligani	3841 Fingerpost 3841 4105	Mesibov 6 Oct 91 (QVM)
Victaphanta milligani	3640 Luina	A. Keily 5 July 92 (QVM)
Victaphanta milligani	3740 Butler Road 3712 4064	KB 25 Oct 98
Victaphanta milligani	3439 Guthrie Creek 3408 3927	KB 23 Oct 98
Victaphanta milligani	3839	Smith + Kershaw (1981)
Victaphanta milligani	3939 Mt Cripps 3970 3924	C. Reid 23 Sep 00 (QVM)
Victaphanta milligani	3238 Corinna 3275 3898	Kershaw 8 June 86 (QVM)
Victaphanta milligani	3338 Pieman River 3397 3855	KB 23 Oct 98
Victaphanta milligani	3438 Wilsons Road 3401 3816	KB 23 Oct 98
Victaphanta milligani	3638	Smith + Kershaw (1981)
Victaphanta milligani	3938	Smith + Kershaw (1981)
Victaphanta milligani	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Victaphanta milligani	3637	Smith + Kershaw (1981)
Victaphanta milligani	3837 Anthony Road 3868 3707	KB 25 Oct 98
Victaphanta milligani	4137 Oakleigh Creek 4197 3700	KB 9 Jan 1991
Victaphanta milligani	3836 Anthony Road 3854 3680	Coy et al (1993)
Victaphanta milligani	4136 Oakleigh Creek 4197 3699	KB 9 Jan 1991
Victaphanta milligani	4236 Lake Ayr track 4218 3688	KB 12 Jan 1991
Victaphanta milligani	3635 Zeehan 3688 3580	Kershaw 2 Apr 88 (QVM)
Victaphanta milligani	4235 Cynthia Bay 4234 3502	KB 20 Mar 93
Victaphanta milligani	3734 Yolande River 3764 3471	Kershaw 2 Apr 88 (QVM)
Victaphanta milligani	4234 Cynthia Bay 4245 3487	KB 20 Mar 93
Victaphanta milligani	3533 Strahan 3564 3324	Kershaw 3 Apr 88
Victaphanta milligani	3633 Hogarth Falls 3633 3318	KB 12 June 96
Victaphanta milligani	3733 Newall Creek 3789 3311	Mesibov 27 Dec 93 (QVM)
Victaphanta milligani	3933 Nelson Falls 3953 3382	KB 27 Jan 00
Victaphanta milligani	4033 Collingwood River	Arthur Clarke c.1988
Victaphanta milligani	3632 Teepookana 3655 3273	KB 13 June 96
Victaphanta milligani	3832 Darwin Crater 3857 3239	Mesibov 27 Dec 93 (QVM)
Victaphanta milligani	4132 Frenchmans Cap track 4125 322	KB 28 Jan 00
Victaphanta milligani	4232 King William Saddle 4253 3260	Mesibov 17 Feb 94 (QVM)
Victaphanta milligani	3831 Darwin Crater	K. Howard 2001
Victaphanta milligani	3730 Sarah Island	Legrand (1871)
Victaphanta milligani	3830	Smith + Kershaw (1981)
Victaphanta milligani	3729 Birch Inlet	Petterd (1879)
Victaphanta milligani	3829 Pine Landing 3858 2994	KB 27 Jan 00
Victaphanta milligani	4029 Lower Gordon survey	Smith + Kershaw (1981)

Victaphanta milligani	3628 Hibbs Lagoon 3621 2857	Steve Smith 8 Jan 87 (QVM)
Victaphanta milligani	3728 Hobbs Creek 3752 2878	KB 1 Mar 00
Victaphanta milligani	3928 Sir John Falls	J. Moore 9 Jan 88 (QVM)
Victaphanta milligani	4028 Lower Gordon survey	Smith + Kershaw (1981)
Victaphanta milligani	4027 Lower Gordon survey	Smith + Kershaw (1981)
Victaphanta milligani	4127 Lower Gordon survey	Smith + Kershaw (1981)
Victaphanta milligani	4026 Lower Gordon survey	Smith + Kershaw (1981)
Victaphanta milligani	4126 Serpentine Dam 4173 2655	KB 27 Jan 01
Victaphanta milligani	4025 Lower Gordon survey	Smith + Kershaw (1981)
Victaphanta milligani	4423 Scotts Peak 4440 2342	Don Driscoll Nov 01
Victaphanta milligani	4021 Paradise Lagoon 4043 2109	Steve Smith 13 Feb 87 (QVM)
Victaphanta milligani	4121 Payne Bay	Smith + Kershaw (1981)
Victaphanta milligani	4020	Smith + Kershaw (1981)
Victaphanta milligani	4220	Smith + Kershaw (1981)
Victaphanta milligani	4320 Bathurst Harbour	Petterd (1879)
Victaphanta milligani	4420 Collins River/Old River	Neboiss + Jackson (QVM)
Victaphanta milligani	4219 Melaleuca Inlet 4298 1956	KB 15 Jan 91
Victaphanta milligani	4319 Melaleuca 4323 1923	KB 14 Jan 91
Victaphanta lampra	3547 Wahroonga 3563 4743	KB 2 Oct 99
Victaphanta lampra	3647 Harris Creek 3608 4707	KB 2 Oct 99
Victaphanta lampra	3546 Deep Creek 3514 4697	KB 21 July 99
Victaphanta lampra	3646 Crayfish Creek 3623 4672	KB 2 Oct 99
Victaphanta lampra	4045 Burnie Fern Glade 4094 4506	KB 10 Jun 96
Victaphanta lampra	5345 Duncraggin Hill 5310 4518	Mesibov 7 Jan 94 (QVM)
Victaphanta lampra	5545 Mount Horror 5598 4507	Kershaw 14 Sep 85 (QVM)
Victaphanta lampra	5645 Mount Horror 5605 4505	KB 10 Jan 96
Victaphanta lampra	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Victaphanta lampra	4144 Ferndene 4188 4447	KB 30 Sep 91
Victaphanta lampra	4244 Paton Park 4240 4420	KB 27 Mar 99
Victaphanta lampra	4744 York Town (Asbestos Rd)	Brian Smith 21 June 94 (QVM)
Victaphanta lampra	4844	Smith + Kershaw (1981)
Victaphanta lampra	4944 Land O' Cakes Ck 4986 4482	KB 17 Mar 01
Victaphanta lampra	5144 Retreat 5142 4435	KB 26 Nov 00
Victaphanta lampra	5244	Smith + Kershaw (1981)
Victaphanta lampra	5344 Blumont 5321 4400	KB 11 Feb 02
Victaphanta lampra	5444	Smith + Kershaw (1981)
Victaphanta lampra	5544 Mt Stronach 5502 4442	KB 19 Jan 96
Victaphanta lampra	5644	Smith + Kershaw (1981)
Victaphanta lampra	5744 Frome Road 5773 4430	KB 22 Jan 96
Victaphanta lampra	5844 Blue Tier 5846 4402	KB 23 Jan 96
Victaphanta lampra	5944 Tinkle Creek 5909 4458	KB 18 Jan 00
Victaphanta lampra	3843 Hellyer Gorge	Petterd (TMAG)
Victaphanta lampra	4243 Isandula 4264 4308	KB 30 Apr 99
Victaphanta lampra	4343 Champion Park 4337 4370	KB 26 Mar 95
Victaphanta lampra	4743 Dalgarth FR 4722 4325	Earthworm Surv 30 June 92 (QVM)
Victaphanta lampra	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Victaphanta lampra	4943 Norfolk Reach 4937 4321	KB 11 Jan 97
Victaphanta lampra	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Victaphanta lampra	5243 Mount Arthur 5250 4313	KB 5 Feb 96
Victaphanta lampra	5343 Sideling 5357 4331	KB 2 Feb 96
Victaphanta lampra	5443 Mount Helen 5430 4307	KB 9 Jan 96
Victaphanta lampra	5543 Hogarth Rivulet 5516 4343	KB 10 Jan 96
Victaphanta lampra	5643 Gold Creek 5681 4384	KB 30 Jan 96
Victaphanta lampra	5743 Weldborough 5794 4367	KB 24 Jan 96
Victaphanta lampra	5843 Murdochs Road 5892 4397	KB 31 Jan 96

Victaphanta lampra	5943 Terrys Hill 5925 4337	KB 31 Jan 96
Victaphanta lampra	4042 Surrey Hills	Petterd (1879)
Victaphanta lampra	4342 Castra 4304 4274	D'Orazio 1 Feb 93 (QVM)
Victaphanta lampra	4542	Smith + Kershaw (1981)
Victaphanta lampra	4842 Dunkards Creek 4862 4259	KB 8 Mar 97
Victaphanta lampra	4942 Notley Gorge 4925 4216	KB 5 Oct 91
Victaphanta lampra	5042 Windermere	Mrs Eddie (QVM)
Victaphanta lampra	5142 Hollybank 5175 4276	KB 12 Aug 95
Victaphanta lampra	5242	Smith + Kershaw (1981)
Victaphanta lampra	5342 Barrow Falls 5328 4215	KB 8 Jan 96
Victaphanta lampra	5442 Mount Maurice 5452 4262	KB 9 Jan 96
Victaphanta lampra	5542 Maurice Road 5505 4245	KB 12 Jan 96
Victaphanta lampra	5642 Mathinna Plains 5604 4221	KB 11 Jan 96
Victaphanta lampra	5742 Mount Victoria 5712 4223	KB 17 Jan 96
Victaphanta lampra	5842 Rayners Hill 5880 4223	KB 1 Feb 96
Victaphanta lampra	5942 Toms Gully 5904 4219	KB 21 Sept 96
Victaphanta lampra	4141 Black Bluff 4125 4105	Scott Nov 96 (QVM)
Victaphanta lampra	4341 Mt Roland	Deloraine Field Naturalists
Victaphanta lampra	4441 Beulah	Holloway 17 Apr 94 (QVM)
Victaphanta lampra	4841 Black Sugarloaf 4828 4171	KB 8 Mar 97
Victaphanta lampra	4941 Ecclestone Road	Kershaw 4 July 85 (QVM)
Victaphanta lampra	5041 Cataract Gorge 5094 4110	KB 10 June 90
Victaphanta lampra	5141 Launceston	Petterd (1879)
Victaphanta lampra	5241	Smith + Kershaw (1981)
Victaphanta lampra	5341 Mount Barrow 5358 4198	KB 8 Jan 96
Victaphanta lampra	5441 Sunset Ridge 5445 4198	KB 6 Feb 96
Victaphanta lampra	5541 Tombstone Creek 5570 4168	KB 11 Jan 96
Victaphanta lampra	5641 Mathinna Plains 5623 4196	KB 11 Jan 96
Victaphanta lampra	5741 Mathinna Falls 5751 4174	KB 15 Jan 96
Victaphanta lampra	5841 Evercreech 5813 4161	KB 15 Jan 96
Victaphanta lampra	4440 Eel Hole Creek 4461 4058	Mesibov 16 Dec 91 (QVM)
Victaphanta lampra	4540 Garden of Eden Creek 4532 408	KB 31 Jan 93
Victaphanta lampra	4640 Christmas Hill 4678 4097	Mesibov 9 Sep 01 (QVM)
Victaphanta lampra	5040	Smith + Kershaw (1981)
Victaphanta lampra	5140 Kate Reed SRA 5124 4074	KB 31 Aug 01
Victaphanta lampra	5340 Blessington 5320 4075	Mesibov 19 Nov 95 (QVM)
Victaphanta lampra	5540 Abrahams Creek 5581 4077	KB 7 Feb 96
Victaphanta lampra	5940 South Sister 5977 4011	KB 4 Sep 88
Victaphanta lampra	3939 Mt Cripps	Arthur Clarke 1997
Victaphanta lampra	4239 Gads Hill	Petterd (1879)
Victaphanta lampra	4339 Gads Hill	Petterd (1879)
Victaphanta lampra	4439 Marakoopa Cave 4408 3968	KB 30 Mar 86
Victaphanta lampra	4539	Smith + Kershaw (1981)
Victaphanta lampra	5539 Ben Lomond Rivulet 5525 3914	KB 31 Dec 98
Victaphanta lampra	5639 Tower Hill 5698 3988	Finnigan/Soccol 7 Dec 93 (QVM)
Victaphanta lampra	5739 Tower Hill 5709 3984	KB 31 Dec 98
Victaphanta lampra	5939	Smith + Kershaw (1981)
Victaphanta lampra	6039 St Marys Pass 6005 3987	KB 28 Aug 88
Victaphanta lampra	4838 Liffey Falls 4802 3834	KB 28 Mar 99
Victaphanta lampra	5538 Castle Cary 5585 3824	KB 30 Dec 98
Victaphanta lampra	5638 Storys Creek	Kershaw 1974 (QVM)
Victaphanta lampra	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Victaphanta lampra	6038	Mesibov (Douglas-Apsley survey)
Victaphanta lampra	5437 Avoca 5492 3791	D'Orazio 19 Oct 93 (QVM)
Victaphanta lampra	5537 Buffalo Brook Avoca	T. Kingston 19 Oct 93 (QVM)
Victaphanta lampra	5937	Mesibov (Douglas-Apsley survey)

Victaphanta lampra	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Victaphanta lampra	5936	Mesibov (Douglas-Apsley survey)
Victaphanta lampra	6036	Mesibov (Douglas-Apsley survey)
Victaphanta lampra	5535 Lake Leake Rd	Bill Mollison 1964 (TMAG)
Victaphanta lampra	5735 Meetus Falls	Roy Crookshanks 1997
Victaphanta lampra	5634 Lake Leake 5657 3492	KB 5 July 00
Victaphanta lampra	5733 Big Sassy Creek 5746 3332	KB 23 Nov 97
Victaphanta lampra	5731 Tiger Creek 5701 3193	Mesibov 7 Oct 01
Victaphanta "W Arthurs"	4523 Schnells Ridge	QVM staffer 2003
Victaphanta "W Arthurs"	4623 Mt Weld 4655 2383	Doran/Bashford 2002 (QVM)
Victaphanta "W Arthurs"	4422 Western Arthurs	David de Little Dec 72 (TMAG)
Victaphanta "W Arthurs"	4517 Ironbound Range	QVM staffer 2003
Tasmaphena sinclairi	3747 Rocky Cape	Petterd (1879)
Tasmaphena sinclairi	3646 Black River	Petterd (1879)
Tasmaphena sinclairi	3946 Table Cape (as T. lamproides)	Petterd (1879)
Tasmaphena sinclairi	4045 Burnie (Emu Bay)	Petterd (1879)
Tasmaphena sinclairi	4144 The Gnomon 4190 4409	KB 28 Mar 99
Tasmaphena sinclairi	4244 Paton Park 4240 4420	KB 27 Mar 99
Tasmaphena sinclairi	4844	Smith + Kershaw (1981)
Tasmaphena sinclairi	4243 Isandula 4264 4308	KB 30 Apr 99
Tasmaphena sinclairi	4343 Champion Park 4337 4370	KB 26 Mar 95
Tasmaphena sinclairi	4443 Torquay	Petterd (1879)
Tasmaphena sinclairi	4643 Frankford Road 4645 4341	Kershaw 9 June 86 (QVM)
Tasmaphena sinclairi	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Tasmaphena sinclairi	3842 Surrey Hills	Petterd (1879)
Tasmaphena sinclairi	4142 Leven River	Petterd (1879)
Tasmaphena sinclairi	4342 Castra 4306 4295	D'Orazio 2 Feb 93 (QVM)
Tasmaphena sinclairi	4442 Railton 4475 4253	Mesibov 29 Aug 92 (QVM)
Tasmaphena sinclairi	4542 Railton 4507 4268	KB 30 Sep 91
Tasmaphena sinclairi	4842	Smith + Kershaw (1981)
Tasmaphena sinclairi	4942 Notley Gorge 4926 4219	Kershaw 8 Nov 84 (QVM)
Tasmaphena sinclairi	3741 Mt Bischoff	Petterd (1879)
Tasmaphena sinclairi	3841 Mt Bischoff	Petterd (1879)
Tasmaphena sinclairi	5041	Smith + Kershaw (1981)
Tasmaphena sinclairi	4140	Smith + Kershaw (1981)
Tasmaphena sinclairi	4240	Smith + Kershaw (1981)
Tasmaphena sinclairi	4640 Lobster Falls 4608 4008	D'Orazio 1 Sep 92 (QVM)
Tasmaphena sinclairi	3939 Mt Cripps	Mesibov 1994
Tasmaphena sinclairi	4139 Middlesex Plains	Smith + Kershaw (1981)
Tasmaphena sinclairi	4239 Gads Hill	Petterd (1879)
Tasmaphena sinclairi	4439 Sensation Gorge 4442 3992	D'Orazio 2 Sep 92 (QVM)
Tasmaphena sinclairi	4539 Chudleigh	Petterd (1879)
Tasmaphena sinclairi	4639 Montana 4682 3970	Mesibov 24 Aug 97
Tasmaphena sinclairi	4338 Arm River 4344 3843	KB 21 Sep 01
Tasmaphena sinclairi	4638	Smith + Kershaw (1981)
Tasmaphena sinclairi	4738 Projection Bluff 4770 3812	KB 29 Mar 98
Tasmaphena sinclairi	4838 Liffey	Bruce Worth c.1994
Tasmaphena sinclairi	4137 Oakleigh Creek 4185 3733	KB 9 Jan 91
Tasmaphena sinclairi	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Tasmaphena sinclairi	4737 Pine Lake 4758 3783	KB 14 May 92
Tasmaphena sinclairi	4736 Split Rock 4722 3644	KB 11 May 92
Tasmaphena sinclairi	3935	Smith + Kershaw (1981)
Tasmaphena sinclairi	4935 Arthurs Lake	Jeff Campbell 1980s
Tasmaphena sinclairi	5035 Snowy Knob 5017 4533	KB 12 Sep 98

Tasmaphena sinclairi	4234 Cynthia Bay 4245 3487	KB 20 Mar 93
Tasmaphena sinclairi	3633	Smith + Kershaw (1981)
Tasmaphena sinclairi	3933 Bubs Hill	Arthur Clarke 1987
Tasmaphena sinclairi	4333	Smith + Kershaw (1981)
Tasmaphena sinclairi	4132 Franklin River 4190 3258	KB 25 Oct 98
Tasmaphena sinclairi	4232	Smith + Kershaw (1981)
Tasmaphena sinclairi	4432 Butlers Gorge 4408 3215	KB 31 Jan 99
Tasmaphena sinclairi	4431 Tarraleah 4474 3162	Mesibov 15 Apr 92 (QVM)
Tasmaphena sinclairi	4631 Glenmark 4695 3190	KB 28 Dec 97
Tasmaphena sinclairi	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Tasmaphena sinclairi	3730	Smith + Kershaw (1981)
Tasmaphena sinclairi	3830	Smith + Kershaw (1981)
Tasmaphena sinclairi	4530 Wayatinah 4593 3097	KB 26 Jan 99
Tasmaphena sinclairi	4529 Tiger Road 4546 2949	KB 31 Jan 99
Tasmaphena sinclairi	4629 Mt Thunderbolt 4640 2970	O. Seeman May 00 (QVM)
Tasmaphena sinclairi	5928 Mt Maria	Mesibov (TMAG)
Tasmaphena sinclairi	3927	Smith + Kershaw (1981)
Tasmaphena sinclairi	4127	Smith + Kershaw (1981)
Tasmaphena sinclairi	4327 Clear Hill 4398 2740	KB 15 Mar 98
Tasmaphena sinclairi	4527 Growling Swallet 4590 2740	KB 20 Aug 89
Tasmaphena sinclairi	4627 Lake Dobson 4666 2740	KB 6 May 01
Tasmaphena sinclairi	4727 Lady Barron Falls 4760 2738	KB 17 Nov 85
Tasmaphena sinclairi	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Tasmaphena sinclairi	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Tasmaphena sinclairi	5427 Wilsons Ridge 5487 2733	KB 9 Aug 98
Tasmaphena sinclairi	5927	Smith + Kershaw (1981)
Tasmaphena sinclairi	4026	Smith + Kershaw (1981)
Tasmaphena sinclairi	4126 Serpentine Dam 4173 2655	KB 27 Jan 01
Tasmaphena sinclairi	4426 Ragged Range 4443 2626	KB 15 Mar 98
Tasmaphena sinclairi	4526 Needles Shelter 4514 2655	KB 1 Dec 92
Tasmaphena sinclairi	4626 Junee Cave 4668 2681	KB 15 Mar 98
Tasmaphena sinclairi	4726 Andromeda Creek	Andrew Walsh 1998
Tasmaphena sinclairi	5126 Mt Dromedary 5103 2697	KB 13 Nov 95
Tasmaphena sinclairi	4325 McPartlan Pass 4365 2540	Don Driscoll Nov 01
Tasmaphena sinclairi	4525	Smith + Kershaw (1981)
Tasmaphena sinclairi	4725 Styx River 4746 2581	KB 9 Dec 01
Tasmaphena sinclairi	5025 Illa Brook 5052 2564	KB 3 June 95
Tasmaphena sinclairi	5125 Organ Pipes Mt W 5197 2509	KB 14 Feb 89
Tasmaphena sinclairi	5225 Myrtle Gully Mt W 5214 2505	KB 8 Oct 88
Tasmaphena sinclairi	5725 Lagoon Bay 5782 2524	KB 8 Oct 94
Tasmaphena sinclairi	4424 Manuka Swamp (as Manuka Ck)	Kershaw Nov 75 (QVM)
Tasmaphena sinclairi	4524	Smith + Kershaw (1981)
Tasmaphena sinclairi	4624	Smith + Kershaw (1981)
Tasmaphena sinclairi	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Tasmaphena sinclairi	4824 Judbury 4820 2479	D'Orazio 16 Nov 92 (QVM)
Tasmaphena sinclairi	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Tasmaphena sinclairi	5124 Lenah Valley Track 5198 2484	KB 26 Jan 86
Tasmaphena sinclairi	5224 Shoobridge Track 5204 2491	KB 26 Jan 86
Tasmaphena sinclairi	5524 Coal Mines 5584 2404	KB 31 Aug 86
Tasmaphena sinclairi	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Tasmaphena sinclairi	4423 Mt Anne	Legrand (1871)
Tasmaphena sinclairi	4623 Mt Weld 4655 2383	Doran/Bashford 2002 (QVM)
Tasmaphena sinclairi	4723 Edwards Road 4796 2303	KB 19 Aug 01
Tasmaphena sinclairi	4823 Bracken Ridge 4897 2308	Bashford 17 Jan 96 (QVM)
Tasmaphena sinclairi	4923 New Road Franklin 4950 2309	KB 26 Nov 89
Tasmaphena sinclairi	5123 Snug Tiers 5153 2320	KB 26 Oct 86

Tasmaphena sinclairi	5223 Margate	Legrand (1871)
Tasmaphena sinclairi	5723 Camp Falls 5772 2315	KB 27 Oct 85
Tasmaphena sinclairi	4622 Blakes Opening 4696 2287	KB 5 Apr 98
Tasmaphena sinclairi	4722 Tahune Park 4772 2284	KB 6 Apr 86
Tasmaphena sinclairi	4822 Lidgerwood Rd 4868 2246	KB 11 Feb 95
Tasmaphena sinclairi	4922	Smith + Kershaw (1981)
Tasmaphena sinclairi	5022 Tobys Hill 5098 2223	KB 30 Sep 00
Tasmaphena sinclairi	5122 Snug Tiers 5125 2297	KB 7 May 94
Tasmaphena sinclairi	5622 Benjafields Ridge 6607 2228	Tim Kingston 9 Sep 92 (QVM)
Tasmaphena sinclairi	5722 Fortescue Bay 5785 2226	KB 13 Jan 86
Tasmaphena sinclairi	4821 Kermandie Track	D. Ratkowsky + G. Gates
Tasmaphena sinclairi	5220	Smith + Kershaw (1981)
Tasmaphena sinclairi	4219 Bathurst Harbour	Petterd (1879)
Tasmaphena sinclairi	4319 Celery Top Islands 4314 1964	KB 18 Jan 91
Tasmaphena sinclairi	4819 Hastings Caves 4879 1957	KB 27 Dec 85
Tasmaphena sinclairi	4919 Jacksons Creek 4970 1958	KB 24 Nov 00
Tasmaphena sinclairi	5219 Mt Mangana 5232 1985	KB 13 Jan 86
Tasmaphena sinclairi	4518 New River 4592 1802	Mesibov 26 Jan 94 (QVM)
Tasmaphena sinclairi	4618 Precipitous Bluff	Arthur Clarke 1988
Tasmaphena sinclairi	4818 Mystery Creek Cave 4876 1878	KB 11 Nov 87
Tasmaphena sinclairi	4918	Smith + Kershaw (1981)
Tasmaphena sinclairi	4817 South Cape Bay 4871 1716	KB 12 Mar 00
Tasmaphena sinclairi	4917 Rescherche Bay	Petterd (1879)
Tasmaphena ruga	4045 Burnie (Emu Bay)	Petterd (1879)
Tasmaphena ruga	4244	Smith + Kershaw (1981)
Tasmaphena ruga	4644	Smith + Kershaw (1981)
Tasmaphena ruga	5444 Mt Stronach	Brian Smith (QVM)
Tasmaphena ruga	5142 Prossers Forest 5147 4236	KB 12 Aug 95
Tasmaphena ruga	4341	Smith + Kershaw (1981)
Tasmaphena ruga	5041 Cataract Gorge	Ron Kershaw
Tasmaphena ruga	5141 Launceston	Petterd (1879)
Tasmaphena ruga	5440 Ben Lomond	Petterd (1879)
Tasmaphena ruga	4738 Quamby Bluff	Petterd (1879)
Tasmaphena ruga	5838 Fingal	QVM (unsorted)
Tasmaphena ruga	5237 Epping Forest	Bob Mesibov
Tasmaphena ruga	5734 Hallam Cave	Roy Crookshanks 1998
Tasmaphena ruga	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Tasmaphena ruga	6033 Wineglass Bay 6069 3308	KB 15 Jan 00
Tasmaphena ruga	5832 Mayfield Bay 5835 3225	KB 10 Feb 02
Tasmaphena ruga	6032 Hazards Beach 6067 3279	KB Easter 85
Tasmaphena ruga	5731 Sassafras Hill	Bob Mesibov
Tasmaphena ruga	6031 Schouten Island	Rob Taylor
Tasmaphena ruga	5529	Smith + Kershaw (1981)
Tasmaphena ruga	4828 Hamilton	Petterd (1879)
Tasmaphena ruga	4928 Gretna 4910 2840	KB 20 Aug 88
Tasmaphena ruga	5528 Prossers Plains	Petterd (1879)
Tasmaphena ruga	5628 Prosser River 5699 2880	KB 26 July 98
Tasmaphena ruga	5728 Prosser River 5709 2880	KB 26 July 98
Tasmaphena ruga	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Tasmaphena ruga	5928 Bishop + Clerk 5915 2841	KB 23 Mar 96
Tasmaphena ruga	5427 Pawleena 5497 2707	KB 9 Aug 98
Tasmaphena ruga	5527 Bust-Me-Gall Hill 5512 2797	KB 10 Feb 02
Tasmaphena ruga	5727 Wielangta 5704 2727	KB 3 Sep 94
Tasmaphena ruga	5827	Smith + Kershaw (1981)
Tasmaphena ruga	5226 Catchpole Gully 5284 2627	KB 7 June 90

Tasmaphena ruga	5326	Smith + Kershaw (1981)
Tasmaphena ruga	5426 Sorell	Petterd (1879)
Tasmaphena ruga	5526 White Hill 5556 2613	KB 24 Feb 02
Tasmaphena ruga	5626 Kellevie 5648 2663	KB 15 July 90
Tasmaphena ruga	5726 Bream Creek 5708 2639	KB 14 Nov 92
Tasmaphena ruga	5125 Goat Hills 5180 2570	KB 20 Dec 88
Tasmaphena ruga	5225 Knocklofty 5240 2521	KB 17 Apr 00
Tasmaphena ruga	5325 Craigow Hill 5335 2595	KB 9 Oct 93
Tasmaphena ruga	5725 Lagoon Bay 5745 2556	KB 8 Oct 94
Tasmaphena ruga	5224 Chimney Pot Hill 5228 2483	KB 29 Dec 00
Tasmaphena ruga	5324	Smith + Kershaw (1981)
Tasmaphena ruga	5223 Margate	Petterd (1879)
Tasmaphena ruga	5323 Gellibrand Road 5391 2372	KB 4 May 86
Tasmaphena ruga	5222 McCrackens Ck 5294 2245	KB 8 Aug 92
Tasmaphena ruga	5321 Church Hill 5328 2125	KB 4 Aug 00
Tasmaphena quaestiosa	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Tasmaphena quaestiosa	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Tasmaphena quaestiosa	6038 Thompsons Marshes 6016 3828	Mesibov 9 June 88 (QVM)
Tasmaphena quaestiosa	5637 St Pauls Dome	Mesibov 28 Nov 01
Tasmaphena quaestiosa	5937 Organ Hill 5975 3732	Mesibov 31 July 88 (QVM)
Tasmaphena quaestiosa	6037 Nicholls Cap 6013 3762	Mesibov 20 June 88 (QVM)
Tasmaphena quaestiosa	5936 Apsley River	Mesibov (QVM)
Tasmaphena quaestiosa	6036 Denison Rivulet	Mesibov (QVM)
Tasmaphena quaestiosa	5734 Lost Falls 5736 3450	KB 28 Apr 01
Tasmaphena quaestiosa	6033 Coles Bay	Roy Crookshanks
Tasmaphena quaestiosa	5632 Tooms White Gum 5693 3234	KB 23 Nov 97
Tasmaphena quaestiosa	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Tasmaphena quaestiosa	5630 Maclaines Creek 5691 3013	Mesibov 15 Apr 91 (QVM)
Tasmaphena quaestiosa	5429 Mount Hobbs 5483 2924	KB 5 July 98
Tasmaphena quaestiosa	5629 Buckland 5696 2961	Mesibov 17 Apr 91 (QVM)
Tasmaphena quaestiosa	5728 Thumbs 5723 2826	KB 2 Mar 01
Tasmaphena quaestiosa	5527 Nelsons Tier 5559 2712	KB 9 Aug 98
Tasmaphena quaestiosa	5627 Sandspit River 5690 2711	KB 6 Oct 90
Tasmaphena quaestiosa	5727 Wielangta 5704 2727	KB 3 Sep 94
Tasmaphena quaestiosa	5626 Wielangta Road 5687 2683	KB 1 Apr 91
Tasmaphena "whinrayi"	5759 Palana	Phil Colman (Aust Mus)
Tasmaphena "whinrayi"	5859 NorthEast River 5819 5994	KB 24 Sep 00
Tasmaphena "whinrayi"	5658 Mt Tanner	Brian Smith 11 Nov 95 (QVM)
Tasmaphena "whinrayi"	5757 Wybalena 5752 5707	KB 24 Sep 00
Tasmaphena "whinrayi"	5857	Smith + Kershaw (1981)
Tasmaphena "whinrayi"	5957 Memana	Phil Colman (Aust Mus)
Tasmaphena "whinrayi"	5856 Blue Rocks 5807 5652	KB 4 Sep 87
Tasmaphena "whinrayi"	5855	Smith + Kershaw (1981)
Tasmaphena "whinrayi"	5854 Trousers Point 5874 5463	KB 23 Sep 00
Austrorhytida "Raffertys"	2460 Pennys Lagoon 2491 6060	KB 14 Dec 96
Austrorhytida "Raffertys"	2358 Porky Lagoon	Johnston (1886)
Austrorhytida "Raffertys"	2457 Zwar Creek 2490 5785	KB 16 Dec 96
Austrorhytida "Raffertys"	2557 Raffertys Creek 2511 5781	KB 12 Dec 96
Austrorhytida "Raffertys"	2456 Gentle Annie 2456 5636	KB 15 Dec 96
Austrorhytida "Raffertys"	2556 Yarra Creek 2524 5673	KB 13 Dec 96
Austrorhytida "Raffertys"	2355 Seal River 2387 5592	KB 16 Dec 96
Austrorhytida "Raffertys"	2455 Red Hut Road 2438 5573	KB 17 Dec 96

Tasmaphena lamproides	3252 Three Hummock Is. 3252 5242	KB 1 Feb 97
Tasmaphena lamproides	3251 Three Hummock Is. 3218 5174	KB 31 Jan 97
Tasmaphena lamproides	3049 Woolnorth Point 3070 4941	KB 5 Sep 00
Tasmaphena lamproides	3248 Boundary Road 3201 4808	Mitch Roberts 26 June 98
Tasmaphena lamproides	3548 The Nut 3571 4860	KB 13 May 98
Tasmaphena lamproides	3147 Flewin Road 3130 4721	KB 6 Sep 00
Tasmaphena lamproides	3247 Togari Block 3273 4734	KB 7 Sep 92
Tasmaphena lamproides	3347 Togari Block 3303 4726	KB 8 Sep 92
Tasmaphena lamproides	3447 Lake Mikany 3475 4714	KB 23 July 99
Tasmaphena lamproides	3146 Bond Tier 3184 4641	KB 17 Sep 92
Tasmaphena lamproides	3246 Togari Block 3247 4638	KB 16 Sep 92
Tasmaphena lamproides	3346 Christmas Hills 3309 4693	FPB files 28 Mar 01
Tasmaphena lamproides	3446 Edith Creek 3422 4640	Mesibov 25 Nov 91
Tasmaphena lamproides	3145 Arthur/Frankland 3128 4503	KB 25 Dec 99
Tasmaphena lamproides	3245 Lerunna Loop 3222 4558	KB 22 July 99
Prolesophanta nelsonensis	4743 Saxon Creek 4720 4310	Kershaw Feb 1969 (QVM)
Prolesophanta nelsonensis	4742	Smith + Kershaw (1981)
Prolesophanta nelsonensis	4842 Frankford	Kershaw Nov 69 (QVM)
Prolesophanta nelsonensis	5942 Ericksons Road 5938 4253	KB 11 Jun 88
Prolesophanta nelsonensis	4241	Smith + Kershaw (1981)
Prolesophanta nelsonensis	5041 Cataract Gorge 5094 4110	KB 10 June 90
Prolesophanta nelsonensis	5141 Cataract Gorge 5102 4119	KB 25 Mar 89
Prolesophanta nelsonensis	6041 Loila Tier 6035 4177	KB 21 Sep 96
Prolesophanta nelsonensis	4040 Lake Lea	Petterd (1879)
Prolesophanta nelsonensis	4140 Lake Lea	Petterd (1879)
Prolesophanta nelsonensis	4240	Smith + Kershaw (1981)
Prolesophanta nelsonensis	5040	Smith + Kershaw (1981)
Prolesophanta nelsonensis	4139	Smith + Kershaw (1981)
Prolesophanta nelsonensis	4339	Smith + Kershaw (1981)
Prolesophanta nelsonensis	4439	Smith + Kershaw (1981)
Prolesophanta nelsonensis	6039 St Marys Pass 6005 3987	KB 28 Aug 88
Prolesophanta nelsonensis	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Prolesophanta nelsonensis	6038	Mesibov (Douglas-Apsley survey)
Prolesophanta nelsonensis	4137 Oakleigh Creek 4184 3726	KB 9 Jan 91
Prolesophanta nelsonensis	5937 Possum Creek 5968 3749	Mesibov 3 July 85 (QVM)
Prolesophanta nelsonensis	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Prolesophanta nelsonensis	5936	Mesibov (Douglas-Apsley survey)
Prolesophanta nelsonensis	6036	Mesibov (Douglas-Apsley survey)
Prolesophanta nelsonensis	4835 Hydro Creek 4885 3555	KB 11 May 92
Prolesophanta nelsonensis	4534 Pine Tier Lagoon 4576 3403	KB 31 Jan 99
Prolesophanta nelsonensis	5634 Lake Leake 5657 3492	KB 5 July 00
Prolesophanta nelsonensis	5734 Lost Falls 5736 3450	KB 28 Apr 01
Prolesophanta nelsonensis	4733 Waddamana 4796 3371	KB 31 Jan 99
Prolesophanta nelsonensis	5033 Alma Pass 5060 3349	KB 4 Apr 92
Prolesophanta nelsonensis	5733 Big Sassy Creek 5746 3332	KB 23 Nov 97
Prolesophanta nelsonensis	5832 Mayfield Bay 5835 3225	KB 10 Feb 02
Prolesophanta nelsonensis	4431 Tarraleah 4473 3163	Mesibov 18 Apr 92 (QVM)
Prolesophanta nelsonensis	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Prolesophanta nelsonensis	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Prolesophanta nelsonensis	5030 Little Den Creek 5093 3027	KB 22 Feb 98
Prolesophanta nelsonensis	5630 Maclaines Creek 688 015	Mesibov 15 Apr 91 (QVM)
Prolesophanta nelsonensis	5229 Yarlington Tier 5245 2902	KB 4 Feb 01
Prolesophanta nelsonensis	5329 Eldon Road 5353 2951	KB 4 Feb 01
Prolesophanta nelsonensis	5429 Mount Hobbs 5483 2924	KB 5 July 98
Prolesophanta nelsonensis	5028 Espies Craig 5018 2286	KB 22 Feb 98

Prolesophanta nelsonensis	5228 Chauncy Vale 5236 2819	KB 8 Dec 01
Prolesophanta nelsonensis	5628 Orford Tip 5654 2847	KB 6 Feb 92
Prolesophanta nelsonensis	5728 Thumbs 5724 2820	KB 6 Feb 93
Prolesophanta nelsonensis	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Prolesophanta nelsonensis	5928 Bishop + Clerk 5915 2841	KB 23 Mar 96
Prolesophanta nelsonensis	4727 Russell Falls 4763 2748	KB 15 Jan 90
Prolesophanta nelsonensis	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Prolesophanta nelsonensis	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Prolesophanta nelsonensis	5427 Phipps Creek 5497 2751	KB 9 Aug 98
Prolesophanta nelsonensis	5527 Nelsons Tier 5559 2712	KB 9 Aug 98
Prolesophanta nelsonensis	5727 Wielangta 5704 2727	KB 6 Oct 90
Prolesophanta nelsonensis	5126 Mt Dromedary 5103 2697	KB 13 Nov 95
Prolesophanta nelsonensis	5226 Grass Tree Hill 5276 2627	KB 26 May 90
Prolesophanta nelsonensis	5626 Wielangta Road 5686 2687	KB 30 May 01
Prolesophanta nelsonensis	5726 Bream Creek 5708 2639	KB 14 Nov 92
Prolesophanta nelsonensis	5025 Illa Brook 5052 2564	KB 3 June 95
Prolesophanta nelsonensis	5125 New Town Falls 5199 2523	KB 15 Nov 87
Prolesophanta nelsonensis	5225 Knocklofty 5240 2521	KB 17 Apr 00
Prolesophanta nelsonensis	5325 Craigow Hill 5335 2595	KB 9 Oct 93
Prolesophanta nelsonensis	4724 Lake Skinner 4750 2455	KB 11 Apr 99
Prolesophanta nelsonensis	5124 Cathedral Rock 5170 2453	KB 25 Apr 89
Prolesophanta nelsonensis	5224 Jacksons Track 5213 2483	KB 7 May 88
Prolesophanta nelsonensis	5724 MacGregor Peak 5769 2411	KB 27 Dec 90
Prolesophanta nelsonensis	5023 Kelleways Creek 5073 2320	KB 29 July 00
Prolesophanta nelsonensis	5123 Pelverata Falls 5107 2332	KB 23 Feb 86
Prolesophanta nelsonensis	5223 Tinderbox 5271 2342	KB 22 Apr 01
Prolesophanta nelsonensis	4922 Kermandie 4961 2214	KB 23 Nov 00
Prolesophanta nelsonensis	5022 Tobys Hill 5098 2223	KB 30 Sep 00
Prolesophanta nelsonensis	5122 Snug Falls 5167 2227	KB 3 June 00
Prolesophanta nelsonensis	5622 Clark Cliffs 5638 2267	KB 3 May 02
Prolesophanta nelsonensis	5121 Garden Island Creek 5148 2157	KB 22 Nov 98
Prolesophanta nelsonensis	5120 Ninepins 5134 2077	KB 8 Feb 03
Prolesophanta "Strzelecki"	5856	Rob Taylor
Prolesophanta "Strzelecki"	5956 Walkers Lookout	Kershaw 3 Nov 74 (QVM)
Prolesophanta "Strzelecki"	5954 Mt Strzelecki 5904 5492	KB 10 Sep 87
Prolesophanta "Strzelecki"	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Prolesophanta "Strzelecki"	6045 Ansons River 6034 5540	KB 3 Sep 88
Prolesophanta "Strzelecki"	5444 Mt Stronach 5477 4423	KB 24 May 03
Prolesophanta "Strzelecki"	5544 Mt Stronach 5502 4442	KB 19 Jan 96
Prolesophanta "Strzelecki"	5644 Cascade Dam 5688 4405	KB 31 Jan 96
Prolesophanta "Strzelecki"	5744 Mutual Road 5728 4411	KB 30 Jan 96
Prolesophanta "Strzelecki"	5844 New England Rd 5894 4403	KB 17 Jan 00
Prolesophanta "Strzelecki"	5243 Lisle Block 5265 4367	KB 5 Feb 96
Prolesophanta "Strzelecki"	5343 Sideling 5357 4331	KB 2 Feb 96
Prolesophanta "Strzelecki"	5443 Mackenzie Rivulet 5474 4340	KB 10 Jan 96
Prolesophanta "Strzelecki"	5843 New England Rd 5898 4397	KB 31 Jan 96
Prolesophanta "Strzelecki"	5242 Patersonia Rivulet 5275 4275	KB 5 Feb 96
Prolesophanta "Strzelecki"	5342 East Diddleum 5393 4275	KB 9 Feb 96
Prolesophanta "Strzelecki"	5442 East Diddleum 5403 4282	KB 9 Feb 96
Prolesophanta "Strzelecki"	5642 Mt Victoria 5675 4282	KB 17 Jan 96
Prolesophanta "Strzelecki"	5742 Cottons Hill 5768 4224	KB 18 Jan 96
Prolesophanta "Strzelecki"	5842 Rayners Hill 5880 4223	KB 1 Feb 96
Prolesophanta "Strzelecki"	5341 Mt Barrow 5358 4198	KB 8 Jan 96
Prolesophanta "Strzelecki"	5541 Telopea Road 5540 4150	KB 9 Dec 95
Prolesophanta "Strzelecki"	5641 Sweets Creek 5608 4168	KB 11 Jan 96

Prolesophanta "Strzelecki"	5741 Mathinna Falls 5751 4174	KB 15 Jan 96
Prolesophanta "Strzelecki"	5340 Blessington 5320 4075	Mesibov 19 Nov 95 (QVM)
Prolesophanta "Strzelecki"	5640	Smith + Kershaw (1991)
Prolesophanta "Strzelecki"	5639 Storeys Creek	Kershaw Mar 74 (QVM)
Prolesophanta "Strzelecki"	5739 Tower Hill 5709 3984	KB 31 Dec 98
Prolesophanta "Togari"	3247 Togari 3298 4726	KB 8 Sep 01
Prolesophanta "Togari"	3245 Lerunna Loop 3222 4558	KB 22 July 99
Prolesophanta "Togari"	3745 Meunna 3728 4519	KB 11 May 99
Prolesophanta "Togari"	3845 Oldina 3881 4585	KB 4 May 99
Prolesophanta "Togari"	3444 Milkshake Hills 3457 4482	KB 26 Dec 88
Prolesophanta "Togari"	3744 West Takone 3724 4408	KB 13 May 99
Prolesophanta "Togari"	4144 The Gnomon 4190 4409	KB 28 Mar 99
Prolesophanta "Togari"	3543 Mount Bertha 3598 4340	KB 2 June 99
Prolesophanta "Togari"	3743 West Takone 3750 4397	KB 13 May 99
Prolesophanta "Togari"	4043	Smith + Kershaw (1981)
Prolesophanta "Francistown"	4920 Francistown 4989 2053	KB 27 Sep 87
Prolesophanta "Francistown"	4819 Hastings Caves 4873 1967	KB 9 Nov 96
Prolesophanta "Francistown"	5219 Mt Mangana 5232 1985	KB 7 Apr 01
Prolesophanta "Francistown"	4618 Precipitous Bluff	Arthur Clarke 1988
Prolesophanta "Francistown"	4818 Moonlight Ridge 4872 1870	KB 11 Nov 89
Prolesophanta "Francistown"	4917 Rescherche Bay 4908 1752	KB 30 Nov 92
Prolesophanta dyeri	2460 Lake Martha Lavinia 2481 6068	KB 14 Dec 96
Prolesophanta dyeri	2457 Zwar Creek 2490 5785	KB 16 Dec 96
Prolesophanta dyeri	2557 Rafferty Creek 2514 5781	KB 27 Sep 03
Prolesophanta dyeri	2455 Red Hut Road 2438 5573	KB 17 Dec 96
Prolesophanta dyeri	3349 Robbins Island 3328 4941	KB 4 Feb 97
Prolesophanta dyeri	3548 The Nut 3567 4856	KB 13 May 98
Prolesophanta dyeri	3147	Smith + Kershaw (1981)
Prolesophanta dyeri	3247 Togari Block 3274 4708	KB 7 Sep 92
Prolesophanta dyeri	3347 Togari Block 3332 4747	KB 9 Sep 92
Prolesophanta dyeri	3447 Deep Creek Bay 3447 4787	KB 5 Sep 00
Prolesophanta dyeri	3547 Black River 3563 4707	KB 3 Oct 91
Prolesophanta dyeri	3647	Smith + Kershaw (1981)
Prolesophanta dyeri	3747	Smith + Kershaw (1981)
Prolesophanta dyeri	3246 Togari Block 3279 4637	KB 17 Sep 92
Prolesophanta dyeri	3346	Smith + Kershaw (1981)
Prolesophanta dyeri	3546 Circular Head	Petterd (1879)
Prolesophanta dyeri	3646 Crayfish Creek 3623 4672	KB 2 Oct 99
Prolesophanta dyeri	5145	Smith + Kershaw (1981)
Prolesophanta dyeri	3944	Smith + Kershaw (1981)
Prolesophanta dyeri	4344	Smith + Kershaw (1981)
Prolesophanta dyeri	4444	Smith + Kershaw (1981)
Prolesophanta dyeri	4744	Smith + Kershaw (1981)
Prolesophanta dyeri	4844	Smith + Kershaw (1981)
Prolesophanta dyeri	4443	Smith + Kershaw (1981)
Prolesophanta dyeri	4843	Smith + Kershaw (1981)
Prolesophanta dyeri	3242 Balfour 3247 4299	KB 1 Nov 91
Prolesophanta dyeri	3642	Smith + Kershaw (1981)
Prolesophanta dyeri	3742	Smith + Kershaw (1981)
Prolesophanta dyeri	4042	Smith + Kershaw (1981)
Prolesophanta dyeri	4142	Smith + Kershaw (1981)
Prolesophanta dyeri	4742	Smith + Kershaw (1981)
Prolesophanta dyeri	4942 Notley Gorge 4925 4216	KB 5 Oct 91

Prolesophanta dyeri	4041	Smith + Kershaw (1981)
Prolesophanta dyeri	5041	Smith + Kershaw (1981)
Prolesophanta dyeri	5141	Smith + Kershaw (1981)
Prolesophanta dyeri	4040	Smith + Kershaw (1981)
Prolesophanta dyeri	4240	Smith + Kershaw (1981)
Prolesophanta dyeri	4340	Smith + Kershaw (1981)
Prolesophanta dyeri	5040	Smith + Kershaw (1981)
Prolesophanta dyeri	5140	Smith + Kershaw (1981)
Prolesophanta dyeri	4439 Marakoopa Cave 4408 3968	KB 30 Mar 86
Prolesophanta dyeri	3638	Smith + Kershaw (1981)
Prolesophanta dyeri	3738	Smith + Kershaw (1981)
Prolesophanta dyeri	3838	Smith + Kershaw (1981)
Prolesophanta dyeri	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Prolesophanta dyeri	3837 Anthony Road 3868 3707	KB 25 Oct 98
Prolesophanta dyeri	4137 Oakleigh Creek 4189 3714	KB 9 Jan 91
Prolesophanta dyeri	4937 Mount Blackwood 4913 3714	KB 6 Nov 99
Prolesophanta dyeri	3632 Teepookana 3655 2273	KB 13 June 96
Prolesophanta dyeri	4432 Butlers Gorge 4408 3215	KB 31 Jan 99
Prolesophanta dyeri	5232 Blackman River 5241 3293	KB 22 Feb 98
Prolesophanta dyeri	4631 Dee River 4683 3131	KB 28 Dec 97
Prolesophanta dyeri	3829 Pine Landing 3858 2994	KB 27 Jan 00
Prolesophanta dyeri	3928	Lower Gordon survey
Prolesophanta dyeri	4027	Lower Gordon survey
Prolesophanta dyeri	4127	Lower Gordon survey
Prolesophanta dyeri	4426 Ragged Range 4443 2626	KB 15 Mar 98
Prolesophanta dyeri	4425 Frodshams Pass 4497 2580	Coy et al (1993)
Prolesophanta dyeri	4024	Smith + Kershaw (1981)
Prolesophanta dyeri	4724 Lake Skinner 4750 2455	KB 11 Apr 99
Prolesophanta dyeri	4824 Herons Creek 4820 2427	KB 25 Dec 97
Prolesophanta dyeri	4223 White Monolith Range	J. Friend 16 Feb 87 (QVM)
Prolesophanta dyeri	5123 Snug Tier 5157 2320	KB 8 Dec 90
Prolesophanta dyeri	4819 Hastings Caves 4873 1967	KB 3 Oct 98
Prolesophanta dyeri	5219 Mt Mangana 5229 1980	Coy et al (1993)
Prolesophanta "Marriotts"	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Prolesophanta "Marriotts"	3740 Waratah 3704 4066	Mesibov 30 Sep 90
Prolesophanta "Marriotts"	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Prolesophanta "Marriotts"	4529 Florentine 4540 2960	Owen Seeman 22 May 00 (QVM)
Prolesophanta "Marriotts"	4527 Growling Swallet 4590 2740	KB 6 Sep 98
Prolesophanta "Marriotts"	4727 Marriotts Falls 4723 2704	KB 15 Apr 90
Prolesophanta "Marriotts"	4725 Styx River 4724 2596	KB 9 Dec 01
Prolesophanta "Marriotts"	4923 New Road Franklin 4950 2309	KB 18 Dec 02
Prolesophanta "Marriotts"	4722 Tahune Park 4772 2284	KB 6 May 90
Prolesophanta "Marriotts"	4618 Precipitous Bluff	Stefan Eberhard (1994) (AM)
Prolesophanta "Marriotts"	4818 Coal Hill	Arthur Clarke
Prolesophanta "Marriotts"	4918 South Cape Road	Winston Ponder (AM)
Caryodes dufresnii	3548	Smith + Kershaw (1981)
Caryodes dufresnii	3147 Gardners Road 3160 4715	KB 6 Sep 00
Caryodes dufresnii	3247 Togari Block	Mesibov
Caryodes dufresnii	3547 Black River 3563 4743	KB 2 Oct 99
Caryodes dufresnii	3647 Harris Creek 3608 4707	KB 2 Oct 99
Caryodes dufresnii	3146 Dismal Swamp 3190 4630	KB 4 Oct 91
Caryodes dufresnii	3546 East Creek 3508 4681	KB 21 July 99
Caryodes dufresnii	3646 Crayfish Creek 3623 4672	KB 2 Oct 99
Caryodes dufresnii	3946	Smith + Kershaw (1981)

Caryodes dufresnii	3145 Arthur/Frankland Jcn 3128 4503	KB 25 Dec 88
Caryodes dufresnii	3245 Leensons Road 3277 4552	KB 24 Oct 98
Caryodes dufresnii	3345	Smith + Kershaw (1981)
Caryodes dufresnii	3445 Trowutta Cave 3410 4519	KB 24 Oct 98
Caryodes dufresnii	3545 Peegra Road 3587 4538	KB 1 June 99
Caryodes dufresnii	3745 Meunna 3728 4519	KB 12 May 99
Caryodes dufresnii	4045 Cam River 4020 4553	KB 5 Jun 98
Caryodes dufresnii	4745 Greens Beach	R. Green 10 July 61 (QVM)
Caryodes dufresnii	4845 George Town	Kershaw 16 Dec 82 (QVM)
Caryodes dufresnii	5545 Mount Horror 5599 4507	Kershaw 14 Sep 85 (QVM)
Caryodes dufresnii	5645 Mount Horror 5612 4531	KB 18 Jan 96
Caryodes dufresnii	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Caryodes dufresnii	5945 Big Boggy Creek	Dick Bashford
Caryodes dufresnii	6045 Ansons River 6034 5540	KB 3 Sep 88
Caryodes dufresnii	3144 Wuthering Heights 3158 4457	KB 19 July 99
Caryodes dufresnii	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Caryodes dufresnii	3444 Milkshake Hills 3457 4482	KB 3 Oct 91
Caryodes dufresnii	3644 Rabalga Road 3624 4498	KB 24 Oct 98
Caryodes dufresnii	3744 West Takone 3723 4406	KB 13 May 99
Caryodes dufresnii	4144 The Gnomon 4190 4409	KB 28 Mar 99
Caryodes dufresnii	4244 Paton Park 4240 4420	KB 27 Mar 99
Caryodes dufresnii	4344 Leven River	Petterd (1879)
Caryodes dufresnii	4744 York Town 4758 4421	Kershaw 22 June 88 (QVM)
Caryodes dufresnii	4844	Smith + Kershaw (1981)
Caryodes dufresnii	4944 Land O' Cakes Ck 4986 4482	KB 17 Mar 01
Caryodes dufresnii	5044 Underwood 5075 4421	Kershaw (1989)
Caryodes dufresnii	5144 Retreat 5142 4435	KB 26 Nov 00
Caryodes dufresnii	5244 Golconda	Ron Kershaw
Caryodes dufresnii	5444 Mt Stronach 5498 4444	KB 19 Jan 96
Caryodes dufresnii	5544 Mt Stronach 5502 4442	KB 19 Jan 96
Caryodes dufresnii	5744 Frome Road 5773 4430	KB 22 Jan 96
Caryodes dufresnii	5844 Blue Tier 5846 4402	KB 23 Jan 96
Caryodes dufresnii	5944 Tinkle Creek 5909 4458	KB 18 Jan 00
Caryodes dufresnii	6044 Big Lagoon Creek 6050 4401	KB 2 Sep 88
Caryodes dufresnii	3743 West Takone 3750 4397	KB 26 May 99
Caryodes dufresnii	3843 Oonah 3857 4362	KB 14 May 99
Caryodes dufresnii	3943 Surrey Hills	Petterd (1879)
Caryodes dufresnii	4743 Dazzler Range 4763 4352	Kershaw 19 May 84 (QVM)
Caryodes dufresnii	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Caryodes dufresnii	5043 Mount Direction	Kershaw
Caryodes dufresnii	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Caryodes dufresnii	5243 Mount Arthur 5250 4313	KB 5 Feb 96
Caryodes dufresnii	5343 Sideling 5357 4331	KB 2 Feb 96
Caryodes dufresnii	5443	Smith + Kershaw (1981)
Caryodes dufresnii	5543 Cuckoo Hill 5538 4348	KB 15 Feb 96
Caryodes dufresnii	5643 Gold Creek 5681 4384	KB 30 Jan 96
Caryodes dufresnii	5743 Weldborough 5794 4367	KB 24 Jan 96
Caryodes dufresnii	5843 Murdochs Road 5892 4397	KB 31 Jan 96
Caryodes dufresnii	5943 Terrys Hill 5925 4337	KB 31 Jan 96
Caryodes dufresnii	6043 Big Lagoon Creek 6050 4399	KB 2 Sep 88
Caryodes dufresnii	6143 Binalong Bay 6103 4320	KB 30 Aug 88
Caryodes dufresnii	3142 Thornton River	Earthwatch 7 Mar 81 (QVM)
Caryodes dufresnii	3542 Mt Bertha 3552 4256	ANZSES 5 Jan 97 (QVM)
Caryodes dufresnii	4842 4km NE Frankford	P. Berry 22 Nov 89 (QVM)
Caryodes dufresnii	4942 Notley Gorge 4925 4216	KB 5 Oct 91
Caryodes dufresnii	5042 Windermere	Mrs Eddie (QVM)

Caryodes dufresnii	5142 Hollybank 5175 4276	KB 12 Aug 95
Caryodes dufresnii	5242	Smith + Kershaw (1981)
Caryodes dufresnii	5342 Barrow Falls 5328 4215	KB 8 Jan 96
Caryodes dufresnii	5442 Mount Maurice 5452 4262	KB 9 Jan 96
Caryodes dufresnii	5542 Maurice Road 5505 4245	KB 12 Jan 96
Caryodes dufresnii	5642 Mathinna Plains 5604 4221	KB 11 Jan 96
Caryodes dufresnii	5742 Cottons Hill 5768 4224	KB 18 Jan 96
Caryodes dufresnii	5842 Rayners Hill 5880 4223	KB 1 Feb 96
Caryodes dufresnii	5942 Ericksons Road 5938 4253	KB 11 Jun 88
Caryodes dufresnii	6042 Humbug Point 6080 4255	KB 27 Oct 90
Caryodes dufresnii	6142 Humbug Point 6103 4292	KB 30 Aug 88
Caryodes dufresnii	3141 Wild Wave River 3196 4187	Mesibov 15 Feb 91
Caryodes dufresnii	3641 Magnet Range 3694 4100	Kershaw (1989)
Caryodes dufresnii	3741	Smith + Kershaw (1981)
Caryodes dufresnii	3841 Fingerpost 3853 4156	Mesibov 26 Sep 91 (QVM)
Caryodes dufresnii	4041	Smith + Kershaw (1981)
Caryodes dufresnii	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Caryodes dufresnii	4241	Smith + Kershaw (1981)
Caryodes dufresnii	4341 Mt Roland	Deloraine Field Nats
Caryodes dufresnii	5041 Cataract Gorge 5088 4113	KB 10 June 90
Caryodes dufresnii	5141	Smith + Kershaw (1981)
Caryodes dufresnii	5241	Smith + Kershaw (1981)
Caryodes dufresnii	5341 Mount Barrow 5358 4198	KB 8 Jan 96
Caryodes dufresnii	5441	Smith + Kershaw (1981)
Caryodes dufresnii	5541 Tombstone Creek 5570 4168	KB 11 Jan 96
Caryodes dufresnii	5641	Smith + Kershaw (1981)
Caryodes dufresnii	5741 Mathinna Falls 5751 4174	KB 15 Jan 96
Caryodes dufresnii	5841 Ryans Creek 5862 4184	KB 1 Feb 96
Caryodes dufresnii	5941 Loila Tier 5979 4162	KB 30 Aug 88
Caryodes dufresnii	6041 Loila Tier 6035 4177	KB 30 Aug 88
Caryodes dufresnii	3540	Smith + Kershaw (1981)
Caryodes dufresnii	3740 Waratah 3703 4065	Mesibov 24 Sep 90 (QVM)
Caryodes dufresnii	3840 Stockwell Marsh 3808 4092	Mesibov 19 Dec 91 (QVM)
Caryodes dufresnii	4140 Winterbrook Falls 4140 4098	KB 25 Mar 95
Caryodes dufresnii	4540 Alum Cliffs 4525 4026	KB 28 Mar 98
Caryodes dufresnii	5040	Smith + Kershaw (1981)
Caryodes dufresnii	5340 Blessington	T. Taylor 21 Apr 85 (QVM)
Caryodes dufresnii	5540 Abrahams Creek 5581 4077	KB 7 Feb 96
Caryodes dufresnii	5940 South Sister 5985 4002	Kershaw (1989)
Caryodes dufresnii	3439 Guthrie Creek 3408 3927	KB 23 Oct 98
Caryodes dufresnii	3739 Hatfield River 3757 3931	L. Ruboch 14 Mar 91 (QVM)
Caryodes dufresnii	3939 Mt Cripps	Bob Mesibov 1994
Caryodes dufresnii	4239 Gads Hill	Petterd (1879)
Caryodes dufresnii	4339 Gads Hill	Petterd (1879)
Caryodes dufresnii	4439 Mayberry	A. Hume 1974 (QVM)
Caryodes dufresnii	4539 Kutra Hena Cave 4515 3952	C. Reid 2 May 93 (QVM)
Caryodes dufresnii	5239	Smith + Kershaw (1981)
Caryodes dufresnii	5339	Smith + Kershaw (1981)
Caryodes dufresnii	5439	Smith + Kershaw (1981)
Caryodes dufresnii	5539 Ben Lomond Rivulet 5525 3914	KB 31 Dec 98
Caryodes dufresnii	5639 Tower Hill 5698 3988	Finnigan/Soccol 7 Dec 93 (QVM)
Caryodes dufresnii	5739 Tower Hill 5709 3984	KB 31 Dec 98
Caryodes dufresnii	5939	Smith + Kershaw (1981)
Caryodes dufresnii	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Caryodes dufresnii	3238	Smith + Kershaw (1981)
Caryodes dufresnii	3338 Pieman River 3397 3855	KB 23 Oct 98

Caryodes dufresnii	3438 Wilsons Road 3401 3816	KB 23 Oct 98
Caryodes dufresnii	4338 Arm River 4344 3843	KB 21 Sep 01
Caryodes dufresnii	4438 Lake Mackenzie	Mesibov 2 Mar 86 (QVM)
Caryodes dufresnii	4638 Sales Rivulet	F. Michaelis 222 Dec 83 (QVM)
Caryodes dufresnii	4838 near Liffey	Peter McQuillan
Caryodes dufresnii	5838 Valley Road Fingal 5894 3836	D'Orazio 3 Aug 92 (QVM)
Caryodes dufresnii	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Caryodes dufresnii	6038 Heritage Falls 6003 3803	KB 28 Oct 90
Caryodes dufresnii	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Caryodes dufresnii	3837 Anthony Road 3868 3707	KB 25 Oct 98
Caryodes dufresnii	4137 Oakleigh Creek 4190 3741	KB 9 Jan 91
Caryodes dufresnii	4237	Smith + Kershaw (1981)
Caryodes dufresnii	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Caryodes dufresnii	4937 Mount Blackwood 4913 3714	KB 6 Nov 99
Caryodes dufresnii	5237 Epping Forest 5260 3751	KB 12 July 98
Caryodes dufresnii	5437 Conara 5440 3724	Greg Blake 29 Apr 92 (QVM)
Caryodes dufresnii	5537 Buffalo Brook	Tim Kingston 19 Oct 93 (QVM)
Caryodes dufresnii	5937 Apsley River 5957 3721	Mesibov 6 July 88 (QVM)
Caryodes dufresnii	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Caryodes dufresnii	5336 Conara	Kershaw (1989)
Caryodes dufresnii	5936	Mesibov (Douglas-Apsely survey)
Caryodes dufresnii	6036 Bicheno 6085 3631	KB 13 May 88
Caryodes dufresnii	4835 Great Lake shore	Bob Mesibov
Caryodes dufresnii	5035 Snowy Knob 5017 4533	KB 12 Sep 98
Caryodes dufresnii	5435 N of Lake Leake road	Bob Mesibov
Caryodes dufresnii	5735 Royal George 5730 3548	Tim Hume 6 Aug 77 (QVM)
Caryodes dufresnii	5935 Moulting Lagoon	Sarah Lloyd
Caryodes dufresnii	6035 Cape Lodi	Roy Crookshanks
Caryodes dufresnii	4234 Cynthia Bay 4245 3487	KB 20 Mar 93
Caryodes dufresnii	4534 Pine Tier Lagoon 4576 3403	KB 31 Jan 99
Caryodes dufresnii	5634 Lake Leake	Dick Bashford 8 May 86 (QVM)
Caryodes dufresnii	5734 Lost Falls 5736 3450	KB 28 Apr 01
Caryodes dufresnii	6034 Friendly Beaches	B Reid 4 Jun 73 (TMAG)
Caryodes dufresnii	3533	Smith + Kershaw (1981)
Caryodes dufresnii	3633 Hogarth Falls 3633 3318	KB 12 June 96
Caryodes dufresnii	3733	Smith + Kershaw (1981)
Caryodes dufresnii	3933 Bubs Hill	Arthur Clarke 1987
Caryodes dufresnii	4233 Shadow Lake 4289 3383	KB 28 Jan 00
Caryodes dufresnii	4333 Watersmeet 4308 3375	KB 28 Jan 00
Caryodes dufresnii	4733 Waddamana 4796 3371	KB 31 Jan 99
Caryodes dufresnii	4833 Diamond Tier	Bob Mesibov
Caryodes dufresnii	4933 Steppes 4905 3394	KB 25 Dec 98
Caryodes dufresnii	5033 Alma Pass 5060 3349	KB 4 Apr 92
Caryodes dufresnii	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Caryodes dufresnii	5733 Big Sassy Creek 5746 3332	KB 23 Nov 97
Caryodes dufresnii	5833	Smith + Kershaw (1981)
Caryodes dufresnii	6033 Coles Bay 6077 3338	KB Sept 85
Caryodes dufresnii	6133 Bluestone Bay 6104 3375	KB Sept 85
Caryodes dufresnii	3632 Teepookana 3655 2273	KB 13 June 96
Caryodes dufresnii	3732	Smith + Kershaw (1981)
Caryodes dufresnii	3832 Crotty River 3859 3211	Kershaw (1989)
Caryodes dufresnii	4132 Franklin River 4190 3258	KB 25 Oct 98
Caryodes dufresnii	4432 Butlers Gorge 4408 3215	KB 31 Jan 99
Caryodes dufresnii	4632	Smith + Kershaw (1981)
Caryodes dufresnii	5232 Blackman River 5241 3293	KB 22 Feb 98
Caryodes dufresnii	5632 Tooms White Gum 5693 3234	KB 23 Nov 97

Caryodes dufresnii	6032 Hazards Beach 6067 3279	KB Easter 85
Caryodes dufresnii	3631	Smith + Kershaw (1981)
Caryodes dufresnii	3731	Smith + Kershaw (1981)
Caryodes dufresnii	4031 Lightning Plains	Horwitz 1989 (TMAG)
Caryodes dufresnii	4431 Tarraleah 4474 3161	Mesibov 15 Apr 92 (QVM)
Caryodes dufresnii	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Caryodes dufresnii	5031	Smith + Kershaw (1981)
Caryodes dufresnii	5231 Oatlands	Petterd (1879)
Caryodes dufresnii	5331 Oatlands	Petterd (1879)
Caryodes dufresnii	5731 Freshwater Bay 5795 3117	KB 9 Sep 01
Caryodes dufresnii	3730 Sarah Island 3723 3058	Steve Smith 30 Dec 86 (QVM)
Caryodes dufresnii	3930 Mt McCall 3973 3077	KB 2 Mar 00
Caryodes dufresnii	4030 Cardia Cave 4055 3033	Steve Smith (AM)
Caryodes dufresnii	4530 Wayatinah 4593 3097	KB 26 Jan 99
Caryodes dufresnii	5030 Little Den Creek 5093 3027	KB 22 Feb 98
Caryodes dufresnii	5630 Pepper Creek 5654 3092	Mesibov 18 Apr 91 (QVM)
Caryodes dufresnii	5730 Ravens Hill 5709 3034	Mesibov 19 Apr 91 (QVM)
Caryodes dufresnii	3829 Pine Landing 3858 2994	KB 27 Jan 00
Caryodes dufresnii	3929 Kutakina Cave	Steve Smith 23 Mar 88 (QVM)
Caryodes dufresnii	4529 Florentine 4540 2960	Owen Seeman 22 May 00 (QVM)
Caryodes dufresnii	4629 Mt Thunderbolt 4640 2970	O. Seeman May 00 (QVM)
Caryodes dufresnii	4929 Hollow Tree	Len Wall 1975 (TMAG)
Caryodes dufresnii	5229 Yarlington Tier 5245 2902	KB 22 Feb 98
Caryodes dufresnii	5329 Coal River Gorge 5328 2968	KB 5 Oct 03
Caryodes dufresnii	5429 Mount Hobbs 5483 2924	KB 5 July 98
Caryodes dufresnii	5529 Sand River 5589 2926	KB 5 July 98
Caryodes dufresnii	5629 Red Hill 5696 2961	Mesibov 17 Apr 91 (QVM)
Caryodes dufresnii	5729 Orford	Petterd (1879)
Caryodes dufresnii	5829 Plain Place Beach 5816 2945	KB 3 Sep 94
Caryodes dufresnii	3628 Hibbs Lagoon 3621 2857	Kershaw (1989)
Caryodes dufresnii	3928 Sir John Falls	J. Moore 9 Jan 88 (QVM)
Caryodes dufresnii	4028	Smith + Kershaw (1981)
Caryodes dufresnii	4428 Gordonvale	Andrew Stewart 1984
Caryodes dufresnii	4528	Smith + Kershaw (1981)
Caryodes dufresnii	4628	Smith + Kershaw (1981)
Caryodes dufresnii	4728	Smith + Kershaw (1981)
Caryodes dufresnii	4828 Hamilton	Petterd (1879)
Caryodes dufresnii	4928 Gretna 4910 2840	KB 20 Aug 88
Caryodes dufresnii	5028 Espies Craig 5018 2286	KB 22 Feb 98
Caryodes dufresnii	5228 Yarlington Tier 5245 2898	KB 22 Feb 98
Caryodes dufresnii	5528 Buckland	Petterd (1879)
Caryodes dufresnii	5628 Prosser River 5699 2880	KB 26 July 98
Caryodes dufresnii	5728 Prosser River 5709 2880	KB 26 July 98
Caryodes dufresnii	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Caryodes dufresnii	5928 Bishop + Clerk 5915 2841	KB 23 Mar 96
Caryodes dufresnii	3927	Smith + Kershaw (1981)
Caryodes dufresnii	4027	Smith + Kershaw (1981)
Caryodes dufresnii	4127	Smith + Kershaw (1981)
Caryodes dufresnii	4327 Clear Hill 4398 2740	KB 15 Mar 98
Caryodes dufresnii	4527 Florentine 4513 2707	KB 19 Apr 87
Caryodes dufresnii	4627 Lake Dobson 4666 2740	KB 6 May 01
Caryodes dufresnii	4727 Lady Barron Falls 4760 2738	KB 17 Nov 85
Caryodes dufresnii	4927 Styx River	Arthur Clarke
Caryodes dufresnii	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Caryodes dufresnii	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Caryodes dufresnii	5227 Brighton	QVM

Caryodes dufresnii	5327 Coal River Sugarloaf	Greenstreet 13 May 72 (QVM)
Caryodes dufresnii	5427 Phipps Creek 5497 2751	KB 9 Aug 98
Caryodes dufresnii	5527 Nelsons Tier 5559 2712	KB 9 Aug 98
Caryodes dufresnii	5627 Sandspit River 5690 2711	KB 6 Oct 90
Caryodes dufresnii	5727 Wielangta 5704 2727	KB 6 Oct 90
Caryodes dufresnii	5827 Frenchs Farm	C. Spry (QVM)
Caryodes dufresnii	4026	Smith + Kershaw (1981)
Caryodes dufresnii	4126	Smith + Kershaw (1981)
Caryodes dufresnii	4426 Ragged Range 4443 2626	KB 15 Mar 98
Caryodes dufresnii	4526	Smith + Kershaw (1981)
Caryodes dufresnii	4626 Junee Cave 4668 2681	KB 15 Mar 98
Caryodes dufresnii	4726	Smith + Kershaw (1981)
Caryodes dufresnii	4826 Torrent Creek 4847 2632	KB 10 Jan 01
Caryodes dufresnii	5026 New Norfolk 5048 2647	KB 17 Jan 90
Caryodes dufresnii	5126 Growling Swallet 4590 2740	KB 20 Aug 89
Caryodes dufresnii	5226 Catchpole Gully 5284 2627	KB 7 June 90
Caryodes dufresnii	5326 Basin Hills 5302 2614	KB 28 Dec 00
Caryodes dufresnii	5426	Smith + Kershaw (1981)
Caryodes dufresnii	5626 Kellevie 5648 2663	KB 15 July 90
Caryodes dufresnii	5726 Mount Jacob 5735 2680	KB 14 Nov 92
Caryodes dufresnii	4125	Smith + Kershaw (1981)
Caryodes dufresnii	4325 Mt Wedge track	John Reid
Caryodes dufresnii	4425 Creepy Crawley 4497 2580	KB 9 Apr 88
Caryodes dufresnii	4525	Smith + Kershaw (1981)
Caryodes dufresnii	4725 Wetpants Peak	John Reid
Caryodes dufresnii	5025 Illa Brook 5052 2564	KB 3 June 95
Caryodes dufresnii	5125 Goat Hills 5180 2570	KB 20 Dec 88
Caryodes dufresnii	5225 Knocklofty 5240 2521	KB 17 Apr 00
Caryodes dufresnii	5325 Craigow Hill 5335 2595	KB 9 Oct 93
Caryodes dufresnii	5525 Gunns Hill	Roy Crookshanks
Caryodes dufresnii	5625 Gunns Hill	Roy Crookshanks
Caryodes dufresnii	5725 Lagoon Bay 5782 2524	KB 8 Oct 94
Caryodes dufresnii	4524 Lake Judd	Tas Field Nats
Caryodes dufresnii	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Caryodes dufresnii	4824 Herons Creek 4820 2427	KB 25 Dec 97
Caryodes dufresnii	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Caryodes dufresnii	5124 Lenah Valley Track 5198 2484	KB 26 Jan 86
Caryodes dufresnii	5224 Shoobridge Track 5204 2491	KB 26 Jan 86
Caryodes dufresnii	5324	Smith + Kershaw (1981)
Caryodes dufresnii	5424 Clifton Beach 5430 2404	KB 1984
Caryodes dufresnii	5524 Lime Bay 5582 2437	KB 16 Oct 94
Caryodes dufresnii	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Caryodes dufresnii	5824 Deep Glen Bay	Don Hird
Caryodes dufresnii	4423 Scotts Peak 4424 2345	KB 9 Apr 88
Caryodes dufresnii	4623 Mt Weld 4655 2383	Doran/Bashford 2002 (QVM)
Caryodes dufresnii	4723 Edwards Road 4796 2303	KB 19 Aug 01
Caryodes dufresnii	4823 Bracken Ridge 4897 2308	Bashford 21 Dec 95 (QVM)
Caryodes dufresnii	4923 New Road Franklin 4950 2309	KB 26 Nov 89
Caryodes dufresnii	5123 Pelverata Falls 5107 2332	KB 23 Feb 86
Caryodes dufresnii	5223 Tinderbox 5271 2342	KB 22 Apr 01
Caryodes dufresnii	5323 Gellibrand Road 5391 2372	KB 4 May 86
Caryodes dufresnii	5423 Calverts Beach 5404 2364	KB 4 May 86
Caryodes dufresnii	5523	Smith + Kershaw (1981)
Caryodes dufresnii	5723 Camp Falls 5772 2315	KB 13 Jan 86
Caryodes dufresnii	4422 Junction Creek 4406 2278	KB 28 Feb 99
Caryodes dufresnii	4622 Blakes Opening 4696 2287	KB 5 Apr 98

Caryodes dufresnii	4722 Tahune Park 4772 2284	KB 6 May 90
Caryodes dufresnii	4822 Lidgerwood Rd 4868 2246	KB 11 Feb 95
Caryodes dufresnii	4922 Castle Forbes Falls 4958 2258	KB 29 Mar 91
Caryodes dufresnii	5022 Tobys Hill 5098 2223	KB 30 Sep 00
Caryodes dufresnii	5122 Snug Tiers 5125 2297	KB 7 May 94
Caryodes dufresnii	5222 Conningham 5223 2284	KB 24 Nov 89
Caryodes dufresnii	5322	Smith + Kershaw (1981)
Caryodes dufresnii	5522 Roaring Beach 5547 2292	KB 1 Apr 90
Caryodes dufresnii	5622	Smith + Kershaw (1981)
Caryodes dufresnii	5722 Fortescue Bay 5785 2226	KB 13 Jan 86
Caryodes dufresnii	5822 Cape Huay 5803 2224	KB 5 Mar 94
Caryodes dufresnii	4121 Settlement Point	Barnett 17 Jan 82 (TMAG)
Caryodes dufresnii	4721 Cook Creek 4708 2180	KB 11 Feb 95
Caryodes dufresnii	4821 Hartz Hut 4810 2171	KB 9 May 87
Caryodes dufresnii	5121 Garden Island Creek 5148 2157	KB 22 Nov 98
Caryodes dufresnii	5321 Church Hill 5328 2125	KB 4 Aug 00
Caryodes dufresnii	5621 Safety Cove 5697 2180	KB 11 Feb 86
Caryodes dufresnii	5721 Cape Pillar track	Don Hird
Caryodes dufresnii	5821 Tasman Island	George Davis (TMAG)
Caryodes dufresnii	4120	Smith + Kershaw (1981)
Caryodes dufresnii	4720 Picton River	Roy Crookshanks
Caryodes dufresnii	4820 Adamsons Peak 4897 2016	KB 6 Aug 00
Caryodes dufresnii	4920 Francistown 4989 2053	KB 27 Sep 87
Caryodes dufresnii	5020 Esperance 5022 2009	KB 26 Dec 85
Caryodes dufresnii	5220 Cooleys Gully 5259 2039	KB 6 Apr 01
Caryodes dufresnii	4119 Stephens Bay	Steve Smith
Caryodes dufresnii	4819 Hastings Caves 4873 1967	KB 3 Oct 98
Caryodes dufresnii	4919 Jacksons Creek 4970 1958	KB 24 Nov 00
Caryodes dufresnii	5019 Lady Bay 5015 1946	KB 27 Dec 88
Caryodes dufresnii	5119 Mickeys Bay 5153 1913	KB 23 May 98
Caryodes dufresnii	5219 Mt Mangana 5232 1985	KB 7 Apr 01
Caryodes dufresnii	5319 Fluted Cape 5302 1989	KB 8 Apr 01
Caryodes dufresnii	4318	Smith + Kershaw (1981)
Caryodes dufresnii	4618	Smith + Kershaw (1981)
Caryodes dufresnii	4818 Mystery Creek Cave 4876 1878	KB 11 Nov 87
Caryodes dufresnii	4918	Smith + Kershaw (1981)
Caryodes dufresnii	5118 Labilladiere Peninsula 5120 188[illegible]	KB 5 Jan 86
Caryodes dufresnii	4217 Southwest Cape	QVM records
Caryodes dufresnii	4417 De Witt Island 4480 1720	N. Brothers 14 Dec 87 (QVM)
Caryodes dufresnii	4817 South Cape Bay 4871 1716	KB 12 Mar 00
Caryodes dufresnii	4917 Rescherche Bay 4908 1752	KB 30 Nov 92
Caryodes dufresnii	4416 Maatsuyker Island 4407 1664	S. Cronin 22 Dec 96 (QVM)
Anoglypta launcestonesis	5645 Mount Horror 5605 4505	KB 10 Jan 96
Anoglypta launcestonesis	5544 Mt Stronach 5502 4442	KB 19 Jan 96
Anoglypta launcestonesis	5644 Cascade River 5692 4401	KB 30 Jan 96
Anoglypta launcestonesis	5744 Main Creek 5728 4411	KB 30 Jan 96
Anoglypta launcestonesis	5844 Musselroe Creek 5879 4493	KB 24 Jan 96
Anoglypta launcestonesis	5243 Mt Arthur 5233 4329	Kershaw (1988)
Anoglypta launcestonesis	5343 Goftons Creek 5361 4304	KB 12 Feb 96
Anoglypta launcestonesis	5443 Saltmarsh Road 5474 4339	KB 10 Jan 96
Anoglypta launcestonesis	5543 Tulendeena 5535 4383	KB 15 Feb 96
Anoglypta launcestonesis	5643 Mt Paris Dam 5670 4390	Kershaw (1988)
Anoglypta launcestonesis	5743 Rattler Range 5712 4328	KB 13 Feb 96
Anoglypta launcestonesis	5843 Lehners Ridge 5825 4347	KB 13 Feb 96
Anoglypta launcestonesis	5943 Terrys Hill 5925 4337	KB 31 Jan 96

Anoglypta launcestonesis	5242 Patersonia Rivulet 5275 4275	KB 5 Feb 96
Anoglypta launcestonesis	5342 Barrow Falls 5328 4215	KB 8 Jan 96
Anoglypta launcestonesis	5442 Diddleum Road 5403 4282	KB 9 Feb 96
Anoglypta launcestonesis	5542 Wayback Hill 5503 4240	Kershaw (1988)
Anoglypta launcestonesis	5642 Mt Victoria 5699 4227	KB 16 Jan 96
Anoglypta launcestonesis	5742 Mt Albert 5749 4210	Roy Crookshanks
Anoglypta launcestonesis	5842 Rayners Hill 5880 4223	KB 1 Feb 96
Anoglypta launcestonesis	5942 Toms Gully 5904 4219	KB 26 Oct 99
Anoglypta launcestonesis	5341 Weavers Creek 5312 4142	Kershaw (1988)
Anoglypta launcestonesis	5441 Beckett Creek 5433 4167	KB 6 Feb 96
Anoglypta launcestonesis	5541 Upper Blessington 5517 4124	Roy Crookshanks
Anoglypta launcestonesis	5641 Sweets Creek 5608 4168	KB 11 Jan 96
Anoglypta launcestonesis	5741 Delvin Creek Mathinna 5751 417	KB 15 Jan 96
Anoglypta launcestonesis	5841 Evercreech 5814 4153	Kershaw (1988)
Anoglypta launcestonesis	5540 Roses Tier 5568 4094	KB 7 Feb 96
Bothriembryon tasmanicus	5848 Little Musselroe Bay	Kershaw (1985)
Bothriembryon tasmanicus	5145 Pipers River	TM Stephens 1913 (TMAG)
Bothriembryon tasmanicus	6044 The Gardens 6076 4415	KB 28 Aug 88
Bothriembryon tasmanicus	6043 Sloop Lagoon 6067 4371	KB 28 Aug 88
Bothriembryon tasmanicus	6042 Humbug Point 6080 4255	KB 27 Oct 90
Bothriembryon tasmanicus	6142 St Helens Point 6133 4296	KB 8 Sep 88
Bothriembryon tasmanicus	6036 Bicheno	E. Armstrong 1972 (QVM)
Bothriembryon tasmanicus	6035 Cape Lodi	Roy Crookshanks
Bothriembryon tasmanicus	6034 Friendly Beaches	A. Francis 1999
Bothriembryon tasmanicus	5833 Webber Point Swansea	Brian Smith 17 Oct 88 (QVM)
Bothriembryon tasmanicus	6033 Wineglass Bay 6069 3308	KB 15 Jan 00
Bothriembryon tasmanicus	6133 Bluestone Bay 6104 3375	KB Sept 85
Bothriembryon tasmanicus	5832 Mayfield Bay 5835 3225	KB 10 Feb 02
Bothriembryon tasmanicus	6032 Hazards Beach 6067 3279	KB Easter 85
Bothriembryon tasmanicus	6031 Schoeten Island 6059 3186	M. Johnstone 13 Oct 86 (QVM)
Bothriembryon tasmanicus	5729 Triabunna	E. Frame 15 Jan 94 (QVM)
Bothriembryon tasmanicus	5829 Plain Place Beach 5816 2945	KB 3 Sep 94
Bothriembryon tasmanicus	5728 Prosser River 5709 2880	KB 26 July 98
Bothriembryon tasmanicus	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Bothriembryon tasmanicus	5928 Bishop + Clerk 5915 2841	KB 23 Mar 96
Bothriembryon tasmanicus	5627 Sandspit River 5690 2711	KB 6 Oct 90
Bothriembryon tasmanicus	5727 Wielangta 5704 2727	KB 3 Sep 94
Bothriembryon tasmanicus	5827	Smith + Kershaw (1981)
Bothriembryon tasmanicus	5626 Wielangta	Geog Dept pitfall traps
Bothriembryon tasmanicus	5726 Bream Creek 5708 2639	KB 14 Nov 92
Bothriembryon tasmanicus	5725 Lagoon Bay 5782 2524	KB 8 Oct 94
Bothriembryon tasmanicus	5624	Smith + Kershaw (1981)
Bothriembryon tasmanicus	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Bothriembryon tasmanicus	5824	Smith + Kershaw (1981)
Bothriembryon tasmanicus	5323 Betsey Island	Kershaw (1985)
Bothriembryon tasmanicus	5723 Hawks Hill 5757 2384	KB 8 Aug 89
Bothriembryon tasmanicus	5622 Port Arthur	Kershaw (1985)
Bothriembryon tasmanicus	5722 Fortescue Bay 5785 2226	KB 13 Jan 86
Bothriembryon tasmanicus	5321 Mars Bluff 5325 2120	KB 22 July 01
Bothriembryon tasmanicus	5621 Tunnel Bay 5607 2169	KB 6 Sep 86
Bothriembryon tasmanicus	5821 Tasman Island	George Davis
Bothriembryon tasmanicus	4120 Port Davey	Janet Fenton (colour drawing)
Bothriembryon tasmanicus	5220 Bruny Island	Kershaw (1985)
Bothriembryon tasmanicus	4319 Celery Top Islands	George Davis
Bothriembryon tasmanicus	5119 Bruny Island	Kershaw (1985)

Bothriembryon tasmanicus	5219 Mt Mangana 5232 1985	KB 13 Jan 86
Bothriembryon tasmanicus	4918 Rescherche Bay	Kershaw (1985)
Bothriembryon tasmanicus	4318 New Harbour	Kershaw (1985)
Bothriembryon tasmanicus	5118 Cape Bruny	Roy Crookshanks
Bothriembryon tasmanicus	4217 Wilson Bight 4253 1783	Moscal 14 Jan 87 (TMAG)
Bothriembryon tasmanicus	4417 Flat Witch Is	Parks island records
Bothriembryon tasmanicus	4617 Ile du Golfe	Nigel Brothers 12 Dec 87 (QVM)
Bothriembryon tasmanicus	4416 Maatsuyker Island 4440 1650	Nigel Brothers 11 Dec 87 (QVM)
Bothriembryon tasmanicus	4516 Flat Top Island 4502 1678	Nigel Brothers 29 Oct 87 (QVM)
Bothriembryon tasmanicus	4415 Mewstone	Parks island records
Paralaoma halli	2359 Fitzmaurice Beach	Liz Turner 10/1/90 (TMAG)
Paralaoma halli	5957 Memana	Kershaw 1 Nov 74 (QVM)
Paralaoma halli	2556 Yarra Creek 2513 5675	KB 28 Sep 03
Paralaoma halli	3148 Welcome River	Mollison 27 Oct 63 (TMAG)
Paralaoma halli	3248 Boundary Road 3204 4805	KB 4 Sep 00
Paralaoma halli	3548 The Nut 3571 4860	KB 13 May 98
Paralaoma halli	3247 Togari 3298 4726	KB 8 Sep 01
Paralaoma halli	3547 Black River 3563 4707	KB 3 Oct 91
Paralaoma halli	5547 Waterhouse Point	Churchill (QVM)
Paralaoma halli	3046 Marrawah	B. Mitchell Dec 1990 (QVM)
Paralaoma halli	3246 Togari 3261 4664	KB 4 June 99
Paralaoma halli	3245 Salmon River 3209 4573	KB 18 July 99
Paralaoma halli	3345 Roger River 3332 4526	KB 26 Dec 88
Paralaoma halli	3445 Trowutta Cave 3410 4519	KB 24 Oct 98
Paralaoma halli	3745 Lapoinya 3770 4574	KB 10 May 99
Paralaoma halli	3845 Oldina 3881 4585	KB 4 May 99
Paralaoma halli	3945 Kaloma Camp 3919 4568	KB 22 Oct 94
Paralaoma halli	4045 Burnie Park 4070 4550	KB 9 Jun 96
Paralaoma halli	4845 Five Mile Bluff 4880 4575	Kershaw July 72 (QVM)
Paralaoma halli	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Paralaoma halli	5945 "Goulds Country" 5933 4504	Dick Bashford 13 Apr 89 (QVM)
Paralaoma halli	3344 Sumac Lookout 3327 4456	KB 3 Oct 91
Paralaoma halli	3644 Rabalga Road 36224 4498	KB 24 Oct 98
Paralaoma halli	3844 Preolenna 3805 4464	KB 6 May 99
Paralaoma halli	4144 The Gnomon 4190 4409	KB 28 Mar 99
Paralaoma halli	4244 Paton Park 4240 4420	KB 27 Mar 99
Paralaoma halli	5444 Mt Stronach 5477 4423	KB 24 May 03
Paralaoma halli	3243 Balfour 3251 4303	KB 1 Nov 91
Paralaoma halli	3843 Oonah 3815 4356	KB 25 May 99
Paralaoma halli	3943 Tewkesbury 3900 4340	Kershaw Nov 70 (QVM)
Paralaoma halli	4443 Miandetta 4450 4388	KB 29 Sep 03
Paralaoma halli	4743 Saxon Creek 4720 4310	Kershaw Feb 69 (QVM)
Paralaoma halli	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Paralaoma halli	3242 Balfour 3247 4299	KB 1 Nov 91
Paralaoma halli	3542 Savage River Pipeline 3558 422	Coy et al (1993)
Paralaoma halli	4142 Loyetea Peak 4125 4252	Mesibov 27 Sep 01
Paralaoma halli	5342 Mt Barrow 5358 4201	Kershaw Apr 59 (QVM)
Paralaoma halli	5642 Mt Victoria 5693 4233	Coy et al (1993)
Paralaoma halli	5942 Ericksons Road 5938 4253	KB 11 Jun 88
Paralaoma halli	6042 Georges Bay	Petterd (QVM)
Paralaoma halli	3141	Mesibov (Arthur-Pieman survey)
Paralaoma halli	3441 Donaldson River 3409 4101	KB 23 Oct 98
Paralaoma halli	5041 Cataract Gorge 5094 4110	KB 10 June 90
Paralaoma halli	5141 Cataract Gorge 5102 4119	KB 25 Mar 89
Paralaoma halli	5241 Distillery Creek 5212 4134	KB 1 Aug 00

Paralaoma halli	5341	Smith + Kershaw (1981)
Paralaoma halli	4540 Garden of Eden Creek 4532 408	KB 31 Jan 93
Paralaoma halli	5140 Kate Reed SRA 5124 4074	KB 31 Aug 01
Paralaoma halli	4439 Marakoopa Cave 4408 3968	KB 30 Mar 86
Paralaoma halli	4539 Caveside 4502 3944	Kershaw Dec 67 (QVM)
Paralaoma halli	4739	Smith + Kershaw (1981)
Paralaoma halli	4338 Arm River 4344 3843	KB 21 Sep 01
Paralaoma halli	4438 nr Fisher River, Walls Jerusalem	B. Mitchell Dec 1990 (QVM)
Paralaoma halli	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Paralaoma halli	4838 Liffey Falls 4802 3834	KB 23 Sep 95
Paralaoma halli	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Paralaoma halli	3837 Mt Murchison	Chris Carr 2001
Paralaoma halli	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Paralaoma halli	4737 Dells Bluff 4764 3749	KB 13 May 92
Paralaoma halli	5237 Epping Forest 5260 3751	KB 12 July 98
Paralaoma halli	3536 Heemskirk River 3518 3692	KB 22 Oct 98
Paralaoma halli	3836 Anthony Road 3854 3680	Coy et al (1993)
Paralaoma halli	4236 Pelion Valley 4208 3669	KB 10 Jan 91
Paralaoma halli	4636 Lake Augusta 4655 3665	KB 6 May 92
Paralaoma halli	4736 Liawenee 4724 3614	KB 7 May 92
Paralaoma halli	4535 Bull Hill 4540 3597	KB 9 May 92
Paralaoma halli	4835 Hydro Creek 4885 3555	KB 10 May 92
Paralaoma halli	5734 Lost Falls 5736 3450	KB 28 Apr 01
Paralaoma halli	3633 Hogarth Falls 3633 3318	KB 12 June 96
Paralaoma halli	3933 Bubs Hill	Arthur Clarke 1987
Paralaoma halli	4333 Lake St Clair 4310 3380	Kershaw May 72 (QVM)
Paralaoma halli	5033 Alma Pass 5060 3349	KB 4 Apr 92
Paralaoma halli	5733 Big Sassy Creek 5749 3332	Coy et al (1993)
Paralaoma halli	4132 Franklin River	Chris Carr 2001
Paralaoma halli	4332 Butlers Gorge 4408 3215	KB 31 Jan 99
Paralaoma halli	4432	Forestry Tas (Tarraleah samples)
Paralaoma halli	5232 Blackman River 5241 3293	KB 22 Feb 98
Paralaoma halli	4431	Forestry Tas (Tarraleah samples)
Paralaoma halli	4631 Glenmark 4695 3190	KB 28 Dec 97
Paralaoma halli	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Paralaoma halli	4530 Wayatinah 4593 3097	KB 26 Jan 99
Paralaoma halli	5030 Bothwell 5030 3070	George David 16 Oct 68
Paralaoma halli	3829 Pine Landing 3858 2994	KB 27 Jan 00
Paralaoma halli	4529 Tiger Road 4546 2949	KB 31 Jan 99
Paralaoma halli	5229 Yarlington Tier 5245 2902	KB 4 Feb 01
Paralaoma halli	5329 Coal River Gorge 5328 2968	KB 5 Oct 03
Paralaoma halli	5729 Rostrevor Reservoir 5767 2960	KB 3 Sep 94
Paralaoma halli	3728 Hobbs Creek 3752 2878	KB 1 Mar 00
Paralaoma halli	4728 Montos Creek 4732 2814	KB 4 Feb 95
Paralaoma halli	5228 Yarlington Tier 5245 2898	KB 22 Feb 98
Paralaoma halli	5628 Prosser River 5699 2880	KB 26 July 98
Paralaoma halli	5728 Prosser River 5709 2880	KB 26 July 98
Paralaoma halli	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Paralaoma halli	5928 Bishop + Clerk 5915 2841	KB 23 Mar 96
Paralaoma halli	4627 Lake Fenton 4695 2746	Coy et al (1993)
Paralaoma halli	4727 Mt Field Kiosk 4766 2742	KB 7 Apr 89
Paralaoma halli	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Paralaoma halli	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Paralaoma halli	5427 Pawleena 5497 2707	KB 9 Aug 98
Paralaoma halli	5527 Nelsons Tier 5559 2712	KB 9 Aug 98
Paralaoma halli	4526 Jubilee Rise 4592 2668	KB 19 Aug 89

Paralaoma halli	4626 Maydena Park 4670 2649	KB 19 Aug 89
Paralaoma halli	5126 Poimena Reserve 5199 2632	KB 13 June 90
Paralaoma halli	5226 Catchpole Gully 5284 2627	KB 18 July 88
Paralaoma halli	5326 Basin Hills 5302 2614	KB 28 Dec 00
Paralaoma halli	5626 Hospital Creek 5674 2658	KB 9 Aug 03
Paralaoma halli	4425 Frodshams Pass 4476 2591	Kershaw 9 Apr 77 (QVM)
Paralaoma halli	5125 New Town Falls 5199 2523	KB 15 Nov 87
Paralaoma halli	5225 Knocklofty 5240 2521	KB 17 Apr 00
Paralaoma halli	3924	Lower Gordon survey (TMAG)
Paralaoma halli	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Paralaoma halli	4824 Herons Creek 4820 2427	KB 25 Dec 97
Paralaoma halli	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Paralaoma halli	5124 Organ Pipes 5193 2496	KB 14 Feb 89
Paralaoma halli	5224 Mt Nelson-Taroona 5285 2468	KB 11 Feb 87
Paralaoma halli	3923 Giblin River	Steve Smith
Paralaoma halli	4423 Scotts Peak 4424 2345	KB 28 Feb 99
Paralaoma halli	4923 New Road Franklin 4950 2309	KB 26 Nov 89
Paralaoma halli	5123 Snug Plains 5144 2316	KB 3 July 88
Paralaoma halli	4722 Manuka Road 4740 2279	KB 22 Nov 00
Paralaoma halli	4822 Lidgerwood Rd 4868 2246	KB 11 Feb 95
Paralaoma halli	5122 Snug Tiers 5125 2297	KB 7 May 94
Paralaoma halli	5222 McCrackens Ck 5294 2245	KB 8 Aug 92
Paralaoma halli	5622 Palmers Lookout 5676 2209	KB 15 Feb 01
Paralaoma halli	5722 Fortescue Bay 5785 2226	KB 13 Jan 86
Paralaoma halli	5822 Cape Huay 5803 2224	KB 5 Mar 94
Paralaoma halli	5321 Church Hill 5328 2125	KB 4 Aug 00
Paralaoma halli	4120 Breaksea Island 4161 2018	KB 16 Jan 91
Paralaoma halli	4920 Francistown 4989 2053	KB 19 June 88
Paralaoma halli	5120 Ninepins 5134 2077	KB 8 Feb 03
Paralaoma halli	5220 The Neck 5283 2090	KB 23 Sep 89
Paralaoma halli	4219 Melaleuca Inlet 4298 1956	KB 15 Jan 91
Paralaoma halli	4319 Melaleuca 4324 1960	KB 14 Jan 91
Paralaoma halli	5219 Mt Mangana 5229 1980	Coy et al (1993)
Paralaoma halli	4618 Precipitous Bluff	Stefan Eberhard (1994) AM
Paralaoma halli	4818 MysteryCreek Track 4880 1878	KB 25 Feb 01
Paralaoma caputspinulae	2361 Cape Wickham 2386 6126	KB 27 Sep 03
Paralaoma caputspinulae	2360 Lake Flanigan 2380 6090	KB 12 Dec 96
Paralaoma caputspinulae	2357 Currie 2304 5752	KB 11 Dec 96
Paralaoma caputspinulae	5757 Wybalena 5752 5707	KB 24 Sep 00
Paralaoma caputspinulae	2456 Grassy River 2492 5631	KB 26 Sep 98
Paralaoma caputspinulae	2355 Seal Rocks 2338 5567	KB 27 Sep 98
Paralaoma caputspinulae	2455 Colliers Beach 2438 5573	KB 17 Dec 96
Paralaoma caputspinulae	5855 Whitemark 5863 5581	Kershaw 23 Aug 57 (QVM)
Paralaoma caputspinulae	5955 Mt Strzelecki	Ron Kershaw 11 Nov 74 (QVM)
Paralaoma caputspinulae	3051 Hunter Island 3096 5117	KB 28 Jan 97
Paralaoma caputspinulae	3151 Three Hummock 3195 5190	KB 31 Jan 97
Paralaoma caputspinulae	3251 Three Hummock 3258 5197	KB 1 Feb 97
Paralaoma caputspinulae	3349 Robbins Island 3316 4912	KB 4 Feb 97
Paralaoma caputspinulae	3548 The Nut 3571 4860	KB 13 May 98
Paralaoma caputspinulae	3447 Smithton 3422 4777	KB 12 Sep 92
Paralaoma caputspinulae	3747 Rocky Cape 3773 4708	KB 2 Oct 91
Paralaoma caputspinulae	5447 Blackmans Lagoon 5498 4708	KB 20 Sep 97
Paralaoma caputspinulae	5547 Waterhouse Point 5542 4792	KB 20 Sep 97
Paralaoma caputspinulae	3946 Table Cape Lookout 3930 4662	KB 22 Oct 94
Paralaoma caputspinulae	5346 Granite Point Bridport 5320 4635	KB 15 Mar 03

Paralaoma caputspinulae	4845 Five Mile Bluff 4880 4575	Kershaw July 72 (QVM)
Paralaoma caputspinulae	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Paralaoma caputspinulae	3744 Arthur River 3722 4408	Mesibov 24 Dec 93 (QVM)
Paralaoma caputspinulae	4344 Camp Clayton 4344 4434	KB 24 Mar 95
Paralaoma caputspinulae	4444 Lillico 4403 4430	Kershaw 26 Oct 70 (QVM)
Paralaoma caputspinulae	4644 Hawley 4613 4454	Kershaw 30 Dec 70 (QVM)
Paralaoma caputspinulae	4744 Badger Head 4722 4499	Kershaw Apr 51 (QVM)
Paralaoma caputspinulae	4844	Smith + Kershaw (1981)
Paralaoma caputspinulae	6044 The Gardens 6076 4415	KB 28 Aug 88
Paralaoma caputspinulae	4343 Champion Park 4337 4370	KB 26 Mar 95
Paralaoma caputspinulae	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Paralaoma caputspinulae	4943 Supply Mill 4950 3326	KB 8 Mar 97
Paralaoma caputspinulae	5142 Prossers Forest 5147 4236	KB 12 Aug 95
Paralaoma caputspinulae	5242 Skemps 5295 4286	KB 9 Dec 95
Paralaoma caputspinulae	6042 Windmill Lagoon 6095 4237	KB 2 Apr 00
Paralaoma caputspinulae	3141	Mesibov (Arthur-Pieman survey)
Paralaoma caputspinulae	5041 Cataract Gorge 5094 4110	KB 10 June 90
Paralaoma caputspinulae	5141 Cataract Gorge 5102 4119	KB 25 Mar 89
Paralaoma caputspinulae	5541 Telopea Road 5540 4150	KB 9 Dec 95
Paralaoma caputspinulae	6041	Smith + Kershaw (1981)
Paralaoma caputspinulae	4440 Granta Ponds 4483 4050	KB 23 Sep 95
Paralaoma caputspinulae	4540 Alum Cliffs 4525 4026	KB 28 Mar 98
Paralaoma caputspinulae	5040	Smith + Kershaw (1981)
Paralaoma caputspinulae	5039 Toiberry 5031 3973	Mesibov 22 Nov 93 (QVM)
Paralaoma caputspinulae	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Paralaoma caputspinulae	6038 Heritage Falls 6003 3803	KB 28 Oct 90
Paralaoma caputspinulae	5337	Smith + Kershaw (1981)
Paralaoma caputspinulae	5537 Eastbourne	Aust Mus collections
Paralaoma caputspinulae	5637 China Cup Hills	Belinda Yaxley 2000
Paralaoma caputspinulae	5937 Douglas-Apsley 5967 3716	Mesibov 18 July 88 (QVM)
Paralaoma caputspinulae	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Paralaoma caputspinulae	4736 Liawenee 4724 3614	KB 7 May 92
Paralaoma caputspinulae	5336 Conara 5360 3690	KB 18 Apr 00
Paralaoma caputspinulae	5936 Douglas-Apsley 5965 3662	Mesibov 4 July 88 (QVM)
Paralaoma caputspinulae	6036 Bicheno 6085 3631	KB 13 May 88
Paralaoma caputspinulae	5535 Gilbert Dick Hills 5586 3508	KB 5 July 00
Paralaoma caputspinulae	4534 Pine Tier Lagoon 4576 3403	KB 31 Jan 99
Paralaoma caputspinulae	5634 Lake Leake 5657 3492	KB 5 July 00
Paralaoma caputspinulae	4733 Waddamana 4796 3371	KB 31 Jan 99
Paralaoma caputspinulae	4933 Lagoon of Islands 4948 3378	KB 3 Aug 03
Paralaoma caputspinulae	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Paralaoma caputspinulae	5333 Tunbridge Tip 5353 3333	KB 9 Nov 91
Paralaoma caputspinulae	6033 Wineglass Bay 6069 3308	KB 15 Jan 00
Paralaoma caputspinulae	5332 Antill Ponds 5332 3273	KB 3 Apr 99
Paralaoma caputspinulae	5832 Spiky Beach 5880 32285	KB 2 Dec 01
Paralaoma caputspinulae	5731 Freshwater Bay 5795 3117	KB 9 Sep 01
Paralaoma caputspinulae	5030 Little Den Creek 5093 3027	KB 22 Feb 98
Paralaoma caputspinulae	5230 Spring Hill 5214 3037	KB 18 Apr 00
Paralaoma caputspinulae	4729 Ouse	Aust Mus collections
Paralaoma caputspinulae	5429 Mount Hobbs 5483 2924	KB 5 July 98
Paralaoma caputspinulae	5529 Sand River 5589 2926	KB 5 July 98
Paralaoma caputspinulae	3628 Hibbs Lagoon	QVM collections
Paralaoma caputspinulae	4928 Gretna 4910 2840	KB 20 Aug 88
Paralaoma caputspinulae	5028 Pelham 5010 2860	George Davis 11 Jan 69 (QVM)
Paralaoma caputspinulae	5228 Yarlington Tier 5245 2898	KB 22 Feb 98
Paralaoma caputspinulae	5628 Prosser River 5699 2880	KB 26 July 98

Paralaoma caputspinulae	5728 Prosser River 5709 2880	KB 26 July 98
Paralaoma caputspinulae	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Paralaoma caputspinulae	5928 Bishop + Clerk 5915 2841	KB 23 Mar 96
Paralaoma caputspinulae	5026 New Norfolk 5048 2647	KB 17 Jan 90
Paralaoma caputspinulae	5126 Granton 5167 2665	KB 3 July 89
Paralaoma caputspinulae	5226 Catchpole Gully 5284 2627	KB 18 July 88
Paralaoma caputspinulae	5326 Basin Hills 5302 2614	KB 28 Dec 00
Paralaoma caputspinulae	5626 Kellevie 5648 2663	KB 15 July 90
Paralaoma caputspinulae	5726 Bream Creek 5708 2639	KB 14 Nov 92
Paralaoma caputspinulae	5125 New Town Falls 5199 2523	KB 15 Nov 87
Paralaoma caputspinulae	5225 Knocklofty 5240 2521	KB 17 Apr 00
Paralaoma caputspinulae	5325 Craigow Hill 5335 2595	KB 9 Oct 93
Paralaoma caputspinulae	5725 Marion Bay 5710 2589	KB 6 Aug 89
Paralaoma caputspinulae	5224 Mt Nelson-Taroona 5285 2468	KB 11 Feb 87
Paralaoma caputspinulae	5324 Sandford	May (QVM)
Paralaoma caputspinulae	5424 Sandford	May (QVM)
Paralaoma caputspinulae	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Paralaoma caputspinulae	4923 New Road Franklin 4950 2309	KB 26 Nov 89
Paralaoma caputspinulae	5223 Tinderbox 5271 2342	KB 22 Apr 01
Paralaoma caputspinulae	5723 Fossil Island 5770 2350	KB 14 Apr 96
Paralaoma caputspinulae	4922 Kermandie 4961 2214	KB 23 Nov 00
Paralaoma caputspinulae	5022 Cradoc 5024 2284	KB 15 Nov 90
Paralaoma caputspinulae	5222 Conningham 5224 2296	KB 5 Dec 98
Paralaoma caputspinulae	5722 Stinking Bay 5719 2251	KB 14 Apr 96
Paralaoma caputspinulae	5021 Randalls Bay 5097 2118	KB 16 Feb 00
Paralaoma caputspinulae	4920 Francistown 4989 2053	KB 19 June 88
Paralaoma caputspinulae	5120 Alonnah 5193 2031	KB 3 Jan 01
Paralaoma caputspinulae	5220 The Neck 5283 2090	KB 23 Sep 89
Paralaoma caputspinulae	5119 Mickeys Bay 5153 1913	KB 23 May 98
Paralaoma caputspinulae	5219 Adventure Bay 5272 1982	KB 23 Sep 89
Paralaoma caputspinulae	4818 MysteryCreek Track 4880 1878	KB 25 Feb 01
Paralaoma caputspinulae	5118 Cape Bruny 5111 1842	KB 26 Dec 91
Paralaoma caputspinulae	4617 Ile du Golfe (as Planilaoma)	Parks Island Records
Paralaoma mucoides	5955 Meunna 5934 5572	Kershaw 1 Nov 74 (QVM)
Paralaoma mucoides	5854 Mt Strzelecki 5898 5489	KB 23 Sep 00
Paralaoma mucoides	3548 The Nut 3571 4860	KB 13 May 98
Paralaoma mucoides	4045 Romaine 4082 4515	KB 2 Nov 97
Paralaoma mucoides	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Paralaoma mucoides	5945 "Goulds Country" 5933 4504	Dick Bashford 13 Apr 89 (QVM)
Paralaoma mucoides	3344 Sumac Lookout 3327 4456	KB 3 Oct 91
Paralaoma mucoides	3744 Arthur River 3722 4408	Mesibov 24 Dec 93 (QVM)
Paralaoma mucoides	4344 Leith	Kershaw 17 May 56 (QVM)
Paralaoma mucoides	5242 Skemps 5295 4286	KB 9 Dec 95
Paralaoma mucoides	5342 Mt Barrow 5358 4201	Kershaw Apr 59 (QVM)
Paralaoma mucoides	3741	Smith + Kershaw (1981)
Paralaoma mucoides	3841	Smith + Kershaw (1981)
Paralaoma mucoides	5241 Distillery Creek 5212 4134	KB 1 Aug 00
Paralaoma mucoides	5140 Kate Reed SRA 5124 4074	KB 31 Aug 01
Paralaoma mucoides	4439 Marakoopa Cave 4408 3968	KB 30 Mar 86
Paralaoma mucoides	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Paralaoma mucoides	4338 Arm River 4346 3805	Kershaw 7 Dec 74 (QVM)
Paralaoma mucoides	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Paralaoma mucoides	4838 Liffey Falls 4802 3834	KB 23 Sep 95
Paralaoma mucoides	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Paralaoma mucoides	6038 Heritage Falls 6003 3803	KB 28 Oct 90

Paralaoma mucoides	4937 Mount Blackwood 4913 3714	KB 6 Nov 99
Paralaoma mucoides	5937 Douglas-Apsley 5967 3716	Mesibov 18 July 88 (QVM)
Paralaoma mucoides	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Paralaoma mucoides	5936 Douglas-Apsley 5965 3662	Mesibov 4 July 88 (QVM)
Paralaoma mucoides	5735 Meetus Falls 5730 3548	Tim Hume 6 Aug 77 (QVM)
Paralaoma mucoides	4933 Lagoon of Islands 4948 3378	KB 3 Aug 03
Paralaoma mucoides	5232 Blackman River 5241 3293	KB 22 Feb 98
Paralaoma mucoides	5630 Maclaines Ck 5688 3015	Mesibov 15 Apr 91
Paralaoma mucoides	4629 Thunderbolt 4640 2970	Owen Seeman May 00 (QVM)
Paralaoma mucoides	5329 Coal River Gorge 5328 2968	KB 5 Oct 03
Paralaoma mucoides	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Paralaoma mucoides	4727 Mt Field Kiosk 4766 2742	KB 7 Apr 89
Paralaoma mucoides	5627 Sandspit River 5690 2711	KB 6 Oct 90
Paralaoma mucoides	5727 Sandspit River 5703 2713	Coy et al (1993)
Paralaoma mucoides	4626 Junee Cave 4668 2681	KB 15 Mar 98
Paralaoma mucoides	5226 Catchpole Gully 5284 2627	KB 18 July 88
Paralaoma mucoides	5626 Kellevie 5648 2663	KB 15 July 90
Paralaoma mucoides	5025 Illa Brook 5052 2564	KB 3 June 95
Paralaoma mucoides	5125 New Town Falls 5199 2523	KB 15 Nov 87
Paralaoma mucoides	5225 Knocklofty 5240 2521	KB 17 Apr 00
Paralaoma mucoides	5325 Craigow Hill 5335 2595	KB 9 Oct 93
Paralaoma mucoides	5224 Mt Nelson-Taroona 5285 2468	KB 11 Feb 87
Paralaoma mucoides	5524 Lime Bay 5582 2437	KB 7 Dec 02
Paralaoma mucoides	5123 Snug Plains 5144 2316	KB 3 July 88
Paralaoma mucoides	5223 Tinderbox 5271 2342	KB 22 Apr 01
Paralaoma mucoides	5323 Gellibrand Road 5391 2372	KB 4 May 86
Paralaoma mucoides	4722 Tahune Park 4772 2284	KB 13 Nov 88
Paralaoma mucoides	4822 Lidgerwood Rd 4868 2246	KB 11 Feb 95
Paralaoma mucoides	4922 Castle Forbes Falls 4958 2258	KB 29 Mar 91
Paralaoma mucoides	5122 Snug Tiers 5125 2297	KB 7 May 94
Paralaoma mucoides	5622 Clark Cliffs 5638 2267	KB 3 May 02
Paralaoma mucoides	5321 Church Hill 5328 2125	KB 4 Aug 00
Paralaoma mucoides	4120 Breaksea Island 4161 2018	KB 16 Jan 91
Paralaoma mucoides	4819 Hastings Caves 4879 1957	KB 3 Oct 98
Paralaoma mucoides	5019 Lady Bay 5015 1946	KB 27 Dec 88
Paralaoma sp. "Hartz"	5844 Mt Michael 5845 4406	Coy et al (1993)
Paralaoma sp. "Hartz"	5642 Mt Victoria 5693 4233	Coy et al (1993)
Paralaoma sp. "Hartz"	4139 Cradle Mountain 4109 3955	Coy et al (1993)
Paralaoma sp. "Hartz"	4327 Clear Hill 4398 2740	KB 15 Mar 98
Paralaoma sp. "Hartz"	4627 Tarn Shelf Mt Field	Belinda Yaxley 7 Feb 00
Paralaoma sp. "Hartz"	4425 Frodshams Pass 4497 22580	Coy et al (1993)
Paralaoma sp. "Hartz"	5125 Big Bend Mt Wellington	Belinda Yaxley 23 Mar 00
Paralaoma sp. "Hartz"	4424 Mt Anne	Don Driscoll Mar 02
Paralaoma sp. "Hartz"	4724 Lake Skinner	Belinda Yaxley 2000
Paralaoma sp. "Hartz"	4821 Hartz Peak 4810 2118	KB 8 Dec 96
Paralaoma sp. "Hartz"	5219 Mt Mangana 5229 1980	Coy et al (1993)
Pasmaditta jungermanniae	4942 Notley 4926 4219	Kershaw 8 Nov 84 (QVM)
Pasmaditta jungermanniae	5041 Cataract Gorge 5098 4117	KB 10 June 90
Pasmaditta jungermanniae	5141 Cataract Gorge 5102 4119	KB 25 Mar 89
Pasmaditta Blue Tier	5844 Blue Tier 5846 4402	KB 1 Apr 00
Pedicamista coesus	3548 The Nut 3571 4860	KB 13 May 98
Pedicamista coesus	3946 Table Cape	Petterd (1879)

Pedicamista coesus	3044 Temma	Roy Crookshanks
Pedicamista coesus	3238 Conical Harbour	Bill Mollison 26 Jan 64 (TMAG)
Pedicamista coesus	3435 Trial Harbour 3480 3564	KB 13 May 89
Pedicamista coesus	4120 Breaksea Island 4161 2018	KB 16 Jan 91
Pedicamista coesus	4918 Southport Bluff 4999 1859	KB 30 Dec 90
Pedicamista coesus	4917 Rescherche Bay	Petterd (1879)
Pedicamista coesus	4416 Needle Rocks 4400 1650	Nigel Brothers 2 Dec 87
Pedicamista "Bull Hill"	4535 Bull Hill 4537 3594	KB 9 May 92
Pedicamista "Bull Hill"	4737 Dells Bluff 4764 3749	KB 13 May 92
Pedicamista "Southport"	5321 Mars Bluff 5327 2121	KB 4 Aug 01
Pedicamista "Southport"	5219 Fluted Cape 5298 1996	KB 8 Apr 01
Pedicamista "Southport"	5319 Fluted Cape 5302 1989	KB 8 Apr 01
Pedicamista "Southport"	4918 Southport Bluff 4999 1861	KB 30 Dec 90
Pedicamista "Southport"	5118 Cape Bruny 5111 1842	KB 26 Dec 91
Pedicamista "Chisholm"	3247 Togari Block 3269 4718	KB 13 Sep 92
Pedicamista "Chisholm"	3347 Togari Block 3312 4719	KB 8 Sep 92
Pedicamista "Chisholm"	3345 Roger River 3332 4526	KB 1 Oct 91
Pedicamista "Chisholm"	3645 Dip Falls 3635 4559	KB 27 Dec 88
Pedicamista "Chisholm"	3745 Meunna 3724 4519	KB 11 May 99
Pedicamista "Chisholm"	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Pedicamista "Chisholm"	3444 Rapid River 3404 4424	KB 3 Oct 91
Pedicamista "Chisholm"	4144 The Gnomon 4190 4409	KB 28 Mar 99
Pedicamista "Chisholm"	5444 Mt Stronach 5498 4444	KB 19 Jan 96
Pedicamista "Chisholm"	5842 Goulds Country	Karen Richards 2002
Pedicamista "Chisholm"	3843 Oonah 3849 4379	KB 27 May 99
Pedicamista "Chisholm"	5743 Rattler Range 5744 4353	Mesibov (1988)
Pedicamista "Chisholm"	4242 Castra	Karen Richards 2002
Pedicamista "Chisholm"	5642 Mt Victoria 5675 4282	KB 17 Jan 96
Pedicamista "Chisholm"	3637 Mt Read	Belinda Yaxley 5 May 00
Pedicamista "Chisholm"	3633 Hogarth Falls 3633 3318	KB 12 June 96
Pedicamista "Chisholm"	5733 Big Sassy Creek 5749 3332	Coy et al (1993)
Pedicamista "Chisholm"	3632 Teepookana	Belinda Yaxley 6 Apr 00
Pedicamista "Chisholm"	4132 Franklin River	Chris Carr 2001
Pedicamista "Chisholm"	3728 Hobbs Creek 3752 2878	KB 1 Mar 00
Pedicamista "Chisholm"	5728 Thumbs 5707 2846	NRCP collections
Pedicamista "Chisholm"	4026 (as P. coesus)	Smith + Kershaw (1981)
Pedicamista "Chisholm"	4725 Styx River 4746 2581	KB 9 Dec 01
Pedicamista "Chisholm"	5224 Mt Nelson-Taroona 5285 2468	KB 31 July 00
Pedicamista "Chisholm"	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Pedicamista "Chisholm"	4722 Tahune Park 4772 2284	KB 27 Dec 91
Pedicamista "Chisholm"	5622 Clark Cliffs 5638 2267	KB 3 May 02
Laomavix collisi	2361 Cape Wickham 2386 6126	KB 27 Sep 03
Laomavix collisi	2360 Lake Flanigan 2380 6090	KB 12 Dec 96
Laomavix collisi	2460 Lake Martha Lavinia 2481 6068	KB 14 Dec 96
Laomavix collisi	5859 NorthEast River 5819 5994	KB 24 Sep 00
Laomavix collisi	5658	Smith + Kershaw (1981)
Laomavix collisi	2357 Currie 2304 5752	KB 11 Dec 96
Laomavix collisi	2557 Naracoopa 2515 5784	KB 25 Sep 98
Laomavix collisi	5757 Wybalena 5752 5707	KB 24 Sep 00
Laomavix collisi	2456 Grassy River 2489 5640	KB 26 Sep 98
Laomavix collisi	5756 Pickford Creek 5782 5694	KB 26 Sep 00
Laomavix collisi	5856 Flinders Aerodrome 5856 5613	KB 23 Sep 00

Laomavix collisi	6056 Planter Beach 6095 5644	KB 25 Sep 00
Laomavix collisi	2355 Seal Rocks 2338 5567	KB 27 Sep 98
Laomavix collisi	2455 Colliers Beach 2438 5573	KB 17 Dec 96
Laomavix collisi	5855 Whitemark 5862 5585	Kershaw 1 Nov 74 (QVM)
Laomavix collisi	5955	Smith + Kershaw (1981)
Laomavix collisi	5854 Trousers Point 5874 5463	KB 23 Sep 00
Laomavix collisi	6054 Vinegar Hill 6064 5490	KB 26 Sep 00
Laomavix collisi	5753 Badger Island	John Whinray (Vic Mus coll)
Laomavix collisi	5953 Cape Barren Island	Petterd (1879)
Laomavix collisi	3252 North Hummock 3252 5242	KB 1 Feb 97
Laomavix collisi	3051 Hunter Island 3096 5117	KB 28 Jan 97
Laomavix collisi	3151 Hunter Island 3102 5107	KB 29 Jan 97
Laomavix collisi	3251 South Hummock 3218 5174	KB 1 Feb 97
Laomavix collisi	5851 Preservation Island	Smith + Kershaw (1981)
Laomavix collisi	3349 Robbins Island 3353 4925	KB 3 Feb 97
Laomavix collisi	3548 The Nut 3571 4860	KB 13 May 98
Laomavix collisi	5548	Smith + Kershaw (1981)
Laomavix collisi	3247 Grunter Road 3231 4748	KB 6 Sep 00
Laomavix collisi	3647 Port Latta 3612 4762	Kershaw Aug 65 (QVM)
Laomavix collisi	3747 Rocky Cape 3773 4708	KB 2 Oct 91
Laomavix collisi	5547 Waterhouse Point 5537 4780	KB 20 Sep 97
Laomavix collisi	3946 Chambers Bay 3919 4663	KB 8 Jun 96
Laomavix collisi	5046	Smith + Kershaw (1981)
Laomavix collisi	5146 Weymouth 5117 4600	Kershaw Sep 73 (QVM)
Laomavix collisi	5346 Bridport	QVM collections
Laomavix collisi	3045 Arthur River Mouth 3032 4527	KB 28 Mar 86
Laomavix collisi	3145 Salmon River 3168 4533	KB 18 July 99
Laomavix collisi	4045 Burnie Fern Glade 4094 4506	KB 10 Jun 96
Laomavix collisi	4145	Smith + Kershaw (1981)
Laomavix collisi	4745	Smith + Kershaw (1981)
Laomavix collisi	4845 East Beach 4833 4540	Kershaw 22 May 55 (QVM)
Laomavix collisi	4945	Smith + Kershaw (1981)
Laomavix collisi	5045	Smith + Kershaw (1981)
Laomavix collisi	5145 Bellingham 5136 4597	Kershaw Apr 75 (QVM)
Laomavix collisi	5945 "Goulds Country" 5933 4504	Dick Bashford 27 Oct 85 (QVM)
Laomavix collisi	3044	Mesibov (Arthur-Pieman survey)
Laomavix collisi	4144	Smith + Kershaw (1981)
Laomavix collisi	4344 Camp Clayton 4344 4434	KB 24 Mar 95
Laomavix collisi	4444 Devonport 4458 44322	Kershaw Oct 70 (QVM)
Laomavix collisi	4544	Smith + Kershaw (1981)
Laomavix collisi	4644 Hawley 4613 4454	Kershaw 30 Dec 70 (QVM)
Laomavix collisi	4744 Badger Head 4722 4499	Kershaw Apr 51 (QVM)
Laomavix collisi	6044 The Gardens 6076 4415	KB 28 Aug 88
Laomavix collisi	3043 Pardoe Creek 3081 4307	Mesibov 3 May 93 (QVM)
Laomavix collisi	3243 Balfour 3251 4303	KB 1 Nov 91
Laomavix collisi	4343	Smith + Kershaw (1981)
Laomavix collisi	5443 Ringarooma	Petterd (1879)
Laomavix collisi	3042 Ingram Bay	Mesibov 5 Jan 91 (QVM)
Laomavix collisi	3142	Mesibov (Arthur-Pieman survey)
Laomavix collisi	3242 Balfour 3247 4299	KB 1 Nov 91
Laomavix collisi	5042	Smith + Kershaw (1981)
Laomavix collisi	6042 Humbug Point 6080 4255	KB 27 Oct 90
Laomavix collisi	6142 St Helens Point 6133 4296	KB 8 Sep 88
Laomavix collisi	3141 Daisy River 3136 4199	Mesibov 17 Apr 93 (QVM)
Laomavix collisi	3140 Lagoon River 3199 4019	Mesibov 1 May 93 (QVM)
Laomavix collisi	6040 Hendersons Lagoon 6049 4070	KB 22 Sep 96

Laomavix collisi	3239 Interview River 3235 3951	Mesibov 1 May 91 (QVM)
Laomavix collisi	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Laomavix collisi	3238 Foam Creek 3254 3889	Mesibov 1 June 93 (QVM)
Laomavix collisi	5237 Conara	Smith + Kershaw (1981)
Laomavix collisi	5937 Denison Marshes	Mesibov 29 June 88 (QVM)
Laomavix collisi	6037 Mount Allen 6021 3713	Mesibov June 88 (QVM)
Laomavix collisi	5936 Mount Andrew	Mesibov 27 July 88 (QVM)
Laomavix collisi	6036 Bicheno 6085 3631	KB 13 May 88
Laomavix collisi	3633	Smith + Kershaw (1981)
Laomavix collisi	5933 Nine Mile Beach	Peter Mc Quillan
Laomavix collisi	6033 Wineglass Bay 6069 3308	KB 15 Jan 00
Laomavix collisi	5832 Spiky Beach 5880 3285	KB 2 Dec 01
Laomavix collisi	5329 Eldon Road 5353 2951	KB 4 Feb 01
Laomavix collisi	5529 Sand River 5589 2926	KB 5 July 98
Laomavix collisi	3628 Hibbs Lagoon	Mc Niven + West 1991 (QVM)
Laomavix collisi	5228 Chauncy Vale 5236 2819	KB 8 Dec 01
Laomavix collisi	5728 Thumbs 5724 2820	KB 6 Feb 93
Laomavix collisi	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Laomavix collisi	5928 Bishop + Clerk 5915 2841	KB 17 Nov 00
Laomavix collisi	5727 Wielangta 5704 2727	KB 6 Oct 90
Laomavix collisi	5226 Catchpole Gully 5284 2627	KB 7 June 90
Laomavix collisi	5326 Basin Hills 5302 2614	KB 28 Dec 00
Laomavix collisi	5626 Kellevie 5648 2663	KB 15 July 90
Laomavix collisi	5726 Bream Creek 5708 2639	KB 14 Nov 92
Laomavix collisi	5025 Illa Brook 5052 2564	KB 3 June 95
Laomavix collisi	5225 Hobart Rivulet 5249 2549	KB 29 July 90
Laomavix collisi	5325 Craigow Hill 5335 2595	KB 9 Oct 93
Laomavix collisi	5525 Clarence Plains	Petterd (1879)
Laomavix collisi	5625 Camden Brook 5634 2504	KB 15 July 90
Laomavix collisi	5725 Marion Bay 5710 2589	KB 6 Aug 89
Laomavix collisi	5224 Alum Cliffs 5274 2418	KB 10 May 87
Laomavix collisi	5324 Gorringes Beach 5378 2423	KB 3 July 00
Laomavix collisi	5424	Smith + Kershaw (1981)
Laomavix collisi	5723 Fossil Island 5770 2350	KB 5 Feb 00
Laomavix collisi	5222 McCrackens Ck 5294 2245	KB 8 Aug 92
Laomavix collisi	5722 Fortescue Bay 5785 2226	KB 24 Dec 89
Laomavix collisi	5822 Cape Huay 5803 2224	KB 5 Mar 94
Laomavix collisi	5021 Randalls Bay 5097 2118	KB 16 Feb 00
Laomavix collisi	5321 Mars Bluff 5325 2120	KB 22 July 01
Laomavix collisi	4120 Breaksea Island 4161 2018	KB 16 Jan 91
Laomavix collisi	5120 Alonnah 5193 2031	KB 3 Jan 01
Laomavix collisi	5220 The Neck 5283 2090	KB 23 Sep 89
Laomavix collisi	4319 Celery Top Islands 4314 1964	KB 18 Jan 91
Laomavix collisi	5019 Burying Ground Point 5006 1903	KB 26 Nov 88
Laomavix collisi	5119 Mickeys Bay 5153 1913	KB 13 Mar 99
Laomavix collisi	5219 Adventure Bay 5272 1982	KB 23 Sep 89
Laomavix collisi	4418	Smith + Kershaw (1981)
Laomavix collisi	4918 Southport Bluff 4999 1859	KB 30 Dec 90
Laomavix collisi	5118 Cape Bruny 5111 1842	KB 26 Dec 91
Laomavix collisi	4617 Ile du Golfe 4620 1762	Steve Smith 5 Feb 87 (QVM)
Laomavix collisi	4717 Surprise Bay	Tim Hume 1975 (QVM)
Miselaoma weldii	3548 The Nut 3564 4859	KB 12 May 98
Trocholaoma parvissima	3349 Robbins Island 3319 4945	KB 5 Feb 97
Trocholaoma parvissima	3548	Smith + Kershaw (1981)

Trocholaoma parvissima	3147	Smith + Kershaw (1981)
Trocholaoma parvissima	3247 Togari Block 3274 4721	KB 13 Sep 92
Trocholaoma parvissima	3347 Deep Creek Bay 3447 4787	KB 5 Sep 00
Trocholaoma parvissima	3447 Smithton 3422 4777	KB 12 Sep 92
Trocholaoma parvissima	3146	Smith + Kershaw (1981)
Trocholaoma parvissima	3246 Montagu Swamp 3220 4600	Kershaw May 69 (QVM)
Trocholaoma parvissima	3346 Christmas Hills 3306 4690	Kershaw May 69 (QVM)
Trocholaoma parvissima	3946 Chambers Bay 3919 4663	KB 8 Jun 96
Trocholaoma parvissima	5946 Great Musselroe River	Roy Crookshanks 1999
Trocholaoma parvissima	3145 Arthur/Frankland Jcn 3128 4503	KB 25 Dec 88
Trocholaoma parvissima	3245 Salmon River 3209 4573	KB 18 July 99
Trocholaoma parvissima	3345 Roger River 3332 4526	KB 26 Dec 88
Trocholaoma parvissima	3645 Dip Falls 3635 4559	KB 27 Dec 88
Trocholaoma parvissima	3745 Meunna 3708 4510	KB 12 May 99
Trocholaoma parvissima	3845 Calder Road 3833 4518	KB 5 May 99
Trocholaoma parvissima	3945 Oldina 3923 4546	KB 3 May 99
Trocholaoma parvissima	4845	Smith + Kershaw (1981)
Trocholaoma parvissima	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Trocholaoma parvissima	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Trocholaoma parvissima	3444 Rapid River 3404 4424	KB 3 Oct 91
Trocholaoma parvissima	3644 Rabalga Road 3624 4498	KB 24 Oct 98
Trocholaoma parvissima	3844 Preolenna 3805 4464	KB 6 May 99
Trocholaoma parvissima	4144 The Gnomon 4190 4409	KB 28 Mar 99
Trocholaoma parvissima	4244 Paton Park 4240 4420	KB 27 Mar 99
Trocholaoma parvissima	4344	Smith + Kershaw (1981)
Trocholaoma parvissima	4444	Smith + Kershaw (1981)
Trocholaoma parvissima	5144	Smith + Kershaw (1981)
Trocholaoma parvissima	5444 Mt Stronach 5477 4423	KB 24 May 03
Trocholaoma parvissima	5844 Blue Tier 5846 4402	KB 23 Jan 96
Trocholaoma parvissima	3843 Oonah 3816 4355	KB 25 May 99
Trocholaoma parvissima	3943 Tewkesbury 3913 4345	Kershaw Nov 70 (QVM)
Trocholaoma parvissima	4243 Purton Flat 4209 4378	KB 27 Mar 99
Trocholaoma parvissima	4343 Champion Park 4337 4370	KB 26 Mar 95
Trocholaoma parvissima	4443 Miandetta 4450 4388	KB 29 Sep 03
Trocholaoma parvissima	4743 Saxon Creek 4710 4310	Kershaw Feb 70 (QVM)
Trocholaoma parvissima	5343 Sideling 5333 4315	Kershaw 1966 (QVM)
Trocholaoma parvissima	5443 Springfield Park 5422 4312	KB 15 Mar 03
Trocholaoma parvissima	5743 Weldborough 5744 4357	Mesibov 27 Aug 90 (QVM)
Trocholaoma parvissima	4142 Loyatea 4107 4264	KB 3 Oct 99
Trocholaoma parvissima	4242 Isandula 4263 4298	KB 30 Apr 99
Trocholaoma parvissima	4742	Smith + Kershaw (1981)
Trocholaoma parvissima	4842 Dunkards Creek 4862 4259	KB 8 Mar 97
Trocholaoma parvissima	4942 Notley Gorge 4925 4216	KB 18 Mar 01
Trocholaoma parvissima	5242	Smith + Kershaw (1981)
Trocholaoma parvissima	5342	Smith + Kershaw (1981)
Trocholaoma parvissima	5642 Mt Victoria 5693 4233	Coy et al (1993)
Trocholaoma parvissima	5842 Goulds Country	Karen Richards 2002
Trocholaoma parvissima	3141 Pedder River 3150 4149	Mesibov 23 Jan 91 (QVM)
Trocholaoma parvissima	3741	Smith + Kershaw (1981)
Trocholaoma parvissima	3941	Smith + Kershaw (1981)
Trocholaoma parvissima	4041	Smith + Kershaw (1981)
Trocholaoma parvissima	4741 Deloraine	Petterd (QVM)
Trocholaoma parvissima	5041 Cataract Gorge 5094 4110	KB 27 Jun 96
Trocholaoma parvissima	5141	Smith + Kershaw (1981)
Trocholaoma parvissima	5641	Smith + Kershaw (1981)
Trocholaoma parvissima	3740 Butler Road 3712 4064	KB 25 Oct 98

Trocholaoma parvissima	3940 Surrey Hills	Petterd (1879)
Trocholaoma parvissima	4140 Lake Lea	Petterd (1879)
Trocholaoma parvissima	4440 Gog Range	Mesibov (QVM colls)
Trocholaoma parvissima	4540 Garden of Eden Creek 4532 408	KB 31 Jan 93
Trocholaoma parvissima	4740	Smith + Kershaw (1981)
Trocholaoma parvissima	5040	Smith + Kershaw (1981)
Trocholaoma parvissima	5140 Corra Linn	Sandy Leighton 2001
Trocholaoma parvissima	3439 Guthrie Creek 3408 3927	KB 23 Oct 98
Trocholaoma parvissima	4039	Smith + Kershaw (1981)
Trocholaoma parvissima	4139 Middlesex Plains	Petterd (1879)
Trocholaoma parvissima	4239 Gads Hill	Petterd (1879)
Trocholaoma parvissima	4339 Gads Hill	Petterd (1879)
Trocholaoma parvissima	4439 Marakoopa Cave 4408 3968	KB 26 Mar 89
Trocholaoma parvissima	4739	Smith + Kershaw (1981)
Trocholaoma parvissima	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Trocholaoma parvissima	4338 Arm River 4344 3843	KB 21 Sep 01
Trocholaoma parvissima	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Trocholaoma parvissima	4838	Smith + Kershaw (1981)
Trocholaoma parvissima	5938 Diamond Hill 5973 3846	Mesibov 28 July 88 (QVM)
Trocholaoma parvissima	3737	Smith + Kershaw (1981)
Trocholaoma parvissima	3837	Smith + Kershaw (1981)
Trocholaoma parvissima	4137 Oakleigh Creek 4190 3741	KB 9 Jan 91
Trocholaoma parvissima	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Trocholaoma parvissima	4937 Mount Blackwood 4913 3714	KB 6 Nov 99
Trocholaoma parvissima	5337	Smith + Kershaw (1981)
Trocholaoma parvissima	5937 Douglas River 5967 3716	Mesibov 18 July 88 (QVM)
Trocholaoma parvissima	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Trocholaoma parvissima	3536 Heemskirk River 3518 3692	KB 22 Oct 98
Trocholaoma parvissima	3836 Mt Murchison	Smith + Kershaw (1981)
Trocholaoma parvissima	4236 Pelion Gap 4208 3669	KB 10 Jan 91
Trocholaoma parvissima	4436 Walls of Jerusalem	B. Mitchell (QVM)
Trocholaoma parvissima	4636 Lake Augusta 4655 3665	KB 6 May 92
Trocholaoma parvissima	4736 Liawenee 4724 3614	KB 7 May 92
Trocholaoma parvissima	5035 Snowy Knob 5017 4533	KB 12 Sep 98
Trocholaoma parvissima	5635	Smith + Kershaw (1981)
Trocholaoma parvissima	4234 Cynthia Bay 4245 3487	KB 20 Mar 93
Trocholaoma parvissima	4934 Lagoon of Island 4950 3410	G. Davis 2 Mar 69 (QVM)
Trocholaoma parvissima	3633 Hogarth Falls 3633 3318	KB 12 June 96
Trocholaoma parvissima	4233	Smith + Kershaw (1981)
Trocholaoma parvissima	4333 Lake St Clair 4310 3380	Kershaw Mar 72 (QVM)
Trocholaoma parvissima	4933 Bakers Tier 4912 3342	KB 3 Aug 03
Trocholaoma parvissima	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Trocholaoma parvissima	5733 Big Sassy Creek 5746 3332	KB 23 Nov 97
Trocholaoma parvissima	3632 Teepookana 3655 2273	KB 13 June 96
Trocholaoma parvissima	4132 Frenchmans Cap track 4125 322	KB 28 Jan 00
Trocholaoma parvissima	4431 Mossy Marsh 4496 3155	KB 10 Jan 01
Trocholaoma parvissima	4631 Glenmark 4695 3190	KB 28 Dec 97
Trocholaoma parvissima	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Trocholaoma parvissima	4530 Wayatinah 4593 3097	KB 26 Jan 99
Trocholaoma parvissima	4529 Florentine 4540 2960	Owen Seeman 22 May 00 (QVM)
Trocholaoma parvissima	4629 Mt Thunderbolt 4640 2970	O. Seeman May 00 (QVM)
Trocholaoma parvissima	5229 Yarlington Tier 5245 2902	KB 4 Feb 01
Trocholaoma parvissima	5429 Mount Hobbs 5483 2924	KB 5 July 98
Trocholaoma parvissima	5529 Sand River 5589 2926	KB 5 July 98
Trocholaoma parvissima	3928	Smith + Kershaw (1981)
Trocholaoma parvissima	4028	Smith + Kershaw (1981)

Trocholaoma parvissima	5028 Espies Craig 5018 2286	KB 22 Feb 98
Trocholaoma parvissima	5228 Yarlington Tier 5245 2898	KB 22 Feb 98
Trocholaoma parvissima	5628 Prosser River 5683 2881	KB 18 Sep 99
Trocholaoma parvissima	5928 Bishop + Clerk 5915 2841	KB 17 Nov 00
Trocholaoma parvissima	3927	Smith + Kershaw (1981)
Trocholaoma parvissima	4027	Smith + Kershaw (1981)
Trocholaoma parvissima	4727 Russell Falls 4763 2748	KB 6 Nov 92
Trocholaoma parvissima	5427 Phipps Creek 5497 2751	KB 9 Aug 98
Trocholaoma parvissima	5527 Nelsons Tier 5559 2712	KB 9 Aug 98
Trocholaoma parvissima	5727 Sandspit River 5703 2713	Coy et al (1993)
Trocholaoma parvissima	3926	Smith + Kershaw (1981)
Trocholaoma parvissima	4026	Smith + Kershaw (1981)
Trocholaoma parvissima	4626 Junee Cave 4668 2681	KB 15 Mar 98
Trocholaoma parvissima	4926	Smith + Kershaw (1981)
Trocholaoma parvissima	5026	Smith + Kershaw (1981)
Trocholaoma parvissima	5126 Poimena Reserve 5199 2632	KB 13 June 90
Trocholaoma parvissima	5226 Mt Direction 5250 2608	KB 7 Jan 00
Trocholaoma parvissima	5726 Bream Creek 5708 2639	KB 14 Nov 92
Trocholaoma parvissima	4025	Smith + Kershaw (1981)
Trocholaoma parvissima	4225 Hermit Valley 4285 22577	Kershaw 9 Apr 77 (QVM)
Trocholaoma parvissima	4325	Smith + Kershaw (1981)
Trocholaoma parvissima	4425 Frodshams Pass 4497 2580	Coy et al (1993)
Trocholaoma parvissima	4725 Styx River 4746 2581	KB 9 Dec 01
Trocholaoma parvissima	5025 Illa Brook 5052 2564	KB 3 June 95
Trocholaoma parvissima	5125 Collinsvale 5127 2543	KB 6 Mar 89
Trocholaoma parvissima	5225 Knocklofty 5240 2521	KB 17 Apr 00
Trocholaoma parvissima	5325 Flagstaff Hill 5313 2562	KB 19 Jun 98
Trocholaoma parvissima	3924	Smith + Kershaw (1981)
Trocholaoma parvissima	4024	Smith + Kershaw (1981)
Trocholaoma parvissima	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Trocholaoma parvissima	5124 Lenah Valley Track 5198 2493	KB 4 Feb 90
Trocholaoma parvissima	5224 Jacksons Track 5213 2485	KB 7 May 88
Trocholaoma parvissima	5724 MacGregor Peak 5765 4412	KB 9 Oct 99
Trocholaoma parvissima	5123 Pelverata Falls 5112 2319	KB 8 Jan 95
Trocholaoma parvissima	5723 Hawks Hill 5757 2384	KB 8 Aug 89
Trocholaoma parvissima	4722 Tahune Park 4772 2284	KB 13 Nov 88
Trocholaoma parvissima	4822 Lidgerwood Rd 4868 2246	KB 11 Feb 95
Trocholaoma parvissima	5022 Cradoc 5024 2284	KB 15 Nov 90
Trocholaoma parvissima	5122 Snug Tiers 5125 2297	KB 7 May 94
Trocholaoma parvissima	5722 Cape Pillar Track 5760 2223	KB 6 Mar 99
Trocholaoma parvissima	4920 Francistown 4989 2053	KB 3 Apr 88
Trocholaoma parvissima	4819 Chestermans Road 4883 1959	KB 24 Nov 00
Trocholaoma parvissima	4919 Jacksons Creek 4970 1958	KB 24 Nov 00
Trocholaoma parvissima	5219 Mt Mangana 5232 1985	KB 7 Apr 01
Trocholaoma parvissima	4318 New Harbour Beach	Steve Smith 15 Dec 88 (QVM)
Trocholaoma parvissima	4418 Lousy Bay (as Bischoffena)	QVM collections
Trocholaoma parvissima	4618 Precipitous Bluff	Stefan Eberhard (1994) AM
Trocholaoma parvissima	4818 Moonlight Ridge 4872 1870	KB 11 Nov 89
Trocholaoma parvissima	4717 Surprise Bay	Tim Hume 1975 (QVM)
Trocholaoma parvissima	4817 South Cape Bay	Tim Hume 1975 (QVM)
Trocholaoma parvissima	4917 Rescherche Bay 4908 1752	KB 30 Nov 92
Trocholaoma parvissima	4716	Smith + Kershaw (1981)
Trocholaoma spiceri	3246 Salmon River Road	ABRS (TMAG)
Trocholaoma spiceri	4644 Devonport	Petterd (1879)
Trocholaoma spiceri	5444 Mt Stronach 5477 4423	KB 24 May 03

Trocholaoma spiceri	3843 Oonah 3855 4362	KB 14 May 99
Trocholaoma spiceri	4242 Castra	Karen Richards 2002
Trocholaoma spiceri	5442 Ringarooma	Petterd (1879)
Trocholaoma spiceri	5842 Goulds Country	Karen Richards 2002
Trocholaoma spiceri	3741 Mt Bischoff	Petterd (1879)
Trocholaoma spiceri	5041 Launceston	Petterd (1879)
Trocholaoma spiceri	4139 Middlesex Plains	Petterd (1879)
Trocholaoma spiceri	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Trocholaoma spiceri	3636 Zeehan	Charles Hedley (AM)
Trocholaoma spiceri	4336 Upper Forth 4313 2653	Tony Moscal 1987 (TMAG)
Trocholaoma spiceri	4530 Wayatinah 4593 3097	KB 26 Jan 99
Trocholaoma spiceri	3829 Pine Landing 3858 2994	KB 27 Jan 00
Trocholaoma spiceri	4727 Waterfalls Track 4756 2742	KB 8 Mar 98
Trocholaoma spiceri	4626 Junee Cave 4668 2681	KB 15 Mar 98
Trocholaoma spiceri	5026 New Norfolk	Petterd (1879)
Trocholaoma spiceri	5126 Mt Faulkner 5116 2625	KB 19 Dec 98
Trocholaoma spiceri	4424 Mt Anne	Don Driscoll Mar 02
Trocholaoma spiceri	5724 MacGregor Peak 5765 4412	KB 9 Oct 99
Trocholaoma spiceri	4923 New Road Franklin 4950 2309	KB 18 Dec 02
Trocholaoma spiceri	4722 Tomalah Ck	Bashford (QVM)
Trocholaoma spiceri	5022 Tobys Hill 5098 2223	KB 30 Sep 00
Trocholaoma spiceri	5622 Clark Cliffs 5638 2267	KB 3 May 02
Trocholaoma spiceri	4219 Claytons Hut 4295 1973	KB 16 Jan 91
Trocholaoma spiceri	4319 Melaleuca Inlet 4300 1956	KB 15 Jan 91
Trocholaoma spiceri	4819 Thermal Pool 4896 1929	KB 9 Nov 96
Trocholaoma spiceri	5219 Lockleys Road 5259 1946	KB 6 Feb 01
Trocholaoma spiceri	4818 MysteryCreek Track 4880 1878	KB 25 Feb 01
Magilaoma penolensis	2361 Cape Wickham 2304 5752	KB 12 Dec 96
Magilaoma penolensis	2461	Smith + Kershaw (1981)
Magilaoma penolensis	2360 Lake Flanigan 2380 6090	KB 12 Dec 96
Magilaoma penolensis	2460 Lake Martha Lavinia 2481 6068	KB 14 Dec 96
Magilaoma penolensis	5759 Palana 5746 5984	Kershaw 1 Nov 74 (QVM)
Magilaoma penolensis	2358	Smith + Kershaw (1981)
Magilaoma penolensis	5658	Smith + Kershaw (1981)
Magilaoma penolensis	2357 Currie 2304 5752	KB 11 Dec 96
Magilaoma penolensis	2457 Yates Creek 2479 5782	KB 16 Dec 96
Magilaoma penolensis	2557 Naracoopa 2515 5784	KB 25 Sep 98
Magilaoma penolensis	5757 Wybalena 5752 5707	KB 24 Sep 00
Magilaoma penolensis	5857	Smith + Kershaw (1981)
Magilaoma penolensis	2456 Grassy River 2489 5640	KB 26 Sep 98
Magilaoma penolensis	2556 Yarra Creek 2524 5673	KB 13 Dec 96
Magilaoma penolensis	5856 Blue Rocks 5807 5652	KB 4 Sep 87
Magilaoma penolensis	6056 Planter Beach 6095 5644	KB 25 Sep 00
Magilaoma penolensis	2355 Seal River 2387 5592	KB 16 Dec 96
Magilaoma penolensis	2455 Colliers Beach 2438 5573	KB 17 Dec 96
Magilaoma penolensis	5855 Whitemark 5863 5581	Kershaw 23 Aug 57 (QVM)
Magilaoma penolensis	5955	Smith + Kershaw (1981)
Magilaoma penolensis	5854 Trousers Point 5874 5463	KB 23 Sep 00
Magilaoma penolensis	5753 Badger Island	John Whinray (Vic Mus)
Magilaoma penolensis	5953 Cape Barren Island	Petterd (1879)
Magilaoma penolensis	3152 Three Hummock 3196 5221	KB 1 Feb 97
Magilaoma penolensis	3051 Hunter Island 3096 5117	KB 28 Jan 97
Magilaoma penolensis	3151 Hunter Island 3102 5107	KB 29 Jan 97
Magilaoma penolensis	3251 Three Hummock 3258 5197	KB 1 Feb 97
Magilaoma penolensis	5851	Smith + Kershaw (1981)

Magilaoma penolensis	5951 Clarke Island	Petterd (1879)
Magilaoma penolensis	3050 Hunter Island (as Barren Island)	Petterd (TMAG)
Magilaoma penolensis	3349 Robbins Island 3310 4952	KB 5 Feb 97
Magilaoma penolensis	3148 Harcus River 3172 4839	KB 5 Sep 00
Magilaoma penolensis	3548 The Nut 3571 4860	KB 13 May 98
Magilaoma penolensis	3147 Flewin Road 3130 4721	KB 6 Sep 00
Magilaoma penolensis	3447 Smithton 3422 4777	KB 12 Sep 92
Magilaoma penolensis	3547 Wahroonga 3562 4743	KB 2 Oct 99
Magilaoma penolensis	3647 Port Latta 3621 4762	Kershaw Aug 65 (QVM)
Magilaoma penolensis	3747 Rocky Cape 3773 4708	KB 2 Oct 91
Magilaoma penolensis	5547 Waterhouse Point 5542 4792	KB 20 Sep 97
Magilaoma penolensis	3746 Lake Llewellyn 3793 4682	KB 2 Oct 99
Magilaoma penolensis	3946 Table Cape Lookout 3930 4662	KB 22 Oct 94
Magilaoma penolensis	5146 Weymouth 5117 4600	Kershaw Sep 73 (QVM)
Magilaoma penolensis	5246	Smith + Kershaw (1981)
Magilaoma penolensis	5346 Andersons Bay Bridport	Tim Hume 1975 (QVM)
Magilaoma penolensis	3045 Arthur River 3039 4511	Mesibov 13 May 93 (QVM)
Magilaoma penolensis	3345 Roger River 3332 4526	KB 26 Dec 88
Magilaoma penolensis	4045 Camdale 4028 4556	KB 5 Jun 98
Magilaoma penolensis	4745	Smith + Kershaw (1981)
Magilaoma penolensis	4845 East Beach 4833 4540	Kershaw 22 May 55 (QVM)
Magilaoma penolensis	4945	Smith + Kershaw (1981)
Magilaoma penolensis	5145 Bellingham	Kershaw Apr 75 (QVM)
Magilaoma penolensis	3044 Alert Creek 3046 4498	Mesibov 8 Apr 93 (QVM)
Magilaoma penolensis	3344 Julius Depot 3350 4432	Mesibov 6 Mar 91 (QVM)
Magilaoma penolensis	4244	Smith + Kershaw (1981)
Magilaoma penolensis	4344 Camp Clayton 4344 4434	KB 24 Mar 95
Magilaoma penolensis	4444 Devonport Bluff	Kershaw Dec 70 (QVM)
Magilaoma penolensis	4544	Smith + Kershaw (1981)
Magilaoma penolensis	4644 Port Sorell	Petterd (QVM)
Magilaoma penolensis	4744 Badger Head 47222 4499	Kershaw July 72 (QVM)
Magilaoma penolensis	4844	Smith + Kershaw (1981)
Magilaoma penolensis	6044 The Gardens 6076 4415	KB 28 Aug 88
Magilaoma penolensis	3043 Little Eel Creek 3073 4318	Mesibov 8 May 93 (QVM)
Magilaoma penolensis	3042 Ingram Bay 3085 4280	Mesibov 5 Jan 91 (QVM)
Magilaoma penolensis	3142 Brooks Creek 3109 4239	Mesibov 16 Apr 93 (QVM)
Magilaoma penolensis	6142 St Helens Point 6133 4296	KB 8 Sep 88
Magilaoma penolensis	3141 Daisy River 3136 4199	Mesibov 17 Apr 93 (QVM)
Magilaoma penolensis	4441	Smith + Kershaw (1981)
Magilaoma penolensis	3140 Lagoon River 3189 4029	Mesibov 1 May 93 (QVM)
Magilaoma penolensis	3240 Hunters Creek 3210 4008	Mesibov 1 May 93 (QVM)
Magilaoma penolensis	6040 Falmouth 6060 4043	KB 15 Jan 00
Magilaoma penolensis	3239 Ford Creek 3254 3908	Mesibov 2 May 93 (QVM)
Magilaoma penolensis	6039 Four Mile Creek 6093 3968	KB 26 Oct 99
Magilaoma penolensis	3238 Nelson Bay 3255 3877	Mesibov 1 June 93 (QVM)
Magilaoma penolensis	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Magilaoma penolensis	6036 Bicheno 6085 3631	KB 13 May 88
Magilaoma penolensis	3435 Trial Harbour 3480 3564	KB 13 May 89
Magilaoma penolensis	3633 Hogarth Falls 3633 3318	KB 12 June 96
Magilaoma penolensis	5933 Nine Mile Beach	Peter McQuillan 1999
Magilaoma penolensis	6033 Coles Bay 6072 3339	Kershaw 3 Nov 73 (QVM)
Magilaoma penolensis	5832 Spiky Beach 5880 3285	KB 2 Dec 01
Magilaoma penolensis	3628 Hibbs Lagoon	McNiven + West 1991 (QVM)
Magilaoma penolensis	5426	Smith + Kershaw (1981)
Magilaoma penolensis	5726 Point du Ressac 5727 2658	KB 14 Nov 92
Magilaoma penolensis	5425 Spectacle Head 5497 2534	KB 24 Feb 02

Magilaoma penolensis	5725 Marion Bay 5710 2589	KB 6 Aug 89
Magilaoma penolensis	5224 Alum Cliffs 5277 2422	KB 7 Jan 01
Magilaoma penolensis	5324 Gorringes Beach 5378 2423	KB 3 July 00
Magilaoma penolensis	5424 Sandford	Petterd (QVM)
Magilaoma penolensis	5223	Smith + Kershaw (1981)
Magilaoma penolensis	5323 Hope Beach 5360 2354	KB 8 Nov 98
Magilaoma penolensis	5423	Smith + Kershaw (1981)
Magilaoma penolensis	5723 Fossil Island 5770 2350	KB 14 Apr 96
Magilaoma penolensis	5321 Mars Bluff 5325 2120	KB 22 July 01
Magilaoma penolensis	5621 Tunnel Bay 5607 2169	KB 6 Sep 86
Magilaoma penolensis	5120 Ninepins 5134 2077	KB 25 Dec 93
Magilaoma penolensis	5119 Mickeys Bay 5153 1913	KB 23 May 98
Magilaoma penolensis	4918 Southport Bluff 4999 1859	KB 30 Dec 90
Magilaoma penolensis	4917 Rescherche Bay 4907 1747	KB 27 Dec 85
Planilaoma luckmanii	3548 The Nut 3566 4856	KB 13 May 98
Planilaoma luckmanii	4045 Burnie (Emu Bay)	Petterd (1879)
Planilaoma luckmanii	5045 Pipers River	Petterd (1879)
Planilaoma luckmanii	3344 Julius River	Chris Carr 2001
Planilaoma luckmanii	3844 Preolenna 3811 4477	KB 6 May 99
Planilaoma luckmanii	4144 The Gnomon 4190 4409	KB 28 Mar 99
Planilaoma luckmanii	4244 Paton Park 4240 4420	KB 27 Mar 99
Planilaoma luckmanii	5144 Retreat 5138 4462	KB 17 Mar 01
Planilaoma luckmanii	4942 Notley Gorge 4925 4216	KB 9 Mar 97
Planilaoma luckmanii	5142 Underwood 5190 4294	KB 2 Aug 01
Planilaoma luckmanii	5242 Skemps 5295 4286	KB 9 Dec 95
Planilaoma luckmanii	5342 Skemps 5303 4278	KB 8 Dec 95
Planilaoma luckmanii	4741 Biralee	Sarah Lloyd 2003
Planilaoma luckmanii	5041 Cataract Gorge 5094 4110	KB 10 June 90
Planilaoma luckmanii	5141 Cataract Gorge 5102 4119	KB 25 Mar 89
Planilaoma luckmanii	5140 Corra Linn	Sandy Leighton 2001
Planilaoma luckmanii	4539 Chudleigh	Petterd (1879)
Planilaoma luckmanii	5739 Tower Hill 5709 3984	KB 31 Dec 98
Planilaoma luckmanii	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Planilaoma luckmanii	5538 Castle Cary 5585 3824	KB 30 Dec 98
Planilaoma luckmanii	5537 Eastbourne	Aust Mus collections (Hedley?)
Planilaoma luckmanii	5937	Mesibov (Douglas-Apsley survey)
Planilaoma luckmanii	4736 Liawenee 4724 3614	KB 7 May 92
Planilaoma luckmanii	4735 Ouse River Bridge	L Price 1966 (FMNH, Chicago)
Planilaoma luckmanii	5035 Snowy Knob 5017 4533	KB 12 Sep 98
Planilaoma luckmanii	4534 Pine Tier Lagoon 4576 3403	KB 31 Jan 99
Planilaoma luckmanii	5734 Lost Falls 5736 3450	KB 28 Apr 01
Planilaoma luckmanii	4733 Waddamana 4796 3371	KB 31 Jan 99
Planilaoma luckmanii	4933 Bakers Tier 4912 3342	KB 3 Aug 03
Planilaoma luckmanii	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Planilaoma luckmanii	5733 Big Sassy Creek 5746 3332	KB 23 Nov 97
Planilaoma luckmanii	5832 Mayfield Bay 5835 3225	KB 10 Feb 02
Planilaoma luckmanii	5232 Blackman River 5241 3293	KB 22 Feb 98
Planilaoma luckmanii	4631 Glenmark 4695 3190	KB 28 Dec 97
Planilaoma luckmanii	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Planilaoma luckmanii	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Planilaoma luckmanii	5030 Little Den Creek 5093 3027	KB 22 Feb 98
Planilaoma luckmanii	5229 Yarlington Tier 5245 2902	KB 4 Feb 01
Planilaoma luckmanii	5329 Eldon Road 5353 2951	KB 4 Feb 01
Planilaoma luckmanii	5429 Mount Hobbs 5483 2924	KB 5 July 98
Planilaoma luckmanii	5028 Pelham 5010 2860	George Davis 11 Jan 69 (QVM)

Planilaoma luckmanii	5228 Yarlington Tier 5245 2898	KB 22 Feb 98
Planilaoma luckmanii	5628 Prosser River 5699 2880	KB 26 July 98
Planilaoma luckmanii	5728 Prosser River 5709 2880	KB 26 July 98
Planilaoma luckmanii	5928 Bishop + Clerk 5915 2841	KB 17 Nov 00
Planilaoma luckmanii	4627 Tarn Shelf	Belinda Yaxley 7 Feb 00
Planilaoma luckmanii	4727 Waterfalls Track 4756 2742	KB 8 Mar 98
Planilaoma luckmanii	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Planilaoma luckmanii	5427 Phipps Creek 5497 2751	KB 9 Aug 98
Planilaoma luckmanii	5126 Mt Faulkner 5116 2625	KB 19 Dec 98
Planilaoma luckmanii	5226 Catchpole Gully 5284 2627	KB 7 June 90
Planilaoma luckmanii	5125 Goat Hills 5180 2570	KB 20 Dec 88
Planilaoma luckmanii	5225 Knocklofty 5240 2521	KB 17 Apr 00
Planilaoma luckmanii	5325 Mt Rumney 5370 2543	KB 11 June 01
Planilaoma luckmanii	4724 Lake Skinner 4750 2455	KB 11 Apr 99
Planilaoma luckmanii	4824 Herons Creek 4820 2427	KB 25 Dec 97
Planilaoma luckmanii	5124 Mountain River 5111 2480	KB 10 Aug 97
Planilaoma luckmanii	5224 Mt Nelson-Taroona 5285 2468	KB 11 Feb 87
Planilaoma luckmanii	5223 Tinderbox	Roy Crookshanks 1999
Planilaoma luckmanii	4821 Lake Esperance 4812 2137	KB 27 Dec 87
Planilaoma luckmanii	5221 Green Island	May (1957)
Planilaoma luckmanii	5118 Cloudy Bay 5153 1872	KB 26 Dec 91
Planilaoma "Pelverata"	5023 Kelleways Creek 5073 2320	KB 29 July 00
Planilaoma "Pelverata"	5123 Pelverata Falls 5112 2319	KB 8 Jan 95
Planilaoma "Breaksea"	4120 Breaksea Island 4161 2018	KB 16 Jan 91
Discocharopa lottah	4942 Notley 4927 4218	Karen Richards 3 Sep 02
Discocharopa lottah	5142 Blythe Spur 5193 4282	KB 29 Oct 02
Discocharopa lottah	5041 Cataract Gorge 5092 4116	KB 23 May 00
Discocharopa lottah	5336 Conara	Petterd (QVM)
Discocharopa vigens	5226 Grass Tree Hill 5274 2623	KB 26 May 90
Discocharopa vigens	5225 Queens Domain	Petterd (1879)
Discocharopa vigens	5224 South Hobart 5247 2498	KB 5 Nov 02
Discocharopa mimosa	3247 Togari Block 3274 4708	KB 7 Sep 92
Discocharopa mimosa	3246 Togari Block 3261 4664	KB 4 June 99
Discocharopa mimosa	3845 Oldina Road 3882 4558	KB 3 Oct 99
Discocharopa mimosa	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Discocharopa mimosa	4144 The Gnomon 4190 4409	KB 28 Mar 99
Discocharopa mimosa	4244 Paton Park 4240 4420	KB 27 Mar 99
Discocharopa mimosa	5144 Retreat 5138 4462	KB 17 Mar 01
Discocharopa mimosa	5444 Mt Stronach 5477 4423	KB 24 May 03
Discocharopa mimosa	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Discocharopa mimosa	5243 Mt Arthur 5230 4310	Vince Kessner (QVM collections)
Discocharopa mimosa	4842 Dunkards Creek 4862 4259	KB 8 Mar 97
Discocharopa mimosa	4942 Notley Gorge 4925 4216	KB 9 Mar 97
Discocharopa mimosa	5142 Hollybank	QVM specimen
Discocharopa mimosa	5242 Whites Mill Road 5204 4274	KB 2 Aug 01
Discocharopa mimosa	5342 Skemps 5303 4278	KB 8 Dec 95
Discocharopa mimosa	5842 Toms Gully 5895 4223	KB 21 Sept 96
Discocharopa mimosa	5041 Cataract Gorge 5092 4116	KB 18 Apr 00
Discocharopa mimosa	3940 Surrey Hills	Petterd (1879)
Discocharopa mimosa	4440 Gog Range	Bob Mesibov (QVM colls)
Discocharopa mimosa	4339 Gads Hill	Petterd (1879)

Discocharopa mimosa	4539 Chudleigh	Petterd (1879)
Discocharopa mimosa	5539 Ben Lomond Rivulet 5525 3914	KB 31 Dec 98
Discocharopa mimosa	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Discocharopa mimosa	5538 Castle Cary 5585 3824	KB 30 Dec 98
Discocharopa mimosa	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Discocharopa mimosa	4137 Oakleigh Creek 4185 3733	KB 9 Jan 91
Discocharopa mimosa	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Discocharopa mimosa	5733 Big Sassy Creek 5749 3332	Coy et al (1993)
Discocharopa mimosa	5232 Blackman River 5241 3293	KB 22 Feb 98
Discocharopa mimosa	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Discocharopa mimosa	4728 Montos Creek 4732 2814	KB 4 Feb 95
Discocharopa mimosa	5228 Chauncy Vale 5236 2819	KB 8 Dec 01
Discocharopa mimosa	5728 Thumbs 5723 2826	KB 2 Mar 01
Discocharopa mimosa	5928 Bishop + Clerk 5915 2841	KB 23 Mar 96
Discocharopa mimosa	4727 Marriotts Falls 4725 2704	KB 1 Dec 92
Discocharopa mimosa	5427 Phipps Creek 5497 2751	KB 9 Aug 98
Discocharopa mimosa	4426 Ragged Range 4443 2626	KB 15 Mar 98
Discocharopa mimosa	4626 Junee Cave 4668 2681	KB 15 Mar 98
Discocharopa mimosa	5125 Collinsvale 5127 2543	KB 10 May 98
Discocharopa mimosa	4824 Herons Creek 4820 2424	KB 18 Dec 02
Discocharopa mimosa	5224 Mt Nelson-Taroona 5285 2468	KB 27 Apr 03
Discocharopa mimosa	5724 Richardsons Road 5783 2466	KB 6 July 97
Discocharopa mimosa	4923 Bermuda Hill 4916 2321	KB 8 Jul 95
Discocharopa mimosa	4722 Manuka Road 4740 2279	KB 22 Nov 00
Discocharopa mimosa	4822 Willies Saddle 4870 2222	KB 3 Feb 96
Discocharopa mimosa	5622 Clark Cliffs 5638 2267	KB 3 May 02
Discocharopa mimosa	4721 Cook Creek 4708 2180	KB 11 Feb 95
Discocharopa mimosa	4920 Adamsons Peak 4903 2018	KB 6 Aug 00
Discocharopa mimosa	4819 Adamsons Falls 4875 1986	KB 3 Apr 88
Discocharopa mimosa	4817 South Cape Bay 4897 1727	KB 10 Nov 96
Charopidae "Skemps"	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Charopidae "Skemps"	5243 Mt Arthur	Ron Kershaw 3/3/71 (QVM)
Charopidae "Skemps"	5343 Carins Creek 5340 4352	KB 2 Feb 96
Charopidae "Skemps"	5142 Blythe Spur 5193 4282	KB 29 Oct 02
Charopidae "Skemps"	5242 Patersonia Rivulet 5275 4275	KB 5 Feb 96
Charopidae "Skemps"	5342 Skemps 5303 4278	KB 8 Dec 95
Charopidae "Skemps"	5241 Nunamurra	T.M. Stephens (TMAG)
Elsothera limula	3547 Circular Head	Petterd (1879)
Elsothera limula	3946 Table Cape	Petterd (1879)
Elsothera limula	4045 Burnie (Emu Bay)	Petterd (1879)
Elsothera limula	5145 Pipers River 5108 4552	Mesibov 16 Apr 95 (QVM)
Elsothera limula	4244 Paton Park 4240 4420	KB 27 Mar 99
Elsothera limula	4744	Smith + Kershaw (1981)
Elsothera limula	4844 West Arm 4817 4456	Kershaw 5 Sep 51 (QVM)
Elsothera limula	5144 Retreat 5142 4435	KB 26 Nov 00
Elsothera limula	3943 Surrey Hills	Petterd (1879)
Elsothera limula	4343 Champion Park 4337 4370	KB 26 Mar 95
Elsothera limula	4543 Latrobe 4528 4265	Mesibov 25 June 97 (QVM)
Elsothera limula	4643 Franklin Rivulet 4675 4309	Mesibov 7 Oct 97 (QVM)
Elsothera limula	4743	Smith + Kershaw (1981)
Elsothera limula	4943 Supply Mill 4950 3326	KB 8 Mar 97
Elsothera limula	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Elsothera limula	5743 Weldborough 5744 4353	Mesibov 5 Sep 90 (QVM)
Elsothera limula	5843	Smith + Kershaw (1981)

Elsothera limula	5943 Goulds Country 5904 4324	KB 27 Oct 90
Elsothera limula	4242 Isandula 4263 4298	KB 30 Apr 99
Elsothera limula	4542 Railton 4544 4274	Mesibov 27 June 97 (QVM)
Elsothera limula	4842 Dunkards Creek 4862 4259	KB 8 Mar 97
Elsothera limula	4942 Notley Gorge 4925 4216	KB 5 Oct 91
Elsothera limula	5142 Hollybank 5175 4276	KB 12 Aug 95
Elsothera limula	5242	Smith + Kershaw (1981)
Elsothera limula	5342 Mt Barrow	Ron Kershaw
Elsothera limula	5442 East Diddleum 5403 4282	KB 9 Feb 96
Elsothera limula	5542 Mt Maurice 5505 4245	KB 12 Jan 96
Elsothera limula	5642 Mt Victoria 5699 4227	KB 16 Jan 96
Elsothera limula	5742 Mt Victoria 5712 4223	KB 16 Jan 96
Elsothera limula	5842 Toms Gully 5895 4223	KB 21 Sept 96
Elsothera limula	5942 Ericksons Road 5938 4253	KB 11 Jun 88
Elsothera limula	6042 Boggy Creek 6054 4221	KB 20 Sep 96
Elsothera limula	5041	Smith + Kershaw (1981)
Elsothera limula	5141 Launceston	Petterd (1879)
Elsothera limula	5741 Mathinna Falls 5751 4174	KB 15 Jan 96
Elsothera limula	5841 Evercreech 5813 4161	KB 15 Jan 96
Elsothera limula	4440 Gog Range	Bob Mesibov (QVM colls)
Elsothera limula	4540 Garden of Eden Creek 4532 408	KB 31 Jan 93
Elsothera limula	4640 Christmas Hills 4678 4097	Mesibov 9 Sep 01 (QVM)
Elsothera limula	5040	Smith + Kershaw (1981)
Elsothera limula	5340 Blessington 5338 4042	Mesibov 22 June 93 (QVM)
Elsothera limula	4339	Smith + Kershaw (1981)
Elsothera limula	4539	Smith + Kershaw (1981)
Elsothera limula	5539 Ben Lomond Rivulet 5525 3914	KB 31 Dec 98
Elsothera limula	5739 Tower Hill 5709 3984	KB 31 Dec 98
Elsothera limula	4638 Meander 4670 3802	Kershaw 7 Oct 84 (QVM)
Elsothera limula	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Elsothera limula	5538 Castle Cary 5585 3824	KB 30 Dec 98
Elsothera limula	4937 Mount Blackwood 4913 3714	KB 6 Nov 99
Elsothera ricei	5848 Cape Portland	Smith + Kershaw (1981)
Elsothera ricei	4745 West Head	Bob Mesibov
Elsothera ricei	5345 Bridport 5315 4516	Mesibov 7 Jan 94 (QVM)
Elsothera ricei	5645 Little Mount Horror 5684 4598	KB 8 Feb 96
Elsothera ricei	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Elsothera ricei	4644 Branch Creek 4698 4408	Mesibov 26 July 97 (QVM)
Elsothera ricei	4744	Smith + Kershaw (1981)
Elsothera ricei	4844 West Arm 4818 4453	Kershaw May 1950 (QVM)
Elsothera ricei	4944 Land O' Cakes Ck 4986 4482	KB 17 Mar 01
Elsothera ricei	5144	Smith + Kershaw (1981)
Elsothera ricei	5344 Jetsonville 5388 4462	Kershaw 1 June 85 (QVM)
Elsothera ricei	5444 Mt Stronach 5477 4423	KB 24 May 03
Elsothera ricei	5644 Cascade Dam 5692 4401	KB 30 Jan 96
Elsothera ricei	5744 Frome Road 5773 4430	KB 22 Jan 96
Elsothera ricei	5844 Blue Tier 5846 4402	KB 23 Jan 96
Elsothera ricei	4443 Kelcey Tier 4429 4364	Mesibov 1 Oct 91 (QVM)
Elsothera ricei	4843	Smith + Kershaw (1981)
Elsothera ricei	5243 Mount Arthur 5250 4313	KB 5 Feb 96
Elsothera ricei	5343 Sideling 5357 4331	KB 2 Feb 96
Elsothera ricei	5543 Cuckoo Hill 5544 4340	KB 15 Feb 96
Elsothera ricei	5643 Cascade Forests	Ron Kershaw
Elsothera ricei	5743 Mount Victoria 5712 4328	KB 13 Feb 96
Elsothera ricei	5843	Smith + Kershaw (1981)

Elsothera ricei	4642 Stony Rises 4673 4240	Mesibov 2 Sep 97 (QVM)
Elsothera ricei	4942 Notley Gorge 4925 4216	KB 9 Mar 97
Elsothera ricei	5142 Prossers Forest 5147 4236	KB 12 Aug 95
Elsothera ricei	5242 Patersonia Rivulet 5275 4275	KB 5 Feb 96
Elsothera ricei	5342 Mt Barrow 5351 4211	KB 8 Jan 96
Elsothera ricei	5442 Mt Maurice 5462 4263	KB 9 Jan 96
Elsothera ricei	5642 Mount Victoria 5663 4226	KB 16 Jan 96
Elsothera ricei	5742 Mount Victoria 5703 4258	KB 17 Jan 96
Elsothera ricei	4841 Black Sugarloaf 4828 4171	KB 8 Mar 97
Elsothera ricei	5041	Smith + Kershaw (1981)
Elsothera ricei	5141 Launceston	Petterd (1879)
Elsothera ricei	5241 Distillery Creek	Petterd (1879)
Elsothera ricei	5341 Sunset Ridge 5395 4155	KB 6 Feb 96
Elsothera ricei	5441 Sunset Ridge 5455 4198	KB 6 Feb 96
Elsothera ricei	5541 Tombstone Creek 5570 4168	KB 11 Jan 96
Elsothera ricei	5641 Mathinna Plains 5623 4196	KB 11 Jan 96
Elsothera ricei	6041 Skyline Tier 6033 4132	KB 23 Oct 99
Elsothera ricei	5040	Smith + Kershaw (1981)
Elsothera ricei	5140 Kate Reed SRA 5124 4074	KB 31 Aug 01
Elsothera ricei	5340 Blessington 5354 4042	Mesibov 31 July 95 (QVM)
Elsothera ricei	5540 Roses Tier 5568 4094	KB 7 Feb 96
Elsothera ricei	4839 Cluan Tier 4808 3930	Mesibov 9 Nov 97 (QVM)
Elsothera ricei	5639 River Tyne 5652 3987	KB 30 Dec 98
Elsothera ricei	6039 St Marys Pass 6005 3987	KB 28 Aug 88
Elsothera ricei	4438 Devils Gullet 4437 3868	KB 21 Sep 01
Elsothera ricei	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Elsothera ricei	6038 Douglas-Apsley 6016 3828	Mesibov 9 June 88 (QVM)
Elsothera ricei	5537 Eastbourne	Aust Mus collections
Elsothera ricei	5637 St Pauls Dome 5693 3754	Mesibov 28 Nov 01
Elsothera ricei	5937 Douglas-Apsley 5992 3710	Mesibov 29 July 88 (QVM)
Elsothera ricei	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Elsothera ricei	5436 Englishmans Gully 5480 3629	Mesibov 9 Mar 96 (QVM)
Elsothera ricei	5936 Douglas-Apsley 5964 3660	Mesibov 4 July 88 (QVM)
Elsothera ricei	6036 Douglas-Apsley 6018 3685	Mesibov 31 May 88 (QVM)
Elsothera ricei	5935 Cherry Tree Hill 5943 3535	KB 1 Feb 93
Elsothera ricei	5734 Hallam Cave	Roy Crookshanks 1998
Elsothera ricei	4833 Diamond Tier 4863 3320	Mesibov 16 July 00 (QVM)
Elsothera ricei	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Elsothera ricei	5633 Sleepy Creek 5634 3375	Mesibov 23 Mar 02
Elsothera ricei	6033 Wineglass Bay 6069 3308	KB 15 Jan 00
Elsothera ricei	5632 Tooms White Gum 5693 3234	KB 23 Nov 97
Elsothera ricei	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Elsothera ricei	5231 Oatlands	Petterd (1879)
Elsothera ricei	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Elsothera ricei	5630 Mitchelmores Creek 5688 3015	Mesibov 15 Apr 91 (QVM)
Elsothera ricei	5730 Ravens Hill 5709 3034	Mesibov 19 Apr 91 (QVM)
Elsothera ricei	5329 Coal River Gorge 5328 2968	KB 5 Oct 03
Elsothera ricei	5429 Mount Hobbs 5483 2924	KB 5 July 98
Elsothera ricei	5529 Tin Pot Creek 5542 2976	KB 5 July 98
Elsothera ricei	5629 Douglas Creek 5634 2929	Mesibov 24 Apr 91 (QVM)
Elsothera ricei	5729 Orford	Petterd (1879)
Elsothera ricei	5228 Chauncy Vale 5236 2819	KB 8 Dec 01
Elsothera ricei	5628 Prosser River 5699 2880	KB 26 July 98
Elsothera ricei	5728 Prosser River 5709 2880	KB 26 July 98
Elsothera ricei	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Elsothera ricei	5928 Bishop + Clerk 5915 2841	KB 17 Nov 00

Elsothera ricei	5627 Sandspit River 5690 2711	KB 6 Oct 90
Elsothera ricei	5727 Whalers Lookout 5712 2776	KB 7 Oct 00
Elsothera ricei	5827 Robinsons Creek 5891 2796	Mesibov 12 Aug 91 (QVM)
Elsothera ricei	5927	Smith + Kershaw (1981)
Elsothera ricei	5226 Catchpole Gully 5284 2627	KB 7 June 90
Elsothera ricei	5326 Basin Hills 5302 2614	KB 28 Dec 00
Elsothera ricei	5626 Kellevie 5648 2663	KB 15 July 90
Elsothera ricei	5726 Mount Jacob 5735 2680	KB 14 Nov 92
Elsothera ricei	5125 Goat Hills 5180 2570	KB 20 Dec 88
Elsothera ricei	5225 Knocklofty 5240 2521	KB 17 Apr 00
Elsothera ricei	5325 Craigow Hill 5335 2595	KB 9 Oct 93
Elsothera ricei	5024 Mt Misery	Bob Mesibov
Elsothera ricei	5124 Neika 5195 2455	KB 5 Apr 97
Elsothera ricei	5224 Mt Nelson-Taroona 5285 2468	KB 11 Feb 87
Elsothera ricei	4923 Bermuda Hill 4916 2321	KB 8 Jul 95
Elsothera ricei	5123 Pelverata Falls 5107 2332	KB 8 Jan 95
Elsothera ricei	4722 Manuka Road 4740 2279	KB 22 Nov 00
Elsothera ricei	4822 Lidgerwood Rd 4868 2246	KB 11 Feb 95
Elsothera ricei	4922 Kermandie 4961 2214	KB 23 Nov 00
Elsothera ricei	5022 Tobys Hill 5098 2223	KB 30 Sep 00
Elsothera ricei	5122 Snug Tiers 5125 2297	KB 7 May 94
Elsothera ricei	5722 Fortescue Bay	Ron Kershaw (QVM specimen)
Elsothera ricei	5121 Garden Island Creek 5148 2157	KB 22 Nov 98
Elsothera ricei	4920 Adamsons Peak 4903 2018	KB 6 Aug 00
Elsothera Needles	4234 Cynthia Bay 4245 3487	KB 20 Mar 93
Elsothera Needles	4232 Mt Arrowsmith	Bob Mesibov (QVM specimen)
Elsothera Needles	3930 Mt McCutcheon 3907 3077	KB 2 Mar 00
Elsothera Needles	4126 Serpentine Dam 4173 2655	KB 27 Jan 01
Elsothera Needles	4526 Needles Shelter 4514 2655	KB 1 Dec 92
Elsothera Needles	4322 Lake Fortuna 4368 2249	KB 15 Feb 00
Allocharopa legrandi	3547 Wahroonga 3562 4743	KB 2 Oct 99
Allocharopa legrandi	4144 The Gnomon 4190 4409	KB 28 Mar 99
Allocharopa legrandi	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Allocharopa legrandi	5243	Smith + Kershaw (1981)
Allocharopa legrandi	5743 Weldborough	Mesibov (QVM)
Allocharopa legrandi	5843	Smith + Kershaw (1981)
Allocharopa legrandi	5242 Skemps 5295 4286	KB 9 Dec 95
Allocharopa legrandi	5342 Skemps 5303 4278	KB 8 Dec 95
Allocharopa legrandi	5442 Mt Maurice 5473 4270	KB 9 Jan 96
Allocharopa legrandi	5542 Mt Maurice 5518 4251	KB 12 Jan 96
Allocharopa legrandi	5642 Mt Victoria 5693 4233	Coy et al (1993)
Allocharopa legrandi	5341	Smith + Kershaw (1981)
Allocharopa legrandi	4240 Round Mountain	Ron Kershaw (QVM)
Allocharopa legrandi	4540 Alum Cliffs 4525 4026	KB 28 Mar 98
Allocharopa legrandi	5440	Smith + Kershaw (1981)
Allocharopa legrandi	4338 Arm River 4344 3843	KB 21 Sep 01
Allocharopa legrandi	4738 Projection Bluff 4770 3812	KB 29 Mar 98
Allocharopa legrandi	4838 Liffey Falls 4802 3834	KB 23 Sep 95
Allocharopa legrandi	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Allocharopa legrandi	4737	Smith + Kershaw (1981)
Allocharopa legrandi	4736 Liawenee 4724 3614	KB 7 May 92
Allocharopa legrandi	4835 Hydro Creek 4885 3555	KB 11 May 92
Allocharopa legrandi	5035 Snowy Knob 5017 4533	KB 12 Sep 98
Allocharopa legrandi	4533 Bronte Park 4582 3352	KB 20 Mar 93

Allocharopa legrandi	4733 Waddamana 4796 3371	KB 31 Jan 99
Allocharopa legrandi	4933 Bakers Tier 4912 3342	KB 3 Aug 03
Allocharopa legrandi	5133 Interlaken	Ron Kershaw
Allocharopa legrandi	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Allocharopa legrandi	4432 Butlers Gorge 4408 3215	KB 31 Jan 99
Allocharopa legrandi	5232 Blackman River 5241 3293	KB 22 Feb 98
Allocharopa legrandi	4431 Mossy Marsh 4496 3155	KB 10 Jan 01
Allocharopa legrandi	4631 Glenmark 4695 3190	KB 28 Dec 97
Allocharopa legrandi	5030 Little Den Creek 5093 3027	KB 22 Feb 98
Allocharopa legrandi	5229 Yarlington Tier 5245 2902	KB 22 Feb 98
Allocharopa legrandi	5429 Mount Ponsonby 5441 2996	Mesibov 3 Sep 00 (QVM)
Allocharopa legrandi	5228 Yarlington Tier 5245 2898	KB 22 Feb 98
Allocharopa legrandi	5728 Thumbs 5724 2820	KB 6 Feb 93
Allocharopa legrandi	4727 Waterfalls Track 4756 2742	KB 8 Mar 98
Allocharopa legrandi	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Allocharopa legrandi	4426 Adams Falls 4424 2698	KB 15 Mar 98
Allocharopa legrandi	5126 Mt Faulkner 5116 2625	KB 19 Dec 98
Allocharopa legrandi	5726 Mount Jacob 5735 2680	KB 14 Nov 92
Allocharopa legrandi	4725 Styx River 4746 2581	KB 9 Dec 01
Allocharopa legrandi	5025	Smith + Kershaw (1981)
Allocharopa legrandi	5125 Goat Hills 5180 2570	KB 20 Dec 88
Allocharopa legrandi	5225 Tolosa Street 5203 2555	KB 20 Dec 88
Allocharopa legrandi	5725 Lagoon Bay 5782 2524	KB 8 Oct 94
Allocharopa legrandi	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Allocharopa legrandi	5124 Mountain River 5111 2480	KB 10 Aug 97
Allocharopa legrandi	5224 Summerleas Road 5224 2473	KB 25 Dec 95
Allocharopa legrandi	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Allocharopa legrandi	4923 Bermuda Hill 4917 2320	KB 8 July 95
Allocharopa legrandi	5723 Tatnells Hill 5771 2301	KB 25 Apr 88
Allocharopa legrandi	4422 Junction Creek 4404 2268	KB 28 Feb 99
Allocharopa legrandi	4722 Tahune Park 4772 2284	KB 6 May 90
Allocharopa legrandi	4822 Lidgerwood Rd 4868 2246	KB 11 Feb 95
Allocharopa legrandi	4922 Kermandie 4961 2214	KB 23 Nov 00
Allocharopa legrandi	5622 Clark Cliffs 5638 2267	KB 3 May 02
Allocharopa legrandi	5722 Fortescue Bay 5776 2237	KB 6 Mar 99
Allocharopa legrandi	4721 Cook Creek 4708 2180	KB 11 Feb 95
Allocharopa legrandi	5121 Garden Island Creek 5148 2157	KB 22 Nov 98
Allocharopa legrandi	4920 Francistown 4989 2053	KB 27 Sep 87
Allocharopa legrandi	4819 Adamsons Falls 4875 1986	KB 3 Apr 88
Allocharopa legrandi	4919 Jacksons Creek 4970 1958	KB 24 Nov 00
Allocharopa legrandi	5019 Burying Ground Point 5006 1903	KB 26 Nov 88
Allocharopa legrandi	5119 Mickeys Bay 5153 1913	KB 23 May 98
Allocharopa legrandi	5219 Mt Mangana 5232 1985	KB 7 Apr 01
Allocharopa legrandi	4918 Ida Bay 4932 1892	KB 6 Dec 92
Allocharopa legrandi	4817 South Cape Bay 4871 1716	KB 12 Mar 00
Allocharopa legrandi	4917 Rescherche Bay 4908 1752	KB 30 Nov 92
Allocharopa "Ravens Hill"	5730 Ravens Hill 5709 3034	Mesibov 19 Apr 91 (QVM)
Allocharopa "McGregor"	5724 MacGregor Peak 5765 4412	KB 9 Oct 99
Allocharopa "McGregor"	5723 Camp Falls 5772 2315	KB 18 Apr 01
Allocharopa "Sandspit"	5728 Prosser River 5709 2880	KB 26 July 98
Allocharopa "Sandspit"	5727 Sandspit River 5703 2713	Penelope Greenslade 22 May 89
Allocharopa "Sandspit"	5626 Middle Peak 5670 2691	KB 6 Oct 90

Allocharopa "Victoria Valley"	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Allocharopa "Victoria Valley"	4626 Junee Cave 4668 2681	KB 15 Mar 98
Allocharopa "Victoria Valley"	4725 Styx River 4746 2581	KB 9 Dec 01
Allocharopa "Victoria Valley"	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Allocharopa "Mystery Ck"	4818 MysteryCreek Track 4880 1878	KB 25 Feb 01
Allocharopa "Christ College"	5228 Chauncy Vale 5236 2819	KB 8 Dec 01
Allocharopa "Christ College"	5226 Mt Direction 5250 2608	KB 7 Jan 00
Allocharopa "Christ College"	5225 Knocklofty 5240 2521	KB 29 Mar 03
Allocharopa "Christ College"	5224 Christ College 5261 2496	KB 26 Dec 00
Allocharopa "Christ College"	5022 Cradoc 5024 2284	KB 15 Nov 90
Allocharopa "Douglas"	6039 St Marys Pass 6005 3987	KB 28 Aug 88
Allocharopa "Douglas"	5938 Douglas-Apsley 5993 3885	Mesibov 1 Aug 88 (QVM)
Allocharopa "Douglas"	6038	Mesibov (Douglas-Apsley survey)
Allocharopa "Douglas"	5937 Douglas-Apsley 5987 3715	Mesibov 30 July 88 (QVM)
Allocharopa "Douglas"	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Allocharopa "Douglas"	5936	Mesibov (Douglas-Apsley survey)
Allocharopa "Douglas"	6036	Mesibov (Douglas-Apsley survey)
Allocharopa "Douglas"	5735 Meetus Falls 5730 3548	Tim Hume 6 Aug 77 (QVM)
Allocharopa "Douglas"	6033 Wineglass Bay 6069 3308	KB 15 Jan 00
Allocharopa "Douglas"	5928 Bishop + Clerk 5915 2841	KB 17 Nov 00
Allocharopa "Teepookana"	3246 Eldridge Road 3265 4621	KB 25 Dec 88
Allocharopa "Teepookana"	3445 Trowutta Cave 3410 4519	KB 24 Oct 98
Allocharopa "Teepookana"	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Allocharopa "Teepookana"	3444 Milkshake Hills 3457 4482	KB 26 Dec 88
Allocharopa "Teepookana"	3243 Balfour 3251 4303	KB 1 Nov 91
Allocharopa "Teepookana"	3242 Balfour 3247 4299	KB 1 Nov 91
Allocharopa "Teepookana"	3438 Wilsons Road 3401 3816	KB 23 Oct 98
Allocharopa "Teepookana"	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Allocharopa "Teepookana"	3536 Heemskirk River 3518 3692	KB 22 Oct 98
Allocharopa "Teepookana"	3836 Anthony Road 3854 3680	Coy et al (1993)
Allocharopa "Teepookana"	3632 Teepookana 3655 2273	KB 13 June 96
Allocharopa "Teepookana"	3930 Mt McCall 3973 3077	KB 2 Mar 00
Allocharopa "Teepookana"	3829 Pine Landing 3858 2994	KB 27 Jan 00
Allocharopa "Teepookana"	3628 Hibbs Lagoon	McNiven + West 1991 (QVM)
Allocharopa "Teepookana"	3728 Hobbs Creek 3752 2878	KB 1 Mar 00
Allocharopa "Teepookana"	4526 Five Road 4528 2684	KB 8 Apr 00
Allocharopa "Teepookana"	4423 Scotts Peak 4424 2345	KB 28 Feb 99
Allocharopa "Teepookana"	4422 Junction Creek 4404 2268	KB 28 Feb 99
Allocharopa "Junee"	4626 Junee Cave 4668 2681	KB 15 Mar 98
Allocharopa "Junee"	5124 Milles Track 5197 2483	KB 17 Oct 98
Allocharopa "Junee"	5123 Pelverata Falls 5112 2319	KB 8 Jan 95
Allocharopa kershawi	5045 Pipers River	Petterd (QVM)
Allocharopa kershawi	5144	Smith + Kershaw (1981)
Allocharopa kershawi	4443 Torquay	Petterd (1879)
Allocharopa kershawi	4942	Smith + Kershaw (1981)
Allocharopa kershawi	5242	Smith + Kershaw (1981)
Allocharopa kershawi	5041 Cataract Gorge 5094 4110	KB 10 June 90
Allocharopa kershawi	5141 Cataract Gorge 5102 4119	KB 25 Mar 89
Allocharopa kershawi	5241 Distillery Creek 5212 4134	KB 1 Aug 00
Allocharopa kershawi	5341 Mount Barrow 5353 4194	KB 16 Feb 96

Allocharopa kershawi	4440 Gog Range	Mesibov (QVM)
Allocharopa kershawi	5040	Smith + Kershaw (1981)
Allocharopa kershawi	5140	Smith + Kershaw (1981)
Allocharopa kershawi	4439 Marakoopa Cave 4408 3968	KB 26 Mar 89
Allocharopa kershawi	5539 Ben Lomond Rivulet 5525 3914	KB 31 Dec 98
Allocharopa kershawi	5739 Tower Hill 5709 3984	KB 31 Dec 98
Allocharopa kershawi	4438 Devils Gullet 4437 3868	KB 21 Sep 01
Allocharopa kershawi	5538 Castle Cary 5585 3824	KB 30 Dec 98
Allocharopa kershawi	4937 Mount Blackwood 4913 3714	KB 6 Nov 99
Allocharopa kershawi	4835 Hydro Creek 4885 3555	KB 11 May 92
Allocharopa kershawi	6033 Coles Bay	Alastair Richardson
Allocharopa kershawi	5629 Douglas Ck 5637 2927	Mesibov 24 Apr 91
Allocharopa kershawi	5628 Prosser River 5683 2881	KB 18 Sep 99
Allocharopa kershawi	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Allocharopa kershawi	5527 Bust-Me-Gall Hill 5512 2797	KB 10 Feb 02
Allocharopa kershawi	5126 Poimena Reserve 5199 2632	KB 13 June 90
Allocharopa kershawi	5226 Poimena Reserve 5201 2632	KB 13 June 90
Allocharopa kershawi	5626 Kellevie 5648 2663	KB 15 July 90
Allocharopa kershawi	5726 Lukes Creek 5708 2620	KB 14 Nov 92
Allocharopa kershawi	5225 Knocklofty 5240 2521	KB 17 Apr 00
Allocharopa kershawi	5324 Sandford	May (1958)
Allocharopa kershawi	5424 Sandford	May (1958)
Allocharopa kershawi	5222 McCrackens Ck 5294 2245	KB 8 Aug 92
Allocharopa "Wellington"	5126 Mt Faulkner 5116 2625	KB 19 Dec 98
Allocharopa "Wellington"	5025 Illa Brook 5052 2564	KB 3 June 95
Allocharopa "Wellington"	5125 Collinsvale 5127 2543	KB 6 Mar 89
Allocharopa "Wellington"	5225 Lenah Valley Track 5203 2504	KB 4 Feb 90
Allocharopa "Wellington"	4824 Herons Creek 4820 2427	KB 25 Dec 97
Allocharopa "Wellington"	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Allocharopa "Wellington"	5124 Cathedral Rock 5170 2453	KB 25 Apr 89
Allocharopa "Wellington"	5224 Mt Nelson-Taroona 5285 2468	KB 31 July 00
Allocharopa "Wellington"	4923 New Road Franklin 4950 2309	KB 18 Dec 02
Allocharopa "Wellington"	5123 Snug Tiers 5153 2320	KB 4 May 97
Allocharopa "Wellington"	5022 Tobys Hill 5098 2223	KB 30 Sep 00
Allocharopa "Wellington"	5122 Snug Falls 5167 2227	KB 3 June 00
Allocharopa "Wellington"	5121 Garden Island Creek 5148 2157	KB 22 Nov 98
Allocharopa "Pelverata"	5123 Pelverata Falls 5112 2319	KB 8 Jan 95
Allocharopa "Dromedary"	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Allocharopa "Dromedary"	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Allocharopa "Dromedary"	5126 Mt Dromedary 5103 2697	KB 13 Nov 95
Allocharopa "Quarry"	4818 Moonlight Ridge 4872 1870	KB 11 Nov 89
Allocharopa tarravillensis	2460 Pennys Lagoon 2491 6060	KB 14 Dec 96
Allocharopa tarravillensis	2458 Ridges Road 2432 5822	KB 15 Dec 96
Allocharopa tarravillensis	2357 Grassy Road 22343 5746	KB 28 Sep 03
Allocharopa tarravillensis	2457 Zwar Creek 2490 5785	KB 16 Dec 96
Allocharopa tarravillensis	2557 Raffertys Creek 2511 5781	KB 12 Dec 96
Allocharopa tarravillensis	2456 Gentle Annie 2456 5636	KB 15 Dec 96
Allocharopa tarravillensis	2556 Yarra Creek 2524 5673	KB 13 Dec 96
Allocharopa tarravillensis	2355 Seal River 2387 5592	KB 16 Dec 96
Allocharopa tarravillensis	3151 Hunter Island 3102 5107	KB 28 Jan 97
Allocharopa tarravillensis	3251 Three Hummock 3218 5178	KB 2 Feb 97

Allocharopa tarravillensis	3349 Robbins Island 3328 4941	KB 5 Feb 97
Allocharopa tarravillensis	3148 Harcus River 3172 4839	KB 5 Sep 00
Allocharopa tarravillensis	3247 Togari Block 3266 4722	KB 8 Sep 92
Allocharopa tarravillensis	3347 Togari Block 3377 4775	KB 10 Sep 92
Allocharopa tarravillensis	3447 Deep Creek Bay 3447 4787	KB 5 Sep 00
Allocharopa tarravillensis	3547 Circular Head	Aust. Mus. Collections (Petterd?)
Allocharopa "Franklin"	3633 Hogarth Falls 3633 3318	KB 1 Mar 00
Allocharopa "Franklin"	4132 Franklin River 4190 3258	KB 25 Oct 98
Allocharopa "Franklin"	3829 Pine Landing 3858 2994	KB 27 Jan 00
Allocharopa "Franklin"	3628 Hibbs Lagoon	Steve Smith (NRCP collections)
Allocharopa "Franklin"	4425 Frodshams Pass 4497 2580	Coy et al (1993)
Pernagera kingstonensis	3148 Harcus River 3172 4839	KB 5 Sep 00
Pernagera kingstonensis	3147 Sunto Road 3145 4741	KB 6 Sep 00
Pernagera kingstonensis	3247 Togari Block 3298 4726	KB 8 Sep 92
Pernagera kingstonensis	3347 Togari Block 3337 4775	KB 10 Sep 92
Pernagera kingstonensis	3146 Galeford Creek 3193 4681	KB 24 Jun 98
Pernagera kingstonensis	3246 Eldridge Road 3265 4621	KB 25 Dec 88
Pernagera kingstonensis	3346	Smith + Kershaw (1981)
Pernagera kingstonensis	3946 Table Cape Lookout 3930 4662	KB 22 Oct 94
Pernagera kingstonensis	3145 Arthur/Frankland Jcn 3128 4503	KB 25 Dec 88
Pernagera kingstonensis	3245 Christmas Hills 3275 4544	KB 19 July 99
Pernagera kingstonensis	3345 Roger River 3332 4526	KB 1 Oct 91
Pernagera kingstonensis	3445 Trowutta Cave 3410 4519	KB 24 Oct 98
Pernagera kingstonensis	3545 Peegra Road 3595 4537	KB 1 June 99
Pernagera kingstonensis	3745 Meunna 3709 4508	KB 12 May 99
Pernagera kingstonensis	3845 Oldina 3884 4598	KB 4 May 99
Pernagera kingstonensis	3945 Kaloma Camp 3919 4568	KB 22 Oct 94
Pernagera kingstonensis	4045 Burnie Park 4070 4550	KB 9 Jun 96
Pernagera kingstonensis	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Pernagera kingstonensis	3444 Rapid River 3404 4424	KB 3 Oct 91
Pernagera kingstonensis	3644 Rabalga Road 3624 4498	KB 24 Oct 98
Pernagera kingstonensis	3744 West Takone 3723 4405	KB 13 May 99
Pernagera kingstonensis	3844 Jessie Gorge 3822 4479	KB 6 May 99
Pernagera kingstonensis	4144 The Gnomon 4190 4409	KB 28 Mar 99
Pernagera kingstonensis	4244 Paton Park 4240 4420	KB 27 Mar 99
Pernagera kingstonensis	5744 Frome Road 5755 4426	KB 22 Jan 96
Pernagera kingstonensis	5844 Blue Tier 5846 4402	KB 23 Jan 96
Pernagera kingstonensis	3243 Balfour 3251 4303	KB 1 Nov 91
Pernagera kingstonensis	3543 Mount Bertha 3597 4338	KB 2 June 99
Pernagera kingstonensis	3743 West Takone 3752 4398	KB 26 May 99
Pernagera kingstonensis	3843 Oonah 3814 4358	KB 25 May 99
Pernagera kingstonensis	3943 Tewkesbury 3900 4340	Kershaw Nov 70 (QVM)
Pernagera kingstonensis	4543 Wesley Vale 4554 4382	KB 26 Sep 03
Pernagera kingstonensis	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Pernagera kingstonensis	4943 Supply Mill 4950 3326	KB 8 Mar 97
Pernagera kingstonensis	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Pernagera kingstonensis	5243 Mount Arthur 5250 4313	KB 5 Feb 96
Pernagera kingstonensis	5343 Sideling 5339 4344	KB 2 Feb 96
Pernagera kingstonensis	5443 Mackenzie Rivulet	Ron Kershaw (QVM)
Pernagera kingstonensis	5543 Tulendeena 5535 4383	KB 15 Feb 96
Pernagera kingstonensis	5643 Gold Creek 5681 4384	KB 30 Jan 96
Pernagera kingstonensis	5743 Rattler Range 5744 4353	Mesibov (1988)
Pernagera kingstonensis	5843 Blue Tier 5841 4383	KB 27 Oct 90
Pernagera kingstonensis	3742	Smith + Kershaw (1981)

Pernagera kingstonensis	3942	Smith + Kershaw (1981)
Pernagera kingstonensis	4142 Loyatea 4107 4264	KB 3 Oct 99
Pernagera kingstonensis	4942 Notley Gorge 4925 4216	KB 18 Mar 01
Pernagera kingstonensis	5142 Hollybank 5175 4276	KB 12 Aug 95
Pernagera kingstonensis	5242 Patersonia Rivulet 5275 4275	KB 5 Feb 96
Pernagera kingstonensis	5342 Skemps 5303 4278	KB 8 Dec 95
Pernagera kingstonensis	5442 Mount Maurice 5452 4262	KB 9 Jan 96
Pernagera kingstonensis	5642 Mount Victoria 5663 4226	KB 16 Jan 96
Pernagera kingstonensis	5742 Saint Columba Falls 5769 4250	KB 18 Jan 96
Pernagera kingstonensis	3341 Leigh River 3352 4198	KB 23 Oct 98
Pernagera kingstonensis	3441 Donaldson River 3409 4101	KB 23 Oct 98
Pernagera kingstonensis	3741 Waratah (Mt Bischoff)	Petterd (1879)
Pernagera kingstonensis	3941 St Valentines Peak	TMAG collections (Petterd?)
Pernagera kingstonensis	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Pernagera kingstonensis	5041 Cataract Gorge	QVM specimen
Pernagera kingstonensis	5341 Sunset Ridge 5395 4155	KB 6 Feb 96
Pernagera kingstonensis	5441 Sunset Ridge 5455 4198	KB 6 Feb 96
Pernagera kingstonensis	5541 Tombstone Creek	Ron Kershaw
Pernagera kingstonensis	5641 Mathinna Plains 5623 4196	KB 11 Jan 96
Pernagera kingstonensis	5741 Mathinna Falls 5751 4174	KB 15 Jan 96
Pernagera kingstonensis	5841 Haleys Creek 5825 4188	KB 1 Feb 96
Pernagera kingstonensis	3740 Waratah 3702 4062	Mesibov (1988)
Pernagera kingstonensis	3840	Smith + Kershaw (1981)
Pernagera kingstonensis	3940 Surrey Hills	Petterd (1879)
Pernagera kingstonensis	4240 Moina	Brian Smith 7 Nov 95 (QVM)
Pernagera kingstonensis	4540 Garden of Eden Creek 4532 408	KB 31 Jan 93
Pernagera kingstonensis	5540 Joy Road 5587 4047	Kershaw 18 Sep 85 (QVM)
Pernagera kingstonensis	3639	Smith + Kershaw (1981)
Pernagera kingstonensis	3939 Mt Cripps	Mesibov 1994
Pernagera kingstonensis	4139 Cradle Mountain 4109 3955	Coy et al (1993)
Pernagera kingstonensis	4339	Smith + Kershaw (1981)
Pernagera kingstonensis	4439 Marakoopa Cave 4408 3968	KB 30 Mar 86
Pernagera kingstonensis	5639 River Tyne 5652 3987	KB 30 Dec 98
Pernagera kingstonensis	5739 Tower Hill 5709 3984	KB 31 Dec 98
Pernagera kingstonensis	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Pernagera kingstonensis	3338 Pieman River 3397 3855	KB 23 Oct 98
Pernagera kingstonensis	3438 Wilsons Road 3401 3816	KB 23 Oct 98
Pernagera kingstonensis	3838	Smith + Kershaw (1981)
Pernagera kingstonensis	3938	Smith + Kershaw (1981)
Pernagera kingstonensis	4338 Arm River 4344 3843	KB 21 Sep 01
Pernagera kingstonensis	4438 Devils Gullet 4437 3868	KB 21 Sep 01
Pernagera kingstonensis	4638 Bessells Road, Meander	Kershaw Nov 76 (QVM)
Pernagera kingstonensis	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Pernagera kingstonensis	4838 Liffey Falls 4802 3834	KB 23 Sep 95
Pernagera kingstonensis	3637	Smith + Kershaw (1981)
Pernagera kingstonensis	3837 Anthony Road 3868 3707	KB 25 Oct 98
Pernagera kingstonensis	3937	Smith + Kershaw (1981)
Pernagera kingstonensis	4137 Oakleigh Creek 4185 3733	KB 9 Jan 91
Pernagera kingstonensis	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Pernagera kingstonensis	4737 Dells Bluff 4764 3749	KB 13 May 92
Pernagera kingstonensis	4937 Poatina	TMAG collections
Pernagera kingstonensis	5437	Smith + Kershaw (1981)
Pernagera kingstonensis	3536 Heemskirk River 3518 3692	KB 22 Oct 98
Pernagera kingstonensis	3736 Mt Dundas	QVM collections
Pernagera kingstonensis	4136 Oakleigh Creek 4198 3693	KB 9 Jan 91
Pernagera kingstonensis	4236 Pelion East 4223 3646	KB 10 Jan 91

Pernagera kingstonensis	4636 Lake Augusta 4655 3668	KB 6 May 92
Pernagera kingstonensis	4736 Liawenee 4724 3614	KB 7 May 92
Pernagera kingstonensis	4535 Lake Ada 4540 3597	KB 9 May 92
Pernagera kingstonensis	4835 Hydro Creek 4885 3555	KB 11 May 92
Pernagera kingstonensis	3734 Pearl Creek 3772 3421	KB 14 May 89
Pernagera kingstonensis	3834 Queenstown 3804 3404	KB 11 June 96
Pernagera kingstonensis	3633 Fabritong Rivulet 3603 3390	KB 14 June 96
Pernagera kingstonensis	3933 Bubs Hill	Arthur Clarke 1987
Pernagera kingstonensis	4333	Smith + Kershaw (1981)
Pernagera kingstonensis	4733	Smith + Kershaw (1981)
Pernagera kingstonensis	4132 Frenchmans Cap track 4139 325	KB 28 Jan 00
Pernagera kingstonensis	4432 Butlers Gorge 4408 3215	KB 31 Jan 99
Pernagera kingstonensis	4632 Dee Tunnel	TMAG collections
Pernagera kingstonensis	5232 Blackman River 5241 3293	KB 22 Feb 98
Pernagera kingstonensis	4431 Tarraleah 4473 3163	Mesibov 18 Apr 92 (QVM)
Pernagera kingstonensis	4531	Forestry Tas (Tarraleah samples)
Pernagera kingstonensis	4631 Glenmark 4695 3190	KB 28 Dec 97
Pernagera kingstonensis	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Pernagera kingstonensis	4530 Wayatinah 4593 3097	KB 26 Jan 99
Pernagera kingstonensis	3929	Smith + Kershaw (1981)
Pernagera kingstonensis	4529 Tiger Road 4546 2949	KB 31 Jan 99
Pernagera kingstonensis	4629 Thunderbolt 4640 2970	Owen Seeman May 2000 (QVM)
Pernagera kingstonensis	5229 Yarlington Tier 5245 2902	KB 22 Feb 98
Pernagera kingstonensis	3728 Hobbs Creek 3752 2878	KB 1 Mar 00
Pernagera kingstonensis	3928	Smith + Kershaw (1981)
Pernagera kingstonensis	4728 Montos Creek 4732 2814	KB 4 Feb 95
Pernagera kingstonensis	5028 Espies Craig 5018 2286	KB 22 Feb 98
Pernagera kingstonensis	5228 Yarlington Tier 5245 2898	KB 22 Feb 98
Pernagera kingstonensis	5628 Prosser River 5683 2881	KB 18 Sep 99
Pernagera kingstonensis	3927	Smith + Kershaw (1981)
Pernagera kingstonensis	4327 Clear Hill 4398 2740	KB 15 Mar 98
Pernagera kingstonensis	4527 Florentine 4513 2707	KB 19 Apr 87
Pernagera kingstonensis	4627 Seagers Lookout 4695 2753	KB 18 Apr 87
Pernagera kingstonensis	4727 Russell Falls 4763 2748	KB 17 Apr 87
Pernagera kingstonensis	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Pernagera kingstonensis	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Pernagera kingstonensis	3926	Smith + Kershaw (1981)
Pernagera kingstonensis	4226 Strathgordon 4221 2642	KB 20 Aug 89
Pernagera kingstonensis	4426 Ragged Range 4443 2626	KB 15 Mar 98
Pernagera kingstonensis	4526 Needles Shelter 4514 2655	KB 2 Mar 86
Pernagera kingstonensis	4626 Junee Cave 4668 2681	KB 15 Mar 98
Pernagera kingstonensis	4826 Torrent Creek 4847 2632	KB 10 Jan 01
Pernagera kingstonensis	5126 Mt Faulkner 5116 2625	KB 19 Dec 98
Pernagera kingstonensis	4325	Smith + Kershaw (1981)
Pernagera kingstonensis	4425 Creepy Crawley 4497 2580	KB 1 Dec 92
Pernagera kingstonensis	4725 Styx River 4746 2581	KB 9 Dec 01
Pernagera kingstonensis	5125 Collinsvale 5127 2543	KB 11 May 86
Pernagera kingstonensis	5225 Ki Creek 5222 2516	KB 7 Nov 96
Pernagera kingstonensis	4424 Condominium Creek 4479 2434	KB 9 Apr 88
Pernagera kingstonensis	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Pernagera kingstonensis	4824 Herons Creek 4820 2427	KB 25 Dec 97
Pernagera kingstonensis	5124 Cathedral Rock 5170 2453	KB 25 Apr 89
Pernagera kingstonensis	5224 Mt Nelson-Taroona 5285 2468	KB 8 Sep 91
Pernagera kingstonensis	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Pernagera kingstonensis	4423 Scotts Peak 4424 2345	KB 9 Apr 88
Pernagera kingstonensis	4623 Mt Weld 4655 2383	Doran/Bashford 2002 (QVM)

Pernagera kingstonensis	5123	Smith + Kershaw (1981)
Pernagera kingstonensis	4722 Tahune Park 4772 2284	KB 6 Apr 86
Pernagera kingstonensis	4822 Lidgerwood Rd 4868 2246	KB 11 Feb 95
Pernagera kingstonensis	4922 Castle Forbes Falls 4958 2258	KB 29 Mar 91
Pernagera kingstonensis	5122 Snug Tiers 5125 2297	KB 7 May 94
Pernagera kingstonensis	4721 Cook Creek 4708 2180	KB 11 Feb 95
Pernagera kingstonensis	4821 Hartz Hut 4810 2171	KB 9 May 87
Pernagera kingstonensis	4820 Adamsons Peak 4897 2016	KB 6 Aug 00
Pernagera kingstonensis	4920 Francistown 4989 2053	KB 27 Sep 87
Pernagera kingstonensis	4219 Melaleuca Inlet 4298 1956	KB 15 Jan 91
Pernagera kingstonensis	4319 Melaleuca 4324 1920	KB 14 Jan 91
Pernagera kingstonensis	4819 Hastings Caves 4873 1967	KB 9 Nov 96
Pernagera kingstonensis	4919 Jacksons Creek 4970 1958	KB 24 Nov 00
Pernagera kingstonensis	5219 Mt Mangana 5232 1985	KB 7 Apr 01
Pernagera kingstonensis	4318 Half Woody Hill 4339 1889	Brian Smith 5 Mar 92 (QVM)
Pernagera kingstonensis	4618 Precipitous Bluff	Arthur Clarke 1988
Pernagera kingstonensis	4818 Moonlight Ridge 4872 1870	KB 11 Nov 89
Pernagera kingstonensis	4918	Smith + Kershaw (1981)
Pernagera kingstonensis	4817 Catamaran River 4886 1770	KB 21 Mar 87
Pernagera kingstonensis	4917 Rescherche Bay 4908 1752	KB 30 Nov 92
Pernagera tasmaniae	4439 Marakoopa Cave 4408 3968	KB 30 Mar 86
Pernagera tasmaniae	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Pernagera tasmaniae	4838 Liffey Falls 4802 3834	KB 23 Sep 95
Pernagera tasmaniae	6037 Douglas-Apsley 6015 3778	Mesibov 15 June 88 (QVM)
Pernagera tasmaniae	4736 Liawenee 4724 3614	KB 7 May 92
Pernagera tasmaniae	6036 Douglas-Apsley 6026 3688	Mesibov 1 June 88 (QVM)
Pernagera tasmaniae	4534 Pine Tier Lagoon 4576 3403	KB 31 Jan 99
Pernagera tasmaniae	4934 Yangena Hill 4943 3463	Mesibov 14 Mar 99 (QVM)
Pernagera tasmaniae	4933 Steppes 4905 3394	KB 23 Oct 94
Pernagera tasmaniae	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Pernagera tasmaniae	5733 Big Sassy Creek 5746 3332	KB 23 Nov 97
Pernagera tasmaniae	5232 Blackman River 5241 3293	KB 22 Feb 98
Pernagera tasmaniae	4631 Glenmark 4695 3190	KB 28 Dec 97
Pernagera tasmaniae	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Pernagera tasmaniae	5030 Bothwell	QVM collections
Pernagera tasmaniae	5630 Pepper Creek 5654 3092	Mesibov 18 Apr 91 (QVM)
Pernagera tasmaniae	5730 Ravens Hill 5709 3034	Mesibov 19 Apr 91 (QVM)
Pernagera tasmaniae	4529 Tiger Road 4546 2949	KB 31 Jan 99
Pernagera tasmaniae	4629 Thunderbolt 4640 2980	Owen Seeman May 00 (QVM)
Pernagera tasmaniae	5229 Yarlington Tier 5245 2902	KB 22 Feb 98
Pernagera tasmaniae	5329 Eldon Road 5353 2951	KB 4 Feb 01
Pernagera tasmaniae	5429 Mount Hobbs 5483 2924	KB 5 July 98
Pernagera tasmaniae	5529 Sand River 5589 2926	KB 5 July 98
Pernagera tasmaniae	5629 Baldy Creek 5656 2997	Mesibov 23 Apr 91 (QVM)
Pernagera tasmaniae	5729 Maclaines Creek 5703 2983	Mesibov 26 Apr 91 (QVM)
Pernagera tasmaniae	5228 Yarlington Tier 5245 2898	KB 22 Feb 98
Pernagera tasmaniae	5728 Prosser River 5709 2880	KB 26 July 98
Pernagera tasmaniae	5828 Skipping Ridge 5899 2839	KB 3 Apr 91
Pernagera tasmaniae	5928 Bishop + Clerk 5915 2841	KB 23 Mar 96
Pernagera tasmaniae	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Pernagera tasmaniae	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Pernagera tasmaniae	5427 Phipps Creek 5497 2751	KB 9 Aug 98
Pernagera tasmaniae	5627 Sandspit River 5690 2711	KB 3 Oct 94
Pernagera tasmaniae	5827	Smith + Kershaw (1981)
Pernagera tasmaniae	5927	Smith + Kershaw (1981)

Pernagera tasmaniae	5126 Mt Faulkner 5116 2625	KB 19 Dec 98
Pernagera tasmaniae	5226 Grass Tree Hill 5276 2627	KB 26 May 90
Pernagera tasmaniae	5025 Illa Brook 5052 2564	KB 3 June 95
Pernagera tasmaniae	5125 Collinsvale 5155 2573(?)	KB 7 Dec 91
Pernagera tasmaniae	5225 Myrtle Gully Mt W 5214 2505	KB 8 Oct 88
Pernagera tasmaniae	5124 Neika 5195 2455	KB 14 Feb 90
Pernagera tasmaniae	5224	Smith + Kershaw (1981)
Pernagera tasmaniae	5524 Coal Mines 5584 2404	KB 31 Aug 86
Pernagera tasmaniae	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Pernagera tasmaniae	5023	Smith + Kershaw (1981)
Pernagera tasmaniae	5123 Pelverata Falls 5107 2332	KB 14 Aug 88
Pernagera tasmaniae	5622 Clark Cliffs 5638 2267	KB 3 May 02
Pernagera tasmaniae	5722 Fortescue Bay 5776 2237	KB 6 Mar 99
Pernagera tasmaniae	4919	Smith + Kershaw (1981)
Pernagera tasmaniae	5019 Lady Bay 5015 1946	KB 27 Dec 88
Pernagera tasmaniae	5219 Fluted Cape 5294 1985	KB 8 Apr 01
Pernagera tasmaniae	4918	Smith + Kershaw (1981)
Pernagera architectonica	4736 Split Rock 4722 3644	KB 11 May 92
Pernagera architectonica	4535 Bull Hill 4537 3594	KB 9 May 92
Pernagera architectonica	4727 Lake Dobson Road 4726 2745	KB 4 May 91
Pernagera architectonica	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Pernagera architectonica	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Pernagera architectonica	4826 Torrent Creek 4847 2632	KB 10 Jan 01
Pernagera architectonica	5125 Collinsvale 5127 2543	KB 10 May 98
Pernagera architectonica	5225 Lenah Valley Track 5203 2504	KB 4 Feb 90
Pernagera architectonica	4824 Herons Creek 4820 2427	KB 25 Dec 97
Pernagera architectonica	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Pernagera architectonica	5124 Lenah Valley Track 5198 2493	KB 4 Feb 90
Pernagera architectonica	5224 Octopus Tree 5203 2495	KB 19 Nov 98
Pernagera architectonica	4923 Bermuda Hill 4916 2321	KB 8 Jul 95
Pernagera architectonica	5123 Snug Tiers 5153 2320	KB 4 May 97
Pernagera architectonica	5223 Margate	Legrand (1871)
Pernagera architectonica	5122 Snug Tiers 5125 2297	KB 7 May 94
Pernagera architectonica	5219 Mt Mangana 5232 1985	KB 7 Apr 01
Pernagera "Waterfall"	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Pernagera "Waterfall"	5723 Tatnells Hill 5771 2301	KB 25 Apr 88
Pernagera "Paradise"	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Pernagera "Paradise"	5734 Lost Falls 5736 3450	KB 28 Apr 01
Pernagera "Paradise"	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Pernagera "Paradise"	5529 Sand River 5589 2926	KB 5 July 98
Pernagera "Paradise"	5729 Little Swanport	TMAG
Pernagera "Paradise"	5628 Prosser River 5699 2880	KB 26 July 98
Pernagera "Paradise"	5728 Prosser River 5709 2880	KB 26 July 98
Pernagera "Paradise"	5928 Bishop+Clerk 5909 2842	KB 7 Apr 02
Pernagera officeri	2361 Cape Wickham 2372 6133	KB 12 Dec 96
Pernagera officeri	2461	Smith + Kershaw (1981)
Pernagera officeri	5861 Sister Islands	Australian Museum
Pernagera officeri	2360 Bob Lagoon 2382 6026	KB 12 Dec 96
Pernagera officeri	2460 Lake Martha Lavinia 2481 6068	KB 14 Dec 96
Pernagera officeri	5860 NorthEast River 5818 6001	KB 24 Sep 00
Pernagera officeri	5259 Black Pyramid Bass Strait	John Whinray (TMAG)
Pernagera officeri	5759	Smith + Kershaw (1981)

Pernagera officeri	5859 NorthEast River 5819 5994	KB 24 Sep 00
Pernagera officeri	2358 Porky Lagoon	Johnston (1886)
Pernagera officeri	2458 Ridges Road 2432 5822	KB 15 Dec 96
Pernagera officeri	5658	Smith + Kershaw (1981)
Pernagera officeri	5758 Mount Tanner 5704 5848	KB 24 Sep 00
Pernagera officeri	2357 Currie 2304 5752	KB 11 Dec 96
Pernagera officeri	2557 Raffertys Creek 2511 5781	KB 12 Dec 96
Pernagera officeri	5757 Wybalena 5752 5707	KB 24 Sep 00
Pernagera officeri	5857	Smith + Kershaw (1981)
Pernagera officeri	5957	Smith + Kershaw (1981)
Pernagera officeri	6057	Smith + Kershaw (1981)
Pernagera officeri	2456 Grassy River 2492 5631	KB 26 Sep 98
Pernagera officeri	2556 Yarra Creek 2513 5676	KB 28 Sep 03
Pernagera officeri	5756 Pickford Creek 5782 5694	KB 26 Sep 00
Pernagera officeri	5856 Blue Rocks 5807 5652	KB 4 Sep 87
Pernagera officeri	5956 Walkers Lookout 5918 5652	KB 25 Sep 00
Pernagera officeri	6056 Planter Beach 6095 5644	KB 25 Sep 00
Pernagera officeri	2355 Seal River 2387 5592	KB 16 Dec 96
Pernagera officeri	2455 Colliers Beach 2438 5573	KB 17 Dec 96
Pernagera officeri	5855 Whitemark	Ron Kershaw (QVM)
Pernagera officeri	5955	Smith + Kershaw (1981)
Pernagera officeri	5854 Trousers Point 5874 5463	KB 23 Sep 00
Pernagera officeri	5954 Mt Strzelecki 5904 5492	KB 23 Sep 00
Pernagera officeri	6054 Vinegar Hill 6064 5490	KB 26 Sep 00
Pernagera officeri	5753 Badger Island	John Whinray (Vic Mus)
Pernagera officeri	5953 Cape Barren Island	Petterd (1879)
Pernagera officeri	3052 Albatross Island	Bob Green (QVM)
Pernagera officeri	3152 Three Hummock 3196 5221	KB 1 Feb 97
Pernagera officeri	3051 Hunter Island 3086 5123	KB 30 Jan 97
Pernagera officeri	3151 Hunter Island 3113 5110	KB 29 Jan 97
Pernagera officeri	3251 Three Hummock 3258 5197	KB 1 Feb 97
Pernagera officeri	5851	Smith + Kershaw (1981)
Pernagera officeri	5951 Clarke Island	Petterd (1879)
Pernagera officeri	3249 Robbins Island 3278 4910	KB 4 Feb 97
Pernagera officeri	3548 The Nut 3571 4860	KB 13 May 98
Pernagera officeri	5848 Cape Portland	Ron Kershaw (QVM)
Pernagera officeri	3547 Black River Mouth	Bill Mollison (TMAG)
Pernagera officeri	3747 Rocky Cape 3773 4708	KB 2 Oct 91
Pernagera officeri	5547 Waterhouse Point 5537 4780	KB 20 Sep 97
Pernagera officeri	3046	Mesibov (Arthur-Pieman survey)
Pernagera officeri	3946	Smith + Kershaw (1981)
Pernagera officeri	5346 Bridport	Tim Hume 1975 (QVM)
Pernagera officeri	6146 Eddystone Point 6133 4610	KB 3 Sep 88
Pernagera officeri	3045 Arthur River Mouth 3032 4527	KB 28 Mar 86
Pernagera officeri	4145	Smith + Kershaw (1981)
Pernagera officeri	4745 West Head 4761 4524	Mesibov 6 Apr 96 (QVM)
Pernagera officeri	4845 Five Mile Bluff 4880 4575	Kershaw July 72 (QVM)
Pernagera officeri	5145 Bellingham	Kershaw Apr 75 (QVM)
Pernagera officeri	5345	Smith + Kershaw (1981)
Pernagera officeri	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Pernagera officeri	6045 Ansons River 6034 5540	KB 3 Sep 88
Pernagera officeri	3044 Sandown Point 3051 4492	Mesibov 8 Apr 93 (QVM)
Pernagera officeri	4344	Smith + Kershaw (1981)
Pernagera officeri	4444 Lillico 4403 4430	Kershaw 16 May 56 (QVM)
Pernagera officeri	4544	Smith + Kershaw (1981)
Pernagera officeri	4644	Smith + Kershaw (1981)

Pernagera officeri	4744 Badger Head 4722 4499	Kershaw Apr 51 (QVM)
Pernagera officeri	4844 Rowella 4889 4430	Brian Smith 1 Oct 94 (QVM)
Pernagera officeri	4944 Land O' Cakes Ck 4986 4482	KB 17 Mar 01
Pernagera officeri	5444 Mt Stronach 5477 4423	KB 24 May 03
Pernagera officeri	6044 The Gardens 6076 4415	KB 28 Aug 88
Pernagera officeri	3043 Rebecca Lagoon 3063 4377	Mesibov 6 Apr 93 (QVM)
Pernagera officeri	4343	Smith + Kershaw (1981)
Pernagera officeri	4443	Smith + Kershaw (1981)
Pernagera officeri	4543	Smith + Kershaw (1981)
Pernagera officeri	4743	Smith + Kershaw (1981)
Pernagera officeri	4843	Smith + Kershaw (1981)
Pernagera officeri	4943 Norfolk Reach 4937 4321	KB 11 Jan 97
Pernagera officeri	6143 Binalong Bay 6103 4320	KB 30 Aug 88
Pernagera officeri	3042 Possum Creek 3085 4286	Mesibov 5 Jan 91 (QVM)
Pernagera officeri	3142 Brooks Creek 3109 4239	Mesibov 16 Apr 93 (QVM)
Pernagera officeri	4942 Notley Gorge 4925 4216	KB 5 Oct 91
Pernagera officeri	5742 Saint Columba Falls 5771 4248	KB 29 Aug 88
Pernagera officeri	5942 Trafalgar Track 5990 4240	KB 31 Aug 88
Pernagera officeri	6042 Humbug Point 6080 4255	KB 27 Oct 90
Pernagera officeri	6142 Humbug Point 6103 4292	KB 30 Aug 88
Pernagera officeri	3141 Wild Wave River 3151 4177	Mesibov 18 Apr 93 (QVM)
Pernagera officeri	4641 Christmas Hill 4675 4102	Mesibov 7 Nov 97 (QVM)
Pernagera officeri	4941	Smith + Kershaw (1981)
Pernagera officeri	5041 Cataract Gorge	Bob Mesibov
Pernagera officeri	5141 Distillery Creek	Petterd (QVM)
Pernagera officeri	5641 Saddleback	Dick Bashford (QVM)
Pernagera officeri	6041 Loila Tier 6035 4177	KB 21 Sep 96
Pernagera officeri	3140 Lagoon River 3176 4060	Mesibov 2 May 93 (QVM)
Pernagera officeri	3240 Hunters Creek 3210 4008	Mesibov 1 May 93 (QVM)
Pernagera officeri	5940 South Sister 5977 4011	KB 4 Sep 88
Pernagera officeri	3239 Interview Road 3229 3965	Mesibov 1 May 93 (QVM)
Pernagera officeri	6039 St Marys Pass 6005 3987	KB 28 Aug 88
Pernagera officeri	3238 Pieman River 3261 3860	Mesibov 1 June 93 (QVM)
Pernagera officeri	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Pernagera officeri	6038 Heritage Falls 6003 3803	KB 28 Oct 90
Pernagera officeri	5337	Smith + Kershaw (1981)
Pernagera officeri	5537 Conara	Petterd (QVM)
Pernagera officeri	5937 Douglas-Apsley 5953 3718	Mesibov 5 July 88 (QVM)
Pernagera officeri	6037 Douglas-Apsley 6015 37622	Mesibov 17 July 88 (QVM)
Pernagera officeri	5936 Douglas-Apsley 5965 3662	Mesibov 4 July 88 (QVM)
Pernagera officeri	6036 Douglas-Apsley 6018 3685	Mesibov 3 May 88 (QVM)
Pernagera officeri	3435 Trial Harbour 3480 3564	KB 13 May 89
Pernagera officeri	6033 Wineglass Bay 6069 3308	KB 15 Jan 00
Pernagera officeri	5533 The Quoin	Mesibov Jan 03
Pernagera officeri	5733 Big Sassy Creek 5746 3332	Coy et al (1993)
Pernagera officeri	5632 Anglers Creek 5695 3227	Mesibov 7 Oct 01
Pernagera officeri	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Pernagera officeri	5230 Jericho	Petterd (QVM)
Pernagera officeri	5829 Plain Place Beach 5816 2945	KB 3 Sep 94
Pernagera officeri	3628 Hibbs Lagoon	QVM collections
Pernagera officeri	5726 Point du Ressac 5727 2658	KB 14 Nov 92
Pernagera officeri	5725 Marion Bay 5710 2589	KB 6 Aug 89
Pernagera officeri	5224 Hobart	Petterd (1879)
Pernagera officeri	5324 Gorringes Beach 5378 2423	KB 3 July 00
Pernagera officeri	5424 Sandford	May (1958)
Pernagera officeri	5524 Coal Mines 5584 2404	KB 31 Aug 86

Pernagera officeri	5223	Smith + Kershaw (1981)
Pernagera officeri	5523	Smith + Kershaw (1981)
Pernagera officeri	5723 Tessellated Pavement 5759 237	KB 10 Nov 85
Pernagera officeri	5622 Nubeena	Ron Kershaw (QVM)
Pernagera officeri	5722 Fortescue Bay 5785 2226	KB 24 Dec 89
Pernagera officeri	5321 Mars Bluff 5325 2120	KB 22 July 01
Pernagera officeri	5621 Remarkable Cave 5685 2178	KB 6 Apr 91
Pernagera officeri	5721 Safety Cove 5701 2181	KB 11 Feb 86
Pernagera officeri	4120 Breaksea Island 4161 2018	KB 16 Jan 91
Pernagera officeri	5120 Ninepins 5134 2077	KB 25 Dec 93
Pernagera officeri	5119 Mickeys Bay 5153 1913	KB 23 May 98
Pernagera officeri	5219 Fluted Cape 5298 1996	KB 8 Apr 01
Pernagera officeri	5319 Fluted Cape 5302 1989	KB 8 Apr 01
Pernagera officeri	5118 Cape Bruny 5111 1842	KB 26 Dec 91
Pernagera officeri	4918	Smith + Kershaw (1981)
Pernagera officeri	4617 Ile du Golfe	Parks island records

Pernagera "Waratah"	3741 Waratah (Mt Bischoff)	Petterd (1879)
Pernagera "Waratah"	3841 Wandle River 3890 4193	Mesibov 22 Sep 91 (QVM)
Pernagera "Waratah"	3941 St Valentines Peak	Petterd (TMAG)
Pernagera "Waratah"	3740 Butler Road 3712 4064	KB 25 Oct 98
Pernagera "Waratah"	3736 Ringville	Petterd (TMAG)

Dentherona dispar	3644 Rabalga Road 3624 4498	KB 24 Oct 98
Dentherona dispar	3543 Mount Bertha 3598 4340	KB 2 June 99
Dentherona dispar	3242 Daisy River 3246 4220	Mesibov 9 Jan 91 (QVM)
Dentherona dispar	3741 Waratah (Mt Bischoff)	Petterd (1879)
Dentherona dispar	3841	Smith + Kershaw (1981)
Dentherona dispar	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Dentherona dispar	4140 Winterbrook Falls 4140 4098	KB 25 Mar 95
Dentherona dispar	3439 Guthrie Creek 3408 3927	KB 23 Oct 98
Dentherona dispar	4039 Vale of Belvoir 4072 3981	Mesibov 21 Dec 93 (QVM)
Dentherona dispar	4139 Waratah (Mt Bischoff)	Petterd (1879)
Dentherona dispar	4239	Smith + Kershaw (1981)
Dentherona dispar	4339 Gad's Hill	Petterd (1879)
Dentherona dispar	4439	Smith + Kershaw (1981)
Dentherona dispar	4539 Chudleigh	Petterd (1879)
Dentherona dispar	3338 Pieman River 3397 3855	KB 23 Oct 98
Dentherona dispar	3438 Wilsons Road 3401 3816	KB 23 Oct 98
Dentherona dispar	3638 Wilson River	Dave Heap
Dentherona dispar	3838	Smith + Kershaw (1981)
Dentherona dispar	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Dentherona dispar	3837 Mt Farrell	Petterd (QVM)
Dentherona dispar	4037	Smith + Kershaw (1981)
Dentherona dispar	4137 Oakleigh Creek 4185 3733	KB 9 Jan 91
Dentherona dispar	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Dentherona dispar	3636 Zeehan	Charles Hedley (AM)
Dentherona dispar	4236 Pelion Valley 4208 3679	KB 11 Jan 91
Dentherona dispar	3635 Mount Zeehan	QVM collections
Dentherona dispar	3633 Fabritong Rivulet 3603 3390	KB 14 June 96
Dentherona dispar	3933 Nelson Falls 3953 3382	KB 27 Jan 00
Dentherona dispar	3632 Teepookana 3655 2273	KB 13 June 96
Dentherona dispar	3931 Andrew River 3950 3124	Steve Smith 22 Mar 88 (QVM)
Dentherona dispar	4132 Frenchmans Cap track 4139 325	KB 28 Jan 00
Dentherona dispar	4530 Wayatinah 4593 3097	KB 26 Jan 99
Dentherona dispar	3829 Pine Landing 3858 2994	KB 27 Jan 00

Dentherona dispar	3628 Hibbs Lagoon	McNiven + West 1991 (QVM)
Dentherona dispar	3928	Smith + Kershaw (1981)
Dentherona dispar	3927	Smith + Kershaw (1981)
Dentherona dispar	4027	Smith + Kershaw (1981)
Dentherona dispar	4527 Growling Swallet 4590 2740	KB 20 Aug 89
Dentherona dispar	4026	Smith + Kershaw (1981)
Dentherona dispar	4226 Strathgordon 4224 2634	KB 28 Jan 01
Dentherona dispar	4626 Junee Cave 4668 2681	KB 15 Mar 98
Dentherona dispar	3925	Smith + Kershaw (1981)
Dentherona dispar	4025	Smith + Kershaw (1981)
Dentherona dispar	4325 Hermit Valley	Kershaw 9 Apr 77 (QVM)
Dentherona dispar	4725 Styx River 4746 2581	KB 9 Dec 01
Dentherona dispar	5225 Lone Cabin 5204 2512	KB 24 Nov 92
Dentherona dispar	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Dentherona dispar	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Dentherona dispar	5124 Milles Track 5197 2483	KB 17 Oct 98
Dentherona dispar	5224 Octopus Tree 5203 2495	KB 19 Nov 98
Dentherona dispar	4923 Bermuda Hill 4916 2321	KB 8 Jul 95
Dentherona dispar	4622 Blakes Opening 4696 2287	KB 5 Apr 98
Dentherona dispar	4722 Tahune Park 4772 2284	KB 6 May 90
Dentherona dispar	4822 Geeveston 4852 2247	Bashford 20 Mar 96 (QVM)
Dentherona dispar	4721 Cook Creek 4708 2180	KB 11 Feb 95
Dentherona dispar	4819 Chestermans Road 4883 1959	KB 24 Nov 00
Dentherona dispar	5219 Lockleys Road 5259 1946	KB 6 Feb 01
Dentherona subrugosa	5645 Mount Horror 5612 4531	KB 18 Jan 96
Dentherona subrugosa	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Dentherona subrugosa	4744 York Town 4775 4433	Brian Smith 21 June 94 (QVM)
Dentherona subrugosa	5144 Retreat 5138 4462	KB 17 Mar 01
Dentherona subrugosa	5344 Blumont 5312 4401	KB 11 Feb 02
Dentherona subrugosa	5444 Mt Stronach 5477 4423	KB 24 May 03
Dentherona subrugosa	5544 Mt Stronach 5502 4442	KB 19 Jan 96
Dentherona subrugosa	5644 Cascade River	Ron Kershaw
Dentherona subrugosa	5844 Southern Cross Ck 5818 4474	KB 24 Jan 96
Dentherona subrugosa	5243 Lisle Block 5265 4367	KB 5 Feb 96
Dentherona subrugosa	5343 Sideling 5357 4331	KB 2 Feb 96
Dentherona subrugosa	5443 Saltmarsh Road 5474 4339	KB 10 Jan 96
Dentherona subrugosa	5543 Cuckoo Hill 5538 4348	KB 15 Feb 96
Dentherona subrugosa	5643 Gold Creek 5681 4384	KB 30 Jan 96
Dentherona subrugosa	5743 Weldborough 5794 4367	KB 29 Aug 88
Dentherona subrugosa	5843 Murdochs Road 5892 4397	KB 31 Jan 96
Dentherona subrugosa	5943 Terrys Hill 5925 4337	KB 31 Jan 96
Dentherona subrugosa	4942 Notley Gorge 4925 4216	KB 5 Oct 91
Dentherona subrugosa	5142 Hollybank 5175 4276	KB 12 Aug 95
Dentherona subrugosa	5242 Patersonia Rivulet 5275 4275	KB 5 Feb 96
Dentherona subrugosa	5342 Barrow Falls 5328 4215	KB 8 Jan 96
Dentherona subrugosa	5442 Mount Maurice 5452 4262	KB 9 Jan 96
Dentherona subrugosa	5542 Mt Maurice 5518 4251	KB 12 Jan 96
Dentherona subrugosa	5642 Mount Victoria 5663 4226	KB 16 Jan 96
Dentherona subrugosa	5742 Saint Columba Falls 5769 4250	KB 18 Jan 96
Dentherona subrugosa	5842 Rayners Hill 5880 4223	KB 1 Feb 96
Dentherona subrugosa	6042 Boggy Creek 6054 4221	KB 20 Sep 96
Dentherona subrugosa	5241 Mount Barrow 5292 4198	KB 17 July 01
Dentherona subrugosa	5341 Mount Barrow 5358 4198	KB 8 Jan 96
Dentherona subrugosa	5441 Sunset Ridge 5445 4198	KB 6 Feb 96
Dentherona subrugosa	5541 Tombstone Creek 5570 4168	KB 11 Jan 96

Dentherona subrugosa	5641 Mathinna Plains 5623 4196	KB 11 Jan 96
Dentherona subrugosa	5741 Mathinna Falls 5751 4174	KB 4 Sep 88
Dentherona subrugosa	5841 Ryans Creek 5862 4184	KB 1 Feb 96
Dentherona subrugosa	5540 Abrahams Creek 5581 4077	KB 7 Feb 96
Dentherona subrugosa	5940 South Sister 5977 4011	KB 4 Sep 88
Dentherona subrugosa	4439 Westmoreland Falls 4489 3918	KB 26 Mar 89
Dentherona subrugosa	4539	Smith + Kershaw (1981)
Dentherona subrugosa	5539 Ben Lomond Rivulet 5525 3914	KB 31 Dec 98
Dentherona subrugosa	5639 River Tyne 5652 3987	KB 30 Dec 98
Dentherona subrugosa	5739 Tower Hill 5709 3984	KB 31 Dec 98
Dentherona subrugosa	6039 St Marys Pass 6005 3987	KB 28 Aug 88
Dentherona subrugosa	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Dentherona subrugosa	4838 Liffey Falls 4802 3834	KB 23 Sep 95
Dentherona subrugosa	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Dentherona subrugosa	6038 Heritage Falls 6003 3803	KB 28 Oct 90
Dentherona subrugosa	4937 Mount Blackwood 4913 3714	KB 6 Nov 99
Dentherona subrugosa	5937 Douglas-Apsley 5973 3738	Mesibov 3 July 88 (QVM)
Dentherona subrugosa	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Dentherona subrugosa	5936 Douglas-Apsley 5992 3655	Mesibov 19 July 88
Dentherona subrugosa	5735 Meetus Falls	Roy Crookshanks
Dentherona subrugosa	5633 Halls Creek 5660 3382	Mesibov 24 Mar 02
Dentherona subrugosa	5733 Big Sassy Creek 5746 3332	KB 23 Nov 97
Dentherona subrugosa	5632 Tooms White Gum 5693 3234	KB 23 Nov 97
Dentherona subrugosa	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Dentherona subrugosa	5630 Buckland 5618 3008	Mesibov 25 Apr 91
Dentherona subrugosa	5629 Buckland 5656 2997	Mesibov 23 Apr 91
Dentherona subrugosa	5224 Mt Wellington	Petterd (1879)
Geminoropa hookeriana	4244 Paton Park 4240 4420	KB 27 Mar 99
Geminoropa hookeriana	4043	Smith + Kershaw (1981)
Geminoropa hookeriana	4343 Champion Park 4337 4370	KB 26 Mar 95
Geminoropa hookeriana	3941 Surrey Hills	Petterd (1879)
Geminoropa hookeriana	4141	Smith + Kershaw (1981)
Geminoropa hookeriana	4440 Gog Range 4461 4058	Mesibov 16 Dec 91 (QVM)
Geminoropa hookeriana	4540 Garden of Eden Creek 4532 408	KB 31 Jan 93
Geminoropa hookeriana	4439 Marakoopa Cave 4408 3968	KB 30 Mar 86
Geminoropa hookeriana	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Geminoropa hookeriana	4838 Liffey	Ron Kershaw (QVM)
Geminoropa "Hastings"	4819 Hastings Caves 4873 1967	KB 9 Nov 96
Geminoropa "Hastings"	4618 Precipitous Bluff	Stefan Eberhard 1994 (AM)
Geminoropa antialba	3344 Julius River 3343 4420	KB 3 Oct 91
Geminoropa antialba	3542 Savage River Pipeline 3558 422	Coy et al (1993)
Geminoropa antialba	3741 Waratah (Mt Bischoff)	Petterd (1879)
Geminoropa antialba	3740 Butler Road 3712 4064	KB 25 Oct 98
Geminoropa antialba	3939 Mt Cripps 3970 3990	Mesibov 10 July 94 (QVM)
Geminoropa antialba	4239 Gads Hill	Petterd (1879)
Geminoropa antialba	3438 Wilsons Road 3401 3816	KB 23 Oct 98
Geminoropa antialba	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Geminoropa antialba	3837 Anthony Road 3868 3707	KB 25 Oct 98
Geminoropa antialba	3636 Zeehan	Charles Hedley (AM specimen)
Geminoropa antialba	3736 Conliffe Creek 3750 3666	Mesibov 21 May 95 (QVM)
Geminoropa antialba	4132 Frenchmans Cap track 4125 322	KB 28 Jan 00
Geminoropa antialba	4027	Smith + Kershaw (1981)
Geminoropa antialba	4126 Serpentine Dam 4173 2655	KB 27 Jan 01

Geminoropa "Moonlight"	4819 Hastings Caves 4879 1957	KB 27 Dec 85
Geminoropa "Moonlight"	4818 Moonlight Ridge 4872 1870	KB 11 Nov 89
Roblinella gadensis	3147 Flewin Road 3130 4721	KB 6 Sep 00
Roblinella gadensis	3347 Togari Block 3303 4726	KB 9 Sep 92
Roblinella gadensis	3547 Wahroonga 3562 4743	KB 2 Oct 99
Roblinella gadensis	3646 Crayfish Creek 3623 4672	KB 2 Oct 99
Roblinella gadensis	3245 Salmon River 3208 4542	KB 18 July 99
Roblinella gadensis	3445 Lovetts Road 3452 4590	KB 20 July 99
Roblinella gadensis	3545 Peegra Road 3588 4536	KB 1 June 99
Roblinella gadensis	3745 Lapoinya 3774 4573	KB 10 May 99
Roblinella gadensis	3845 Calder Road 3831 4517	KB 5 May 99
Roblinella gadensis	3945 Oldina 3923 4546	KB 3 May 99
Roblinella gadensis	4045 Burnie Fern Glade 4094 4506	KB 10 Jun 96
Roblinella gadensis	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Roblinella gadensis	3444 Holder Quarry 3497 4498	KB 3 June 99
Roblinella gadensis	3744 West Takone 3721 4404	KB 13 May 99
Roblinella gadensis	3844 Preolenna 3805 4464	KB 6 May 99
Roblinella gadensis	4244 Paton Park 4240 4420	KB 27 Mar 99
Roblinella gadensis	3543 Mount Bertha 3597 4338	KB 2 June 99
Roblinella gadensis	3843 Oonah 3858 4363	KB 14 May 99
Roblinella gadensis	4243 Isandula 4264 4308	KB 30 Apr 99
Roblinella gadensis	4343 Champion Park 4337 4370	KB 26 Mar 95
Roblinella gadensis	5643 Gold Creek 5681 4384	KB 30 Jan 96
Roblinella gadensis	4242 Isandula 4263 4298	KB 30 Apr 99
Roblinella gadensis	4442 Railton 4487 4225	Mesibov 27 Sep 97
Roblinella gadensis	5442 Mt Maurice 5462 4263	KB 9 Jan 96
Roblinella gadensis	3841	Smith + Kershaw (1981)
Roblinella gadensis	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Roblinella gadensis	5141 Distillery Creek	Petterd (AM)
Roblinella gadensis	3740 Waratah 3702 4062	Mesibov (1988)
Roblinella gadensis	3940 Surrey Hills	Petterd (1879)
Roblinella gadensis	4140 Winterbrook Falls 4140 4098	KB 25 Mar 95
Roblinella gadensis	4240 Round Mountain	Ron Kershaw (QVM)
Roblinella gadensis	4340 Gowrie Park 4310 4070	Kershaw 27 Sep 78 (QVM)
Roblinella gadensis	4540 Alum Cliffs 4525 4026	KB 28 Mar 98
Roblinella gadensis	3439 Guthrie Creek 3408 3927	KB 23 Oct 98
Roblinella gadensis	4239 Gads Hill	Petterd (1879)
Roblinella gadensis	4339 Gads Hill	Petterd (1879)
Roblinella gadensis	4338 Arm River 4344 3843	KB 21 Sep 01
Roblinella gadensis	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Roblinella gadensis	4838 Liffey Falls 4802 3834	KB 23 Sep 95
Roblinella gadensis	5938 Douglas-Apsley 5981 3843	Mesibov 14 July 88
Roblinella gadensis	3937	Smith + Kershaw (1981)
Roblinella gadensis	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Roblinella gadensis	5937 Douglas-Apsley 5992 3710	Mesibov 29 July 88 (QVM)
Roblinella gadensis	6037 Douglas-Apsley 6004 3715	Mesibov 27 June 88 (QVM)
Roblinella gadensis	3536 Heemskirk River 3518 3692	KB 22 Oct 98
Roblinella gadensis	4736 Split Rock 4722 3644	KB 11 May 92
Roblinella gadensis	4432 Butlers Gorge 4408 3215	KB 31 Jan 99
Roblinella gadensis	5832 Mayfield Bay 5835 3225	KB 10 Feb 02
Roblinella gadensis	4431 Mossy Marsh 4496 3155	KB 10 Jan 01
Roblinella gadensis	4531	Forestry Tas (Tarraleah samples)
Roblinella gadensis	4631 Glenmark 4695 3190	KB 28 Dec 97
Roblinella gadensis	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97

Roblinella gadensis	4530 Wayatinah 4593 3097	KB 26 Jan 99
Roblinella gadensis	4529 Tiger Road 4546 2949	KB 31 Jan 99
Roblinella gadensis	5329 Eldon Road 5353 2951	KB 4 Feb 01
Roblinella gadensis	5028 Espies Craig 5018 2286	KB 22 Feb 98
Roblinella gadensis	4527 Growling Swallet 4590 2740	KB 20 Aug 89
Roblinella gadensis	4727 Waterfalls Track 4756 2742	KB 8 Mar 98
Roblinella gadensis	5427 Wilsons Ridge 5487 2733	KB 9 Aug 98
Roblinella gadensis	5627 Sandspit River 5690 2711	KB 30 May 01
Roblinella gadensis	4626 Maydena Park 4670 2649	KB 19 Aug 89
Roblinella gadensis	5626 Wielangta Road 5687 2683	KB 1 Apr 91
Roblinella gadensis	5025 Illa Brook 5052 2564	KB 3 June 95
Roblinella gadensis	5125 Suhrs Road 5122 2549	KB 3 Mar 01
Roblinella gadensis	5225 Old Farm Track 5208 2513	KB 31 Mar 03
Roblinella gadensis	5325 Flagstaff Hill 5313 2562	KB 19 Jun 98
Roblinella gadensis	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Roblinella gadensis	5224 Pillinger Drive 5213 2478	KB 2 Nov 99
Roblinella gadensis	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Roblinella gadensis	4723 Edwards Road 4796 2303	KB 19 Aug 01
Roblinella gadensis	4923 Bermuda Hill 4916 2321	KB 8 Jul 95
Roblinella gadensis	5123 Snug Tier 5157 2320	KB 8 Dec 90
Roblinella gadensis	5723 Hawks Hill 5757 2384	KB 8 Aug 89
Roblinella gadensis	4722 Tahune Park 4772 2284	KB 6 May 90
Roblinella gadensis	4822 Willies Saddle 4870 2222	KB 3 Feb 96
Roblinella gadensis	5022 Tobys Hill 5098 2223	KB 30 Sep 00
Roblinella gadensis	5122 Snug Tiers 5125 2297	KB 7 May 94
Roblinella gadensis	5622 Palmers Lookout 5676 2209	KB 15 Feb 01
Roblinella gadensis	5822 Cape Huay 5803 2224	KB 5 Mar 94
Roblinella gadensis	4920 Adamsons Peak 4903 2018	KB 6 Aug 00
Roblinella gadensis	5220 Cooleys Gully 5259 2039	KB 6 Apr 01
Roblinella gadensis	5219 Mt Mangana 5232 1985	KB 7 Apr 01
Roblinella "Bubs Hill"	3933 Bubs Hill 3985 3361	Arthur Clarke 9 Mar 88
Roblinella roblini	5141 Distillery Creek	Petterd (TMAG) (1879)
Roblinella sp. "Tahune"	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Roblinella sp. "Tahune"	3740 Butler Road 3712 4064	KB 25 Oct 98
Roblinella sp. "Tahune"	4139 Cradle Mountain 4109 3955	Coy et al (1993)
Roblinella sp. "Tahune"	4339 Gads Hill	Petterd (1879)
Roblinella sp. "Tahune"	3837 Mt Murchison	Petterd (QVM)
Roblinella sp. "Tahune"	4136 Pelion West 4174 3685	KB 12 Jan 91
Roblinella sp. "Tahune"	4236 Pelion Valley 4208 3658	KB 10 Jan 91
Roblinella sp. "Tahune"	3633 Hogarth Falls 3633 3318	KB 1 Mar 00
Roblinella sp. "Tahune"	3632 Teepookana 3655 3273	KB 13 June 96
Roblinella sp. "Tahune"	3930 Mt McCutcheon 3907 3077	KB 2 Mar 00
Roblinella sp. "Tahune"	4030 Cardia Cave	Steve Smith (AM)
Roblinella sp. "Tahune"	4728 Montos Creek 4732 2814	KB 4 Feb 95
Roblinella sp. "Tahune"	4127 (as Bischoffena)	Lower Gordon survey
Roblinella sp. "Tahune"	4627 Lake Dobson 4666 2740	KB 6 May 01
Roblinella sp. "Tahune"	4126 W of Strathgordon 4175 2655	Mesibov 1 Oct 2003
Roblinella sp. "Tahune"	4426 Ragged Range 4443 2626	KB 15 Mar 98
Roblinella sp. "Tahune"	4526 Needles Shelter 4514 2655	KB 8 Apr 00
Roblinella sp. "Tahune"	4626 Junee Cave 4668 2681	KB 15 Mar 98
Roblinella sp. "Tahune"	4726 Styx River 4746 2612	KB 9 Dec 01
Roblinella sp. "Tahune"	4325 Wedge River 4370 2543	KB 28 Jan 01
Roblinella sp. "Tahune"	5125 Collinsvale 5127 2543	KB 10 May 98

Roblinella sp. "Tahune"	5224 Pillinger Drive 5213 2478	KB 2 Nov 99
Roblinella sp. "Tahune"	4423 Scotts Peak 4424 2345	KB 9 Apr 88
Roblinella sp. "Tahune"	4923 Bermuda Hill 4916 2321	KB 8 Jul 95
Roblinella sp. "Tahune"	4322 Mt Hesperus 4378 2264	KB 28 Feb 99
Roblinella sp. "Tahune"	4722 Manuka Road 4740 2279	KB 22 Nov 00
Roblinella sp. "Tahune"	5122 Tobys Hill 5105 2227	KB 30 Sep 00
Roblinella sp. "Tahune"	4820 Adamsons Peak 4897 2016	KB 6 Aug 00
Roblinella sp. "Tahune"	4920 Adamsons Peak 4903 2018	KB 6 Aug 00
Roblinella sp. "Tahune"	4917 Rescherche Bay	Roy Crookshanks
Roblinella sp. "Mystery"	4818 MysteryCreek Track 4880 1878	KB 25 Feb 01
Roblinella agnewi	5125 Lost World 5185 2518	KB 24 Jan 01
Roblinella agnewi	5124 Lenah Valley Track 5198 2490	KB 9 July 00
Roblinella "Bishop"	5928 Bishop + Clerk 5915 2841	KB 17 Nov 00
Roblinella curacoae	4942 Notley Gorge	Schoolchildren (per Ron Kershaw)
Roblinella curacoae	5041 Cataract Gorge 5092 4101	KB 23 May 00
Roblinella curacoae	6041 Loila Tier 6035 4177	KB 21 Sep 96
Roblinella curacoae	5739 Tower Hill 5709 3984	KB 31 Dec 98
Roblinella curacoae	4030 Cardia Cave	Steve Smith (QVM)
Roblinella curacoae	3628 Hibbs Lagoon	McNiven + West 1991 (QVM)
Roblinella curacoae	4627 Lake Dobson 4666 2740	KB 4 May 91
Roblinella curacoae	4626 Junee Cave 4668 2681	KB 15 Mar 98
Roblinella curacoae	5126 Mt Faulkner 5116 2625	KB 19 Dec 98
Roblinella curacoae	4725 Styx River 4724 2596	KB 9 Dec 01
Roblinella curacoae	5125 Collinsvale 5127 2543	KB 10 May 98
Roblinella curacoae	5124 Milles Track 5197 2483	KB 17 Oct 98
Roblinella curacoae	5224 Octopus Tree 5203 2495	KB 19 Nov 98
Roblinella curacoae	5723 Camp Falls 5772 2315	KB 18 Apr 01
Roblinella curacoae	4722 Manuka Road 4740 2279	KB 22 Nov 00
Roblinella curacoae	5122 Tobys Hill 5105 2227	KB 30 Sep 00
Roblinella curacoae	4721 Cook Creek 4708 2180	KB 11 Feb 95
Roblinella curacoae	4819 Hastings Caves 4873 1967	KB 9 Nov 96
Roblinella curacoae	4618 Precipitous Bluff	Stefan Eberhard (1994) AM (AM)
Roblinella curacoae	4818 Moonlight Ridge 4872 1870	KB 11 Nov 89
Roblinella curacoae	4417 De Witt Island	Parks islands records
Roblinella curacoae	4817 South Cape Bay 4871 1716	KB 12 Mar 00
Roblinella curacoae	4917 Ramsgate	Petterd (TMAG)
Roblinella "Flash Tier"	5728 Flash Tier 5695 2808	Bob Mesibov (QVM)
Pillomena dandenongensis	2457 Zwar Creek 2490 5785	KB 16 Dec 96
Pillomena dandenongensis	2557 Raffertys Creek 2511 5781	KB 12 Dec 96
Pillomena dandenongensis	2456 Gentle Annie 2456 5636	KB 15 Dec 96
Pillomena dandenongensis	2556 Yarra Creek 2524 5673	KB 13 Dec 96
Bischoffena bischoffensis	3247 Togari Block 3274 4708	KB 7 Sep 92
Bischoffena bischoffensis	4142 Loyetea Peak 4124 4251	Mesibov 22 July 01
Bischoffena bischoffensis	3741 Waratah (Mt Bischoff)	Petterd (1879)
Bischoffena bischoffensis	3841 Waratah (Mt Bischoff)	Petterd (1879)
Bischoffena bischoffensis	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Bischoffena bischoffensis	3740 Butler Road 3712 4064	KB 25 Oct 98
Bischoffena bischoffensis	4239 Gads Hill	Petterd (1879)
Bischoffena bischoffensis	4339 Gads Hill	Petterd (1879)

Bischoffena bischoffensis	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Oreomava johnstoni	3248 Boundary Road 3204 4805	KB 6 Sep 00
Oreomava johnstoni	3247 Togari Block 3274 4708	KB 7 Sep 92
Oreomava johnstoni	3347 Togari Block 3312 4719	KB 8 Sep 92
Oreomava johnstoni	3447 Duck River 3408 4763	Mesibov 6 Mar 99 (QVM)
Oreomava johnstoni	3547 Black River 3563 4707	KB 3 Oct 91
Oreomava johnstoni	3647 Harris Creek 3608 4707	KB 2 Oct 99
Oreomava johnstoni	3146 Bond Tier 3185 4644	KB 17 Sep 92
Oreomava johnstoni	3246 Eldridge Road 3265 4621	KB 24 June 98
Oreomava johnstoni	3546 East Creek 3508 4681	KB 21 July 99
Oreomava johnstoni	3846 Sisters Beach	Bob Mesibov
Oreomava johnstoni	3145 Warra Creek 3127 4533	KB 18 July 99
Oreomava johnstoni	3245 Lovells Creek 3208 4544	KB 18 July 99
Oreomava johnstoni	3345 Roger River 3332 4526	KB 1 Oct 91
Oreomava johnstoni	3445 Trowutta Cave 3410 4519	KB 24 Oct 98
Oreomava johnstoni	3545 Peegra Road 3587 4538	KB 1 June 99
Oreomava johnstoni	3745 Meunna 3728 4519	KB 11 May 99
Oreomava johnstoni	3845 Oldina 3881 4585	KB 4 May 99
Oreomava johnstoni	4045 Burnie Fern Glade 4094 4506	KB 10 Jun 96
Oreomava johnstoni	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Oreomava johnstoni	3644 Rabalga Road 3624 4498	KB 24 Oct 98
Oreomava johnstoni	3744 West Takone 3723 4406	KB 13 May 99
Oreomava johnstoni	3844 Preolenna 3805 4464	KB 6 May 99
Oreomava johnstoni	4144 Ferndene 4188 4447	KB 30 Sep 91
Oreomava johnstoni	4244 Lobster Creek 4211 4414	KB 28 May 99
Oreomava johnstoni	3243 Balfour 3251 4303	KB 1 Nov 91
Oreomava johnstoni	3543 Mount Bertha 3597 4338	KB 2 June 99
Oreomava johnstoni	3943 Surrey Hills	Petterd (1879)
Oreomava johnstoni	3242 Balfour 3247 4299	KB 1 Nov 91
Oreomava johnstoni	3341 Leigh River 3352 4198	KB 23 Oct 98
Oreomava johnstoni	3940 Surrey Hills	Petterd (1879)
Oreomava johnstoni	4440 Gog Range	Mesibov (QVM colls)
Oreomava johnstoni	4540 Garden of Eden Creek 4532 408	KB 31 Jan 93
Oreomava johnstoni	4439 Marakoopa Cave 4408 3968	KB 26 Mar 89
Oreomava johnstoni	3438 Pieman River	Bob Mesibov
Oreomava johnstoni	4638 Bessells Road, Meander	Kershaw Nov 76 (QVM)
Oreomava johnstoni	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Oreomava johnstoni	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Oreomava johnstoni	3837	Smith + Kershaw (1981)
Oreomava johnstoni	3536 Heemskirk River 3518 3692	KB 22 Oct 98
Oreomava johnstoni	4529 Tiger Road 4546 2949	KB 31 Jan 99
Oreomava johnstoni	4426 Ragged Range 4443 2626	KB 15 Mar 98
Oreomava "Hibbs"	3628 Hibbs Lagoon	McNiven + West 1991 (QVM)
Letomola barrenense	5758 Killiecrankie	Phil Colman (Aus Museum)
Letomola barrenense	5757 Wybalena 5752 5707	KB 24 Sep 00
Letomola barrenense	5857	Smith + Kershaw (1981)
Letomola barrenense	5957	Smith + Kershaw (1981)
Letomola barrenense	6157 Babel Island	May (1958)
Letomola barrenense	5756 Pickford Creek 5782 5694	KB 26 Sep 00
Letomola barrenense	5856 Flinders Aerodrome 5856 5613	KB 23 Sep 00
Letomola barrenense	5855	Smith + Kershaw (1981)
Letomola barrenense	6053 Cape Barren Island	Petterd (1879)
Letomola barrenense	5952 Cape Barren Island	Petterd (1879)

Thryasona marchianae	4045 Burnie Fern Glade 4094 4506	KB 24 Dec 88
Thryasona marchianae	4343 Champion Park 4337 4370	KB 26 Mar 95
Thryasona marchianae	5343 Blumont 5321 4399	KB 11 Feb 02
Thryasona marchianae	4942 Notley Gorge 4925 4216	KB 18 Mar 01
Thryasona marchianae	5142 Hollybank 5175 4276	KB 12 Aug 95
Thryasona marchianae	5242 Whites Mill Road 5204 4274	KB 2 Aug 01
Thryasona marchianae	5041 Cataract Gorge	Aus Museum
Thryasona marchianae	5140 Corra Linn	Petterd (1879)
Thryasona marchianae	5540 Ben Lomond	Petterd (1879)
Thryasona marchianae	4439 Chudleigh	Petterd (1879)
Thryasona marchianae	5539 Ben Lomond Rivulet 5525 3914	KB 31 Dec 98
Thryasona marchianae	4626 Junee Cave 4668 2681	KB 15 Mar 98
Thryasona marchianae	4725 Styx River 4724 2596	KB 9 Dec 01
Thryasona marchianae	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Thryasona marchianae	4824 Herons Creek 4820 2424	KB 18 Dec 02
Thryasona marchianae	5124 Milles Track 5197 2483	KB 17 Oct 98
Thryasona marchianae	5224 Browns River	Legrand (1871)
Thryasona marchianae	5724 MacGregor Peak 5765 4412	KB 9 Oct 99
Thryasona marchianae	4923 Bermuda Hill 4916 2321	KB 8 Jul 95
Thryasona marchianae	5123 Snug Tier 5157 2320	KB 8 Dec 90
Thryasona marchianae	4622 Blakes Opening 4696 2287	KB 5 Apr 98
Thryasona marchianae	4722 Manuka Road 4740 2279	KB 22 Nov 00
Thryasona marchianae	5622 Palmers Lookout 5676 2209	KB 15 Feb 01
Thryasona marchianae	4819 Hastings Caves 4873 1967	KB 9 Nov 96
Thryasona marchianae	5219 Mt Mangana 5232 1985	KB 7 Apr 01
Thryasona marchianae	4618 Precipitous Bluff	Stefan Eberhard (1994) (AM)
Thryasona marchianae	4818 Moonlight Ridge 4872 1870	KB 11 Nov 89
Thryasona marchianae	4917 Rescherche Bay	Petterd (1879)
Thryasona "Wedge"	4325 McPartlan Pass 4365 2540	Don Driscoll Nov 01
Thryasona "Wedge"	4423 Scotts Peak 4440 2342	Don Driscoll Jan 02
Thryasona diemenensis	5759 Palana	Ron Kershaw (MV)
Thryasona diemenensis	5658	Smith + Kershaw (1981)
Thryasona diemenensis	5758 Mount Tanner 5704 5848	KB 24 Sep 00
Thryasona diemenensis	5857	Smith + Kershaw (1981)
Thryasona diemenensis	5756 Pickford Creek 5782 5694	KB 26 Sep 00
Thryasona diemenensis	5856 Badger Hill 5888 5670	KB 25 Sep 00
Thryasona diemenensis	5956 Walkers Lookout 5918 5652	KB 25 Sep 00
Thryasona diemenensis	5855	Smith + Kershaw (1981)
Thryasona diemenensis	5955	Smith + Kershaw (1981)
Thryasona diemenensis	5854 Mt Strzelecki 5898 5489	KB 23 Sep 00
Thryasona diemenensis	5954 Mt Strzelecki 5904 5492	KB 10 Sep 87
Thryasona diemenensis	6054 Badger Corner 6009 5458	KB 26 Sep 00
Thryasona diemenensis	6053	Smith + Kershaw (1981)
Thryasona diemenensis	6052 Nautilus Cove, Cape Barren Is	TMAG specimen (1990)
Thryasona diemenensis	3251 Three Hummock Is. 3218 5174	KB 31 Jan 97
Thryasona diemenensis	5951	Smith + Kershaw (1981)
Thryasona diemenensis	5848	Smith + Kershaw (1981)
Thryasona diemenensis	3247 Togari Block 3269 4718	KB 10 Sep 92
Thryasona diemenensis	3347 Togari Block 3303 4726	KB 8 Sep 92
Thryasona diemenensis	3747 Rocky Cape 3773 4708	KB 2 Oct 91
Thryasona diemenensis	3246 Eldridge Road 3265 4621	KB 25 Dec 88
Thryasona diemenensis	3346	Smith + Kershaw (1981)
Thryasona diemenensis	3145 Arthur/Frankland Jcn 3128 4503	KB 25 Dec 88

Thryasona diemenensis	3245 Lovells Creek 3208 4544	KB 18 July 99
Thryasona diemenensis	3345	Smith + Kershaw (1981)
Thryasona diemenensis	3445 Trowutta Cave 3410 4519	KB 24 Oct 98
Thryasona diemenensis	3545 Peegra Road 3587 4538	KB 1 June 99
Thryasona diemenensis	3745 Detention Falls 3759 4597	KB 2 Oct 91
Thryasona diemenensis	3845 Inglis 3828 4518	KB 5 May 99
Thryasona diemenensis	3945 Kaloma Camp 3919 4568	KB 22 Oct 94
Thryasona diemenensis	4045 Burnie Fern Glade 4094 4506	KB 24 Dec 88
Thryasona diemenensis	4145	Smith + Kershaw (1981)
Thryasona diemenensis	5645 Mount Horror 5612 4531	KB 18 Jan 96
Thryasona diemenensis	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Thryasona diemenensis	3344 Julius River 3343 4420	KB 3 Oct 91
Thryasona diemenensis	3844 Jessie Gorge 3823 4479	KB 7 May 99
Thryasona diemenensis	4144 Ferndene 4188 4447	KB 30 Sep 91
Thryasona diemenensis	4244 Paton Park 4240 4420	KB 27 Mar 99
Thryasona diemenensis	4544	Smith + Kershaw (1981)
Thryasona diemenensis	4744 York Town	Kershaw (QVM)
Thryasona diemenensis	4844 George Town 4899 4493	Mesibov 2 Mar 96 (QVM)
Thryasona diemenensis	5144	Smith + Kershaw (1981)
Thryasona diemenensis	5344 Blumont 5321 4400	KB 11 Feb 02
Thryasona diemenensis	5444 Mt Stronach 5498 4444	KB 19 Jan 96
Thryasona diemenensis	5544 Mt Stronach 5502 4442	KB 19 Jan 96
Thryasona diemenensis	5644 Cascade Dam 5689 4410	KB 31 Jan 93
Thryasona diemenensis	5744 Frome Road 5773 4430	KB 22 Jan 96
Thryasona diemenensis	5844 Blue Tier 5846 4402	KB 23 Jan 96
Thryasona diemenensis	5944 Tinkle Creek 5909 4458	KB 18 Jan 00
Thryasona diemenensis	3043 Rebecca Creek 3067 4376	Mesibov 7 Apr 93
Thryasona diemenensis	3243 Balfour 3251 4303	KB 1 Nov 91
Thryasona diemenensis	3543 Mount Bertha 3597 4338	KB 2 June 99
Thryasona diemenensis	3843 Oonah 3858 4363	KB 14 May 99
Thryasona diemenensis	3943 Tewkesbury 3900 4340	Kershaw Nov 70 (QVM)
Thryasona diemenensis	4243 Purton Flat 4209 4378	KB 27 Mar 99
Thryasona diemenensis	4743 Dazzler Range 4764 4349	D'Orazio 5 Aug 92 (QVM)
Thryasona diemenensis	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Thryasona diemenensis	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Thryasona diemenensis	5243 Mount Arthur 5250 4313	KB 5 Feb 96
Thryasona diemenensis	5343 Carins Creek 5340 4352	KB 2 Feb 96
Thryasona diemenensis	5443 Mount Helen 5430 4307	KB 9 Jan 96
Thryasona diemenensis	5543 Hogarth Rivulet 5516 4343	KB 10 Jan 96
Thryasona diemenensis	5643 Gold Creek 5681 4384	KB 30 Jan 96
Thryasona diemenensis	5743 Weldborough 5794 4367	KB 29 Aug 88
Thryasona diemenensis	5843 Murdochs Road 5892 4397	KB 31 Jan 96
Thryasona diemenensis	5943 Terrys Hill 5925 4337	KB 31 Jan 96
Thryasona diemenensis	3242 Balfour 3247 4299	KB 1 Nov 91
Thryasona diemenensis	3842	Smith + Kershaw (1981)
Thryasona diemenensis	4842 Dunkards Creek 4862 4259	KB 8 Mar 97
Thryasona diemenensis	4942 Notley Gorge 4925 4216	KB 5 Oct 91
Thryasona diemenensis	5142 Hollybank 5175 4276	KB 12 Aug 95
Thryasona diemenensis	5242	Smith + Kershaw (1981)
Thryasona diemenensis	5342 Barrow Falls 5328 4215	KB 8 Jan 96
Thryasona diemenensis	5442 Mt Maurice 5473 4270	KB 9 Jan 96
Thryasona diemenensis	5542 Mt Maurice 5524 4253	KB 31 Jan 93
Thryasona diemenensis	5642 Mount Victoria 5663 4226	KB 16 Jan 96
Thryasona diemenensis	5742 Saint Columba Falls 5771 4248	KB 29 Aug 88
Thryasona diemenensis	5842 Rayners Hill 5880 4223	KB 1 Feb 96
Thryasona diemenensis	5942 Toms Gully 5904 4219	KB 21 Sept 96

Thryasona diemenensis	3841 Wandle River 3820 4193	Mesibov 28 Sep 91 (QVM)
Thryasona diemenensis	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Thryasona diemenensis	5041 Cataract Gorge 5094 4110	KB 10 June 90
Thryasona diemenensis	5141 Cataract Gorge 5102 4119	KB 25 Mar 89
Thryasona diemenensis	5241	Smith + Kershaw (1981)
Thryasona diemenensis	5341 Mount Barrow 5358 4198	KB 8 Jan 96
Thryasona diemenensis	5441 Sunset Ridge 5455 4198	KB 6 Feb 96
Thryasona diemenensis	5541 Tombstone Creek 5567 4173	KB 11 Jan 96
Thryasona diemenensis	5641 Mathinna Plains 5623 4196	KB 11 Jan 96
Thryasona diemenensis	5741 Mathinna Falls 5751 4174	KB 4 Sep 88
Thryasona diemenensis	5841 Evercreech 5813 4161	KB 15 Jan 96
Thryasona diemenensis	3740 Waratah 3703 4065	Mesibov 27 Sep 90 (QVM)
Thryasona diemenensis	4440 Gog Range 4467 4049	Mesibov 16 Dec 91 (QVM)
Thryasona diemenensis	4540 Gog Range 5532 4058	Mesibov 17 Dec 91(QVM)
Thryasona diemenensis	5040	Smith + Kershaw (1981)
Thryasona diemenensis	5140	Smith + Kershaw (1981)
Thryasona diemenensis	5340 Blessington 5338 4042	Mesibov 22 June 95 (QVM)
Thryasona diemenensis	5540	Smith + Kershaw (1981)
Thryasona diemenensis	5940 South Sister 5977 4011	KB 4 Sep 88
Thryasona diemenensis	3739	Smith + Kershaw (1981)
Thryasona diemenensis	3939 Mt Cripps	Bob Mesibov
Thryasona diemenensis	4139 Cradle Mountain 4109 3955	Coy et al (1993)
Thryasona diemenensis	4439 Marakoopa Cave 4408 3968	KB 26 Mar 89
Thryasona diemenensis	4539	Smith + Kershaw (1981)
Thryasona diemenensis	5539	Smith + Kershaw (1981)
Thryasona diemenensis	5639 River Tyne 5652 3987	KB 30 Dec 98
Thryasona diemenensis	5939	Smith + Kershaw (1981)
Thryasona diemenensis	6039 St Marys Pass 6005 3987	KB 28 Aug 88
Thryasona diemenensis	3338 Pieman River 3397 3855	KB 23 Oct 98
Thryasona diemenensis	5538	Smith + Kershaw (1981)
Thryasona diemenensis	5838 Valley Road Fingal 5894 3836	D'Orazio 3 Aug 92 (QVM)
Thryasona diemenensis	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Thryasona diemenensis	6038 Heritage Falls 6003 3803	KB 28 Oct 90
Thryasona diemenensis	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Thryasona diemenensis	3737 Rosebery	Michael Shea (QVM)
Thryasona diemenensis	4337 Maggs Mountain	Bob Green (QVM)
Thryasona diemenensis	4937 Poatina	Kershaw 16 June 85 (QVM)
Thryasona diemenensis	5937 Apsley Gorge 5932 3719	D'Orazio 5 Aug 92 (QVM)
Thryasona diemenensis	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Thryasona diemenensis	3536 Heemskirk River 3518 3692	KB 22 Oct 98
Thryasona diemenensis	4136 Pelion West 4173 3680	KB 12 Jan 91
Thryasona diemenensis	5936 Douglas Apsley 5992 3655	Mesibov 19 July 88 (QVM)
Thryasona diemenensis	6036	Mesibov (Douglas-Apsley survey)
Thryasona diemenensis	5035 Snowy Knob 5017 4533	KB 12 Sep 98
Thryasona diemenensis	4534 Pine Tier Lagoon 4576 3403	KB 31 Jan 99
Thryasona diemenensis	3633 Fabritong Rivulet 3603 3390	KB 14 June 96
Thryasona diemenensis	3933 Bubs Hill	Arthur Clarke 1987
Thryasona diemenensis	4333	Smith + Kershaw (1981)
Thryasona diemenensis	4733 Waddamana 4796 3371	KB 31 Jan 99
Thryasona diemenensis	4833 Diamond Tier	Bob Mesibov
Thryasona diemenensis	4933 Bakers Tier	Bob Mesibov
Thryasona diemenensis	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Thryasona diemenensis	3632 Teepookana 3655 3273	KB 13 June 96
Thryasona diemenensis	4132 Frenchmans Cap track 4139 325	KB 28 Jan 00
Thryasona diemenensis	4432	Forestry Tas (Tarraleah samples)
Thryasona diemenensis	4632	Smith + Kershaw (1981)

Thryasona diemenensis	5232 Blackman River 5241 3293	KB 22 Feb 98
Thryasona diemenensis	4431 Tarraleah 4473 3163	Mesibov 22 Apr 92 (QVM)
Thryasona diemenensis	4631 Glenmark 4695 3190	KB 28 Dec 97
Thryasona diemenensis	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Thryasona diemenensis	3930 Mt McCall 3973 3077	KB 2 Mar 00
Thryasona diemenensis	5030 Little Den Creek 5093 3027	KB 22 Feb 98
Thryasona diemenensis	4529 Tiger Road 4546 2949	KB 31 Jan 99
Thryasona diemenensis	4629 Mt Thunderbolt 4640 2970	O. Seeman May 00 (QVM)
Thryasona diemenensis	5429 Mount Hobbs 5483 2924	KB 5 July 98
Thryasona diemenensis	3628 Hibbs Lagoon	QVM collections
Thryasona diemenensis	3928	Lower Gordon survey
Thryasona diemenensis	4028	Smith + Kershaw (1981)
Thryasona diemenensis	5628 Flash Tier 5695 2808	Mesibov 29 July 91 (QVM)
Thryasona diemenensis	5728 Thumbs 5723 2826	KB 2 Mar 01
Thryasona diemenensis	5828 Counsel Creek 5872 2829	KB 11 Feb 99
Thryasona diemenensis	5928 Bishop + Clerk 5915 2841	KB 23 Mar 96
Thryasona diemenensis	3927	Lower Gordon survey
Thryasona diemenensis	4027	Smith + Kershaw (1981)
Thryasona diemenensis	4327 Clear Hill 4398 2740	KB 15 Mar 98
Thryasona diemenensis	4727 Lake Dobson Road 4726 2745	KB 1 Dec 92
Thryasona diemenensis	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Thryasona diemenensis	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Thryasona diemenensis	5427 Phipps Creek 5497 2751	KB 9 Aug 98
Thryasona diemenensis	5527 Nelsons Tier 5559 2712	KB 9 Aug 98
Thryasona diemenensis	5627 Sandspit River 5690 2711	KB 6 Oct 90
Thryasona diemenensis	5727 Wielangta 5704 2727	KB 3 Sep 94
Thryasona diemenensis	5827	Smith + Kershaw (1981)
Thryasona diemenensis	5927	Smith + Kershaw (1981)
Thryasona diemenensis	4026	Smith + Kershaw (1981)
Thryasona diemenensis	4126 Serpentine Dam 4173 2655	KB 27 Jan 01
Thryasona diemenensis	4226 Strathgordon 4224 2634	KB 28 Jan 01
Thryasona diemenensis	4426 Ragged Range 4443 2626	KB 15 Mar 98
Thryasona diemenensis	4526 Needles Shelter 4514 2655	KB 1 Dec 92
Thryasona diemenensis	4626	Smith + Kershaw (1981)
Thryasona diemenensis	5626 Wielangta Road 5687 2683	KB 1 Apr 91
Thryasona diemenensis	5726 Mount Jacob 5735 2680	KB 14 Nov 92
Thryasona diemenensis	4025	Smith + Kershaw (1981)
Thryasona diemenensis	4325 McPartlan Pass 4365 2540	Don Driscoll Nov 01
Thryasona diemenensis	4725 Styx River 4746 2581	KB 9 Dec 01
Thryasona diemenensis	5125 Collinsvale 5127 2543	KB 10 May 98
Thryasona diemenensis	5225 Myrtle Gully 5218 2505	KB 24 Nov 92
Thryasona diemenensis	5725 Lagoon Bay 5782 2524	KB 8 Oct 94
Thryasona diemenensis	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Thryasona diemenensis	5124	Smith + Kershaw (1981)
Thryasona diemenensis	5224 Summerleas Road 5224 2473	KB 25 Dec 95
Thryasona diemenensis	5724 MacGregor Peak 5765 4412	KB 27 Dec 90
Thryasona diemenensis	4423 Scotts Peak	Alan Dartnall 9 Apr 77 (QVM)
Thryasona diemenensis	4623 Mt Weld 4655 2383	Doran/Bashford 2002 (QVM)
Thryasona diemenensis	4723 Reuben Falls 4720 2369	Bashford 9 May 95 (QVM)
Thryasona diemenensis	4823 Bracken Ridge 4897 2308	Bashford 18 July 95 (QVM)
Thryasona diemenensis	4923 New Road Franklin 4950 2309	KB 26 Nov 89
Thryasona diemenensis	5123 Pelverata Falls 5112 2319	KB 8 Jan 95
Thryasona diemenensis	5223 Margate	Legrand (1871)
Thryasona diemenensis	5723 Camp Falls 5772 2315	KB 27 Oct 85
Thryasona diemenensis	4722 Tahune Park 4772 2284	KB 6 Apr 86
Thryasona diemenensis	4822 Lidgerwood Rd 4868 2246	KB 11 Feb 95

Thryasona diemenensis	4922	Smith + Kershaw (1981)
Thryasona diemenensis	5022 Tobys Hill 5098 2223	KB 30 Sep 00
Thryasona diemenensis	5122 Snug Tiers 5125 2297	KB 7 May 94
Thryasona diemenensis	5222 McCrackens Ck 5294 2245	KB 8 Aug 92
Thryasona diemenensis	5622 Palmers Lookout 5676 2209	KB 15 Feb 01
Thryasona diemenensis	5722 Fortescue Bay 5785 2226	KB 13 Jan 86
Thryasona diemenensis	5822 Cape Huay 5803 2224	KB 5 Mar 94
Thryasona diemenensis	4721 Cook Creek 4708 2180	KB 11 Feb 95
Thryasona diemenensis	5621 Safety Cove 5697 2180	KB 29 June 86
Thryasona diemenensis	5721 Safety Cove 5701 2181	KB 11 Feb 86
Thryasona diemenensis	4220	Smith + Kershaw (1981)
Thryasona diemenensis	4219 Melaleuca Inlet 4298 1956	KB 15 Jan 91
Thryasona diemenensis	4319 Melaleuca 4324 1920	KB 14 Jan 91
Thryasona diemenensis	4919	Smith + Kershaw (1981)
Thryasona diemenensis	5219 Mt Mangana 5232 1985	KB 7 Apr 01
Thryasona diemenensis	4318 Half Woody Hill 4338 1889	KB 14 Jan 91
Thryasona diemenensis	4918	Smith + Kershaw (1981)
Thryasona diemenensis	4917	Smith + Kershaw (1981)
Mulathena fordei	3346	Smith + Kershaw (1981)
Mulathena fordei	3245	Smith + Kershaw (1981)
Mulathena fordei	3345	Smith + Kershaw (1981)
Mulathena fordei	3744 West Takone 3723 4406	KB 13 May 99
Mulathena fordei	3843 Oonah 3816 4355	KB 25 May 99
Mulathena fordei	3542 Savage River Pipeline 3558 4227	Coy et al (1993)
Mulathena fordei	3842 Surrey Hills	Petterd (1879)
Mulathena fordei	3341 Leigh River 3352 4198	KB 23 Oct 98
Mulathena fordei	3741 Waratah (Mt Bischoff)	Petterd (1879)
Mulathena fordei	3841 Wandle River 3820 4193	Mesibov 22 Sep 91 (QVM)
Mulathena fordei	3838	Smith + Kershaw (1981)
Mulathena fordei	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Mulathena fordei	3637 Mt Read	Belinda Yaxley 5 May 00
Mulathena fordei	3837 Mt Murchison	Chris Carr 2001
Mulathena fordei	3836 Anthony Road 3854 3680	Coy et al (1993)
Mulathena fordei	3933 Bubs Hill	Arthur Clarke 1997
Mulathena fordei	3632 Teepookana	Belinda Yaxley 6 Apr 00
Mulathena fordei	4431 Tarraleah	Forestry Tas (QVM)
Mulathena fordei	3930 Mt McCall 3973 3077	KB 2 Mar 00
Mulathena fordei	4530 Wayatinah 4593 3097	KB 26 Jan 99
Mulathena fordei	3628 Hibbs Lagoon	QVM collections
Mulathena fordei	3928	Smith + Kershaw (1981)
Mulathena fordei	4728 Montos Creek 4732 2814	KB 4 Feb 95
Mulathena fordei	3927	Smith + Kershaw (1981)
Mulathena fordei	4027	Smith + Kershaw (1981)
Mulathena fordei	4527 Growling Swallet 4590 2740	KB 20 Aug 89
Mulathena fordei	4627 Lake Fenton 4691 2748	KB 4 May 91
Mulathena fordei	4727 Marriotts Falls 4723 2704	KB 15 Apr 90
Mulathena fordei	3926	Smith + Kershaw (1981)
Mulathena fordei	4026	Smith + Kershaw (1981)
Mulathena fordei	4426 Adams Falls 4424 2698	KB 15 Mar 98
Mulathena fordei	4626 Junee Cave 4668 2681	KB 15 Mar 98
Mulathena fordei	4325 McPartlan Pass 4365 2540	Don Driscoll Nov 01
Mulathena fordei	4725 Styx River 4746 2581	KB 9 Dec 01
Mulathena fordei	5125 Collinsvale 5127 2543	KB 10 May 98
Mulathena fordei	5225 Myrtle Gully 5218 2505	KB 24 Nov 92
Mulathena fordei	4424 Mt Anne 4484 2438	Don Driscoll Nov 01

Mulathena fordei	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Mulathena fordei	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Mulathena fordei	5124 Cathedral Rock 5170 2453	KB 25 Apr 89
Mulathena fordei	5224 Pillinger Drive 5213 2478	KB 2 Nov 99
Mulathena fordei	4423 Scotts Peak 4440 2342	Don Driscoll Feb 02
Mulathena fordei	4623 Mt Weld 4655 2383	Doran/Bashford 2002 (QVM)
Mulathena fordei	4723 Edwards Road 4796 2303	KB 19 Aug 01
Mulathena fordei	4823 Bracken Ridge 4897 2308	Bashford 24 Oct 95 (QVM)
Mulathena fordei	4923 Bermuda Hill 4916 2321	KB 8 Jul 95
Mulathena fordei	5123	Smith + Kershaw (1981)
Mulathena fordei	4622 Blakes Opening 4696 2287	KB 5 Apr 98
Mulathena fordei	4722 Tahune Park 4772 2284	KB 6 Apr 86
Mulathena fordei	4822 Arve River 4843 2212	KB 3 Feb 96
Mulathena fordei	5122 Snug Tiers 5125 2297	KB 7 May 94
Mulathena fordei	4821 Lake Esperance 4812 2137	KB 27 Dec 87
Mulathena fordei	5121	Smith + Kershaw (1981)
Mulathena fordei	4120 Breaksea Island 4161 2018	KB 16 Jan 91
Mulathena fordei	4220 Port Davey	Petterd (1879)
Mulathena fordei	4920 Francistown 4989 2053	KB 27 Sep 87
Mulathena fordei	4219 Claytons Hut 4295 1973	KB 16 Jan 91
Mulathena fordei	4319 Celery Top Islands 4314 1964	KB 18 Jan 91
Mulathena fordei	4819 Hastings Caves 4879 1957	KB 27 Dec 85
Mulathena fordei	4919 Jacksons Creek 4970 1958	KB 24 Nov 00
Mulathena fordei	5019 Lady Bay 5015 1946	KB 27 Dec 88
Mulathena fordei	5219 Mt Mangana 5232 1985	KB 13 Jan 86
Mulathena fordei	4618 Precipitous Bluff	Arthur Clarke 1998
Mulathena fordei	4818 Moonlight Ridge 4872 1870	KB 11 Nov 89
Mulathena fordei	4918 Ida Bay 4932 1892	KB 6 Dec 92
Mulathena fordei	4617 Ile du Golfe	Nigel Brothers (QVM)
Mulathena fordei	4817 South Cape Bay 4871 1716	KB 12 Mar 00
Mulathena fordei	4917 Rescherche Bay 4908 1752	KB 30 Nov 92
Flammulops excelsior	2557 Naracoopa 2515 5784	KB 25 Sep 98
Flammulops excelsior	2456 Gentle Annie 2456 5636	KB 15 Dec 96
Flammulops excelsior	2556 Yarra Creek 2513 5676	KB 28 Sep 03
Flammulops excelsior	2455 Red Hut Road 2438 5573	KB 17 Dec 96
Stenacapha savesi	3747 Rocky Cape	Petterd (1879)
Stenacapha savesi	3846 Flowerdale 3817 4650	Mesibov 29 Nov 96 (QVM)
Stenacapha savesi	3946 Table Cape	Petterd (1879)
Stenacapha savesi	3845 Oldina Road 3882 4558	KB 3 Oct 99
Stenacapha savesi	3945 Oldina 3923 4546	KB 3 May 99
Stenacapha savesi	4045 Burnie Park 4070 4550	KB 9 Jun 96
Stenacapha savesi	4244 Paton Park 4240 4420	KB 27 Mar 99
Stenacapha ducani	3349 Robbins Island 3316 4912	KB 4 Feb 97
Stenacapha ducani	3048 Woolnorth 3068 4880	Mesibov 18 Nov 92 (QVM)
Stenacapha ducani	3148 Welcome River 3110 4855	KB 5 Sep 00
Stenacapha ducani	3248 Boundary Road 3204 4805	KB 4 Sep 00
Stenacapha ducani	3047 Blue Bog 3077 4702	KB 6 Sep 00
Stenacapha ducani	3147 Sunto Road 3145 4721	KB 6 Sep 00
Stenacapha ducani	3247 Togari Block 3274 4708	KB 7 Sep 92
Stenacapha ducani	3347 Jones Plain 3342 4704	KB 4 Oct 91
Stenacapha ducani	3547 Wahroonga 3562 4743	KB 2 Oct 99
Stenacapha ducani	3647 Harris Creek 3608 4707	KB 2 Oct 99
Stenacapha ducani	3146 Dismal Swamp 3190 4630	KB 4 Oct 91

Stenacapha ducani	3246 Togari Block 3247 4638	KB 16 Sep 92
Stenacapha ducani	3346 Edith Creek	Simon Plowright 2001
Stenacapha ducani	3546 East Creek 3508 4681	KB 21 July 99
Stenacapha ducani	3646 Black River	Petterd (1879)
Stenacapha ducani	3746 Lake Llewellyn 3793 4682	KB 2 Oct 99
Stenacapha ducani	3846 Sisters Beach	Bob Mesibov
Stenacapha ducani	3145 Salmon River 3168 4533	KB 18 July 99
Stenacapha ducani	3245 Leensons Road 3277 4552	KB 24 Oct 98
Stenacapha ducani	3345 Roger River 3332 4526	KB 26 Dec 88
Stenacapha ducani	3445 Lovetts Road 3452 4590	KB 20 July 99
Stenacapha ducani	3545 Peegra Road 3587 4538	KB 1 June 99
Stenacapha ducani	3645 Dip Falls 3635 4559	KB 27 Dec 88
Stenacapha ducani	3745 Detention Falls 3759 4597	KB 2 Oct 91
Stenacapha ducani	3845 Oldina 3881 4585	KB 4 May 99
Stenacapha ducani	3144 Wuthering Heights 3158 4457	KB 19 July 99
Stenacapha ducani	3244 Balfour Track Forest Reserve	Bob Mesibov
Stenacapha ducani	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Stenacapha ducani	3444 Rapid River 3404 4424	KB 3 Oct 91
Stenacapha ducani	3744 West Takone 3723 4405	KB 13 May 99
Stenacapha ducani	3844 Preolenna 3805 4464	KB 6 May 99
Stenacapha ducani	4144 The Gnomon 4190 4409	KB 28 Mar 99
Stenacapha ducani	4244 Paton Park 4240 4420	KB 27 Mar 99
Stenacapha ducani	3143 Big Eel Creek 3180 4303	Mesibov 16 Dec 90 (QVM)
Stenacapha ducani	3243 Balfour 3251 4303	KB 1 Nov 91
Stenacapha ducani	3443 Dodds Creek 3433 4384	Mesibov 12 Nov 93 (QVM)
Stenacapha ducani	3543 Mount Bertha 3598 4340	KB 2 June 99
Stenacapha ducani	3743 West Takone 3750 4397	KB 13 May 99
Stenacapha ducani	3843 Oonah 3857 4362	KB 14 May 99
Stenacapha ducani	3142 Thornton River	Earthwatch 7 Mar 81 (QVM)
Stenacapha ducani	3242 Balfour 3247 4299	KB 1 Nov 91
Stenacapha ducani	4142 Loyatea 4107 4264	KB 3 Oct 99
Stenacapha ducani	3141 Wild Wave River 3145 4179	Mesibov 17 Apr 93 (QVM)
Stenacapha ducani	3441 Donaldson River 3409 4101	KB 23 Oct 98
Stenacapha ducani	3741 Waratah (Mt Bischoff)	Petterd (1879)
Stenacapha ducani	3740 Butler Road 3712 4064	KB 25 Oct 98
Stenacapha ducani	3239 Ford Creek 3254 3908	Mesibov 2 May 93 (QVM)
Stenacapha ducani	3339 Guthrie Creek	Bob Mesibov
Stenacapha ducani	3439 Corinna 3458 3912	Kershaw 8 June 86 (QVM)
Stenacapha ducani	3338 Pieman River 3397 3855	KB 23 Oct 98
Stenacapha ducani	3438 Pieman River	Bob Mesibov
Stenacapha ducani	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Stenacapha ducani	3837 Mt Murchison	Chris Carr 2001
Stenacapha "Hunter"	3152 Three Hummock 3196 5221	KB 1 Feb 97
Stenacapha "Hunter"	3051 Hunter Island 3096 5117	KB 28 Jan 97
Stenacapha "Hunter"	3151 Hunter Island 3102 5107	KB 29 Jan 97
Stenacapha "Hunter"	3251 Three Hummock Is. 3218 5174	KB 31 Jan 97
Stenacapha "Hunter"	3049 Woolnorth Point 3070 4941	KB 5 Sep 00
Stenacapha "Hunter"	3349 Robbins Island 3328 4941	KB 4 Feb 97
Stenacapha hamiltoni	3251 Three Hummock Is. 3218 5174	KB 31 Jan 97
Stenacapha hamiltoni	3348	Smith + Kershaw (1981)
Stenacapha hamiltoni	3548 Circular Head	Petterd (1879)
Stenacapha hamiltoni	3247 Togari Block 3274 4708	KB 7 Sep 92
Stenacapha hamiltoni	3347 Togari Block 3303 4726	KB 8 Sep 92
Stenacapha hamiltoni	3447 Deep Creek Bay 3447 4787	KB 5 Sep 00

Stenacapha hamiltoni	3547	Smith + Kershaw (1981)
Stenacapha hamiltoni	3647 Harris Creek 3608 4707	KB 2 Oct 99
Stenacapha hamiltoni	3747 Rocky Cape 3773 4708	KB 2 Oct 91
Stenacapha hamiltoni	3146 Bond Tier 3184 4641	KB 17 Sep 92
Stenacapha hamiltoni	3246 Togari Block 3247 4638	KB 16 Sep 92
Stenacapha hamiltoni	3346	Smith + Kershaw (1981)
Stenacapha hamiltoni	3546 Deep Creek 3514 4697	KB 21 July 99
Stenacapha hamiltoni	3646 Crayfish Creek 3623 4672	KB 2 Oct 99
Stenacapha hamiltoni	3746 Lake Llewellyn 3793 4682	KB 2 Oct 99
Stenacapha hamiltoni	3846 Sisters Beach	Bob Mesibov
Stenacapha hamiltoni	3946 Chambers Bay 3919 4663	KB 8 Jun 96
Stenacapha hamiltoni	5146	Smith + Kershaw (1981)
Stenacapha hamiltoni	3145 Salmon River 3168 4533	KB 18 July 99
Stenacapha hamiltoni	3245 Christmas Hills 3275 4544	KB 19 July 99
Stenacapha hamiltoni	3445 Trowutta Cave 3410 4519	KB 24 Oct 98
Stenacapha hamiltoni	3545 Peegra Road 3587 4538	KB 1 June 99
Stenacapha hamiltoni	3745 Detention Falls 3759 4597	KB 2 Oct 91
Stenacapha hamiltoni	3845 Oldina 3881 4585	KB 4 May 99
Stenacapha hamiltoni	3945 Kaloma Camp 3919 4568	KB 22 Oct 94
Stenacapha hamiltoni	4045 Burnie Fern Glade 4094 4506	KB 10 Jun 96
Stenacapha hamiltoni	4145	Smith + Kershaw (1981)
Stenacapha hamiltoni	5045	Smith + Kershaw (1981)
Stenacapha hamiltoni	5145	Smith + Kershaw (1981)
Stenacapha hamiltoni	5245	Smith + Kershaw (1981)
Stenacapha hamiltoni	5645 Mount Horror 5605 4505	KB 10 Jan 96
Stenacapha hamiltoni	3144 Wuthering Heights 3158 4457	KB 19 July 99
Stenacapha hamiltoni	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Stenacapha hamiltoni	3444 Milkshake Hills 3457 4482	KB 26 Dec 88
Stenacapha hamiltoni	3644 Rabalga Road 3624 4498	KB 24 Oct 98
Stenacapha hamiltoni	3744 West Takone 3721 4404	KB 13 May 99
Stenacapha hamiltoni	3844 Preolenna 3805 4464	KB 6 May 99
Stenacapha hamiltoni	4044 Ridgley	Bob Mesibov
Stenacapha hamiltoni	4144 Ferndene 4188 4447	KB 30 Sep 91
Stenacapha hamiltoni	4244 Paton Park 4240 4420	KB 27 Mar 99
Stenacapha hamiltoni	4344	Smith + Kershaw (1981)
Stenacapha hamiltoni	4444	Smith + Kershaw (1981)
Stenacapha hamiltoni	4544	Smith + Kershaw (1981)
Stenacapha hamiltoni	4644 Branch Creek 4680 4406	Mesibov 26 July 77 (QVM)
Stenacapha hamiltoni	4744 York Town 4775 4433	Brian Smith 21 June 94 (QVM)
Stenacapha hamiltoni	4844 Kelso	Kershaw (QVM)
Stenacapha hamiltoni	4944 Land O' Cakes Ck 4986 4482	KB 17 Mar 01
Stenacapha hamiltoni	5144 Retreat 5142 4435	KB 26 Nov 00
Stenacapha hamiltoni	5344 Golconda 5363 4438	Kershaw (QVM)
Stenacapha hamiltoni	5444 Mt Stronach 5477 4423	KB 24 May 03
Stenacapha hamiltoni	5544 Mt Stronach 5502 4442	KB 19 Jan 96
Stenacapha hamiltoni	5644 Cascade River 5692 4401	KB 30 Jan 96
Stenacapha hamiltoni	5744 Frome Road 5755 4426	KB 22 Jan 96
Stenacapha hamiltoni	5844 Southern Cross Ck 5818 4474	KB 24 Jan 96
Stenacapha hamiltoni	3243 Balfour	Bob Mesibov
Stenacapha hamiltoni	3543 Mount Bertha 3598 4340	KB 2 June 99
Stenacapha hamiltoni	3743 West Takone 3750 4397	KB 13 May 99
Stenacapha hamiltoni	3843 Oonah 3857 4362	KB 14 May 99
Stenacapha hamiltoni	3943	Smith + Kershaw (1981)
Stenacapha hamiltoni	4243 Purton Flat 4209 4378	KB 27 Mar 99
Stenacapha hamiltoni	4343 Champion Park 4337 4370	KB 26 Mar 95
Stenacapha hamiltoni	4443 Torquay	Petterd (1879)

Stenacapha hamiltoni	4543	Smith + Kershaw (1981)
Stenacapha hamiltoni	4643 Rubicon River 4643 4343	KB 5 Oct 91
Stenacapha hamiltoni	4743 Dazzler Range	Ron Kershaw
Stenacapha hamiltoni	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Stenacapha hamiltoni	4943 Norfolk Reach 4937 4321	KB 11 Jan 97
Stenacapha hamiltoni	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Stenacapha hamiltoni	5243 Mount Arthur 5250 4313	KB 5 Feb 96
Stenacapha hamiltoni	5343 Sideling 5357 4331	KB 2 Feb 96
Stenacapha hamiltoni	5443 Mount Helen 5430 4307	KB 9 Jan 96
Stenacapha hamiltoni	5543 Hogarth Rivulet 5516 4343	KB 10 Jan 96
Stenacapha hamiltoni	5643	Smith + Kershaw (1981)
Stenacapha hamiltoni	5743 Weldborough 5794 4367	KB 24 Jan 96
Stenacapha hamiltoni	5843 Lehners Ridge 5825 4347	KB 13 Feb 96
Stenacapha hamiltoni	3242 Balfour	Bob Mesibov
Stenacapha hamiltoni	3542 Savage River Pipeline 3558 4227	Coy et al (1993)
Stenacapha hamiltoni	3942	Smith + Kershaw (1981)
Stenacapha hamiltoni	4142 Loyatea 4107 4264	KB 3 Oct 99
Stenacapha hamiltoni	4242 Isandula 4263 4298	KB 30 Apr 99
Stenacapha hamiltoni	4442 Aitken Creek 4430 4260	Mesibov 29 Aug 97 (QVM)
Stenacapha hamiltoni	4542 Railton 4507 4268	KB 30 Sep 91
Stenacapha hamiltoni	4642 Stony Rises 4654 4267	Mesibov 2 Sep 97 (QVM)
Stenacapha hamiltoni	4842 Dunkards Creek 4862 4259	KB 8 Mar 97
Stenacapha hamiltoni	4942 Notley Gorge 4925 4216	KB 5 Oct 91
Stenacapha hamiltoni	5142 Hollybank 5175 4276	KB 12 Aug 95
Stenacapha hamiltoni	5242 Patersonia Rivulet 5275 4275	KB 5 Feb 96
Stenacapha hamiltoni	5342 Barrow Falls 5328 4215	KB 8 Jan 96
Stenacapha hamiltoni	5442 Mount Maurice 5452 4262	KB 9 Jan 96
Stenacapha hamiltoni	5642 Mt Victoria 5699 4227	KB 16 Jan 96
Stenacapha hamiltoni	5742 Mount Victoria 5712 4223	KB 17 Jan 96
Stenacapha hamiltoni	3441 Donaldson River 3409 4101	KB 23 Oct 98
Stenacapha hamiltoni	3841	Smith + Kershaw (1981)
Stenacapha hamiltoni	3941	Smith + Kershaw (1981)
Stenacapha hamiltoni	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Stenacapha hamiltoni	4241	Smith + Kershaw (1981)
Stenacapha hamiltoni	4341 Forth Falls 4333 4185	D'Orazio 31 Aug 92 (QVM)
Stenacapha hamiltoni	4541 Dynans Bridge 4552 4104	KB 28 Mar 98
Stenacapha hamiltoni	4641 Christmas Hill 4675 4102	Mesibov 9 Sep 01
Stenacapha hamiltoni	4841 Black Sugarloaf 4828 4171	KB 8 Mar 97
Stenacapha hamiltoni	5041	Smith + Kershaw (1981)
Stenacapha hamiltoni	5141	Smith + Kershaw (1981)
Stenacapha hamiltoni	5241	Smith + Kershaw (1981)
Stenacapha hamiltoni	5341 Mount Barrow 5358 4198	KB 8 Jan 96
Stenacapha hamiltoni	5441 Sunset Ridge 5455 4198	KB 6 Feb 96
Stenacapha hamiltoni	5541 Stag Creek 5569 4112	KB 7 Feb 96
Stenacapha hamiltoni	5641 Sweets Creek 5608 4168	KB 11 Jan 96
Stenacapha hamiltoni	5741 Mathinna Falls 5751 4174	KB 4 Sep 88
Stenacapha hamiltoni	3540	Smith + Kershaw (1981)
Stenacapha hamiltoni	3640 Magnet 3690 4085	Kershaw 7 June 86 (QVM)
Stenacapha hamiltoni	3740 Waratah 3703 4065	Mesibov 24 Sep 90 (QVM)
Stenacapha hamiltoni	3940 Surrey Hills	Petterd (1879)
Stenacapha hamiltoni	4140 Winterbrook Falls 4140 4098	KB 25 Mar 95
Stenacapha hamiltoni	4240 Moina	Brian Smith 7 Nov 95 (QVM)
Stenacapha hamiltoni	4340 Mt Claude 4300 4064	Kershaw 27 Sep 78 (QVM)
Stenacapha hamiltoni	4440 Gog Range 4467 4049	Mesibov 16 Dec 91 (QVM)
Stenacapha hamiltoni	4540 Garden of Eden Creek 4532 408	KB 31 Jan 93
Stenacapha hamiltoni	4640 Beefeater Hill 4673 4009	Mesibov 2 Dec 96 (QVM)

Stenacapha hamiltoni	5040	Smith + Kershaw (1981)
Stenacapha hamiltoni	5140	Smith + Kershaw (1981)
Stenacapha hamiltoni	5340	Smith + Kershaw (1981)
Stenacapha hamiltoni	5440 Englishtown 5439 4008	Mesibov 5 July 95 (QVM)
Stenacapha hamiltoni	5540 Roses Tier 5568 4094	KB 7 Feb 96
Stenacapha hamiltoni	3339 Guthrie Creek	Bob Mesibov
Stenacapha hamiltoni	3439 Guthrie Creek 3408 3927	KB 23 Oct 98
Stenacapha hamiltoni	3739	Smith + Kershaw (1981)
Stenacapha hamiltoni	3939 Mt Cripps	Bob Mesibov (QVM)
Stenacapha hamiltoni	4039 Vale of Belvoir 4072 3981	Mesibov 21 Dec 93 (QVM)
Stenacapha hamiltoni	4139	Smith + Kershaw (1981)
Stenacapha hamiltoni	4339	Smith + Kershaw (1981)
Stenacapha hamiltoni	4439 Marakoopa Cave 4408 3968	KB 30 Mar 86
Stenacapha hamiltoni	4539	Smith + Kershaw (1981)
Stenacapha hamiltoni	4639	Smith + Kershaw (1981)
Stenacapha hamiltoni	4739	Smith + Kershaw (1981)
Stenacapha hamiltoni	5339 Deddington 5392 3985	Mesibov 5 July 95 (QVM)
Stenacapha hamiltoni	5539 Ben Lomond Rivulet 5525 3914	KB 31 Dec 98
Stenacapha hamiltoni	5639	Smith + Kershaw (1981)
Stenacapha hamiltoni	6039 Elephant Pass	Kershaw 11 Apr 77 (QVM)
Stenacapha hamiltoni	3338 Pieman River 3397 3855	KB 23 Oct 98
Stenacapha hamiltoni	3438 Wilsons Road 3401 3816	KB 23 Oct 98
Stenacapha hamiltoni	4338 Arm River 4344 3843	KB 21 Sep 01
Stenacapha hamiltoni	4438 Lake Mackenzie 4471 3833	Mesibov 21 Jan 93 (QVM)
Stenacapha hamiltoni	4638 Meander	Kershaw Nov 76 (QVM)
Stenacapha hamiltoni	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Stenacapha hamiltoni	4838 Liffey Falls 4802 3834	KB 28 Mar 99
Stenacapha hamiltoni	5538 Castle Cary 5585 3824	KB 30 Dec 98
Stenacapha hamiltoni	5938	Mesibov (Douglas-Apsley survey)
Stenacapha hamiltoni	6038	Smith + Kershaw (1981)
Stenacapha hamiltoni	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Stenacapha hamiltoni	3737 Rosebery	Michael Shea Mar 80 (QVM)
Stenacapha hamiltoni	3837 Anthony Road 3868 3707	KB 25 Oct 98
Stenacapha hamiltoni	3937	Smith + Kershaw (1981)
Stenacapha hamiltoni	4137 Oakleigh Creek 4185 3733	KB 9 Jan 91
Stenacapha hamiltoni	4237 Mt Oakleigh 4210 3705	KB 11 Jan 91
Stenacapha hamiltoni	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Stenacapha hamiltoni	4737 Pine Lake 4758 3783	KB 14 May 92
Stenacapha hamiltoni	4837 Cathcart Bluff 4873 3733	Mesibov 2 Jan 94 (QVM)
Stenacapha hamiltoni	4937 Mount Blackwood 4913 3714	KB 6 Nov 99
Stenacapha hamiltoni	5937	Mesibov (Douglas-Apsley survey)
Stenacapha hamiltoni	3536 Heemskirk River 3518 3692	KB 22 Oct 98
Stenacapha hamiltoni	3736	Smith + Kershaw (1981)
Stenacapha hamiltoni	4136 Oakleigh Creek 4198 3693	KB 9 Jan 91
Stenacapha hamiltoni	4236 Pelion East 4223 3646	KB 10 Jan 91
Stenacapha hamiltoni	4636 Lake Augusta	Bob Mesibov
Stenacapha hamiltoni	4736 Split Rock 4722 3644	KB 11 May 92
Stenacapha hamiltoni	4836	Smith + Kershaw (1981)
Stenacapha hamiltoni	4235 Cynthia Bay 4234 3502	KB 20 Mar 93
Stenacapha hamiltoni	4535 Bull Hill 4540 3597	KB 9 May 92
Stenacapha hamiltoni	4835 Hydro Creek 4885 3555	KB 11 May 92
Stenacapha hamiltoni	4234 Cynthia Bay 4245 3487	KB 20 Mar 93
Stenacapha hamiltoni	4534 Pine Tier Lagoon 4576 3403	KB 31 Jan 99
Stenacapha hamiltoni	4934 Yangena Hill 4943 3463	Mesibov 14 Mar 99 (QVM)
Stenacapha hamiltoni	3633 Fabritong Rivulet 3603 3390	KB 14 June 96
Stenacapha hamiltoni	3833 Queenstown	Ron Kershaw (QVM)

Stenacapha hamiltoni	3933 Bubs Hill	Arthur Clarke 1987
Stenacapha hamiltoni	4233 Shadow Lake 4289 3383	KB 28 Jan 00
Stenacapha hamiltoni	4333 Watersmeet 4308 3375	KB 28 Jan 00
Stenacapha hamiltoni	3632 Teepookana 3655 3273	KB 13 June 96
Stenacapha hamiltoni	3832 Crotty River 3859 3211	Kershaw (1989)
Stenacapha hamiltoni	4132 Frenchmans Cap track 4125 322	KB 28 Jan 00
Stenacapha hamiltoni	4232 King William Saddle 4223 3255	Mesibov 16 Feb 94 (QVM)
Stenacapha hamiltoni	4432 Butlers Gorge 4408 3215	KB 31 Jan 99
Stenacapha hamiltoni	5232 Blackman River 5241 3293	KB 22 Feb 98
Stenacapha hamiltoni	3731	Smith + Kershaw (1981)
Stenacapha hamiltoni	4431 Mossy Marsh 4496 3155	KB 10 Jan 01
Stenacapha hamiltoni	4531	Smith + Kershaw (1981)
Stenacapha hamiltoni	4631 Glenmark 4695 3190	KB 28 Dec 97
Stenacapha hamiltoni	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Stenacapha hamiltoni	3930 Mt McCutcheon 3907 3077	KB 2 Mar 00
Stenacapha hamiltoni	4530 Wayatinah 4593 3097	KB 26 Jan 99
Stenacapha hamiltoni	4630	Smith + Kershaw (1981)
Stenacapha hamiltoni	4529 Florentine 4540 2960	Owen Seeman 22 May 00 (QVM)
Stenacapha hamiltoni	4629 Mt Thunderbolt 4640 2970	O. Seeman May 00 (QVM)
Stenacapha hamiltoni	3928	Smith + Kershaw (1981)
Stenacapha hamiltoni	4028	Smith + Kershaw (1981)
Stenacapha hamiltoni	4428 Lake Rhona	Andrews+Barker 1972 (TMAG)
Stenacapha hamiltoni	4728 Montos Creek 4732 2814	KB 4 Feb 95
Stenacapha hamiltoni	5028 Espies Craig 5018 2286	KB 22 Feb 98
Stenacapha hamiltoni	3927	Smith + Kershaw (1981)
Stenacapha hamiltoni	4027	Smith + Kershaw (1981)
Stenacapha hamiltoni	4527 Growling Swallet 4590 2740	KB 20 Aug 89
Stenacapha hamiltoni	4727 Marriotts Falls 4723 2704	KB 15 Apr 90
Stenacapha hamiltoni	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Stenacapha hamiltoni	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Stenacapha hamiltoni	3926	Smith + Kershaw (1981)
Stenacapha hamiltoni	4026 Gordon/Denison jcn 4036 3695	C. Howard 29 Jan 77 (QVM)
Stenacapha hamiltoni	4126	Smith + Kershaw (1981)
Stenacapha hamiltoni	4426 Adams Falls 4424 2698	KB 15 Mar 98
Stenacapha hamiltoni	4526 Needles Shelter 4514 2655	KB 1 Dec 92
Stenacapha hamiltoni	4626 Junee Cave 4668 2681	KB 15 Mar 98
Stenacapha hamiltoni	4726 Styx River 4746 2612	KB 9 Dec 01
Stenacapha hamiltoni	4826 Torrent Creek 4847 2632	KB 10 Jan 01
Stenacapha hamiltoni	5026 Mt Dromedary 5088 2696	KB 13 Nov 95
Stenacapha hamiltoni	5126 Mt Dromedary 5103 2697	KB 10 Jan 01
Stenacapha hamiltoni	5225 Myrtle Gully Mt W 5214 2505	KB 8 Oct 88
Stenacapha hamiltoni	5124	Smith + Kershaw (1981)
Stenacapha hamiltoni	5224 Pillinger Drive 5213 2478	KB 2 Nov 99
Stenacapha hamiltoni	5724 Bellettes Creek 5751 2450	KB 6 July 97
Stenacapha hamiltoni	4223 White Monolith Range	J. Friend 16 Feb 87 (QVM)
Stenacapha hamiltoni	4423 Scotts Peak	Kershaw 9 Apr 77 (QVM)
Stenacapha hamiltoni	4623 Mt Weld 4655 2383	Doran/Bashford 2002 (QVM)
Stenacapha hamiltoni	5123 Pelverata Falls 5112 2319	KB 8 Jan 95
Stenacapha hamiltoni	5223	Smith + Kershaw (1981)
Stenacapha hamiltoni	5723 Hawks Hill 5757 2384	KB 8 Aug 89
Stenacapha hamiltoni	4722 Warra	Dick Bashford (FT pitfalls)
Stenacapha hamiltoni	4922 Kermandie 4961 2214	KB 23 Nov 00
Stenacapha hamiltoni	5022 Tobys Hill 5098 2223	KB 30 Sep 00
Stenacapha hamiltoni	5122 Snug Falls 5167 2227	KB 3 June 00
Stenacapha hamiltoni	5222	Smith + Kershaw (1981)
Stenacapha hamiltoni	5322 North Bruny	QVM collections

Stenacapha hamiltoni	5622 Palmers Lookout 5676 2209	KB 15 Feb 01
Stenacapha hamiltoni	5722 Stinking Bay 5719 2251	KB 14 Apr 96
Stenacapha hamiltoni	5021	Smith + Kershaw (1981)
Stenacapha hamiltoni	5121	Smith + Kershaw (1981)
Stenacapha hamiltoni	5221	Smith + Kershaw (1981)
Stenacapha hamiltoni	4220	Smith + Kershaw (1981)
Stenacapha hamiltoni	4320 Port Davey	Petterd (1879)
Stenacapha hamiltoni	4920 Francistown 4989 2053	KB 21 Feb 88
Stenacapha hamiltoni	5020	Smith + Kershaw (1981)
Stenacapha hamiltoni	4319 Melaleuca	Brian Smith
Stenacapha hamiltoni	4819 Mesa Creek 4854 1949	KB 7 Nov 87
Stenacapha hamiltoni	4919	Smith + Kershaw (1981)
Stenacapha hamiltoni	5019	Smith + Kershaw (1981)
Stenacapha hamiltoni	5119 Mickeys Bay 5153 1913	KB 23 May 98
Stenacapha hamiltoni	5219 Mavista Falls 5255 1970	KB 8 Apr 01
Stenacapha hamiltoni	4618 Precipitous Bluff	Arthur Clarke 1988
Stenacapha hamiltoni	4918	Smith + Kershaw (1981)
Stenacapha hamiltoni	4617 Ile du Golfe	Parks island records
Stenacapha hamiltoni	4917	Smith + Kershaw (1981)
Stenacapha vitrinaformis	4436 Walls of Jerusalem	Margaret Andrews 1994
Stenacapha vitrinaformis	4233 Shadow Lake 4289 3383	KB 28 Jan 00
Stenacapha vitrinaformis	4627 Lake Dobson 4666 2740	KB 6 May 01
Stenacapha vitrinaformis	4727 Lake Dobson Road 4726 2745	KB 4 May 91
Stenacapha vitrinaformis	4126 Serpentine Dam 4173 2655	KB 27 Jan 01
Stenacapha vitrinaformis	4226 Strathgordon 4224 2634	KB 28 Jan 01
Stenacapha vitrinaformis	4426 Adams Falls 4424 2698	KB 15 Mar 98
Stenacapha vitrinaformis	4526 Five Road 4528 2684	KB 8 Apr 00
Stenacapha vitrinaformis	4225 Trappes Inlet 4267 2585	KB 28 Jan 01
Stenacapha vitrinaformis	4325 Mc Partlan Pass	Mike Dreissen (pitfalls, 2000)
Stenacapha vitrinaformis	5125 Collinsvale 5127 2543	KB 10 Jan 01
Stenacapha vitrinaformis	4424 Mt Anne 4484 2438	Don Driscoll Nov 01
Stenacapha vitrinaformis	4524 Mount Anne	Louise Gilfedder 1990
Stenacapha vitrinaformis	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Stenacapha vitrinaformis	5124 Milles Track 5197 2483	KB 17 Oct 98
Stenacapha vitrinaformis	5224 Octopus Tree 5203 2495	KB 19 Nov 98
Stenacapha vitrinaformis	4423 Scotts Peak 4440 2342	Don Driscoll Nov 01
Stenacapha vitrinaformis	4623 Mt Weld 4655 2383	Doran/Bashford 2002 (QVM)
Stenacapha vitrinaformis	4322 Lake Fortuna 4368 2249	KB 15 Feb 00
Stenacapha vitrinaformis	4622 Blakes Opening 4696 2287	KB 5 Apr 98
Stenacapha vitrinaformis	4722 Manuka Road 4740 2279	KB 22 Nov 00
Stenacapha vitrinaformis	4721 Cook Creek 4708 2180	KB 11 Feb 95
Stenacapha vitrinaformis	4821 Hartz Peak 4810 2118	KB 8 Dec 96
Stenacapha vitrinaformis	4920 Adamsons Peak 4903 2018	KB 6 Aug 00
Stenacapha vitrinaformis	4818 Mount La Perouse	Legrand (1871)
Stenacapha "Flinders"	5856 Badger Hill 5888 5670	KB 25 Sep 00
Stenacapha "Flinders"	5956 Walkers Lookout 5918 5652	KB 25 Sep 00
Stenacapha "Flinders"	5955 (as T. sinclairi)	Smith + Kershaw (1981)
Stenacapha "Flinders"	5954 Mt Strzelecki 5904 5492	KB 23 Sep 00
Charopidae "Swallet"	4137 Oakleigh Creek 4190 3741	KB 9 Jan 91
Charopidae "Swallet"	4237 Mt Oakleigh 4210 3705	KB 11 Jan 91
Charopidae "Swallet"	4136 Pelion West 4174 3685	KB 12 Jan 91
Charopidae "Swallet"	3933 Nelson Falls 3953 3382	KB 27 Jan 00
Charopidae "Swallet"	4233 Shadow Lake 4289 3383	KB 28 Jan 00

Charopidae "Swallet"	3632 Teepookana 3655 2273	KB 13 June 96
Charopidae "Swallet"	4432 Tarraleah 4415 3287	Mesibov 28 Apr 92 (QVM)
Charopidae "Swallet"	4431 Tarraleah 4473 3163	Mesibov 16 Apr 92 (QVM)
Charopidae "Swallet"	4531	Forestry Tas (Tarraleah samples)
Charopidae "Swallet"	4529 Florentine 4540 2950	Owen Seeman May 2000 (QVM)
Charopidae "Swallet"	4527 Growling Swallet 4590 2740	KB 20 Aug 89
Charopidae "Swallet"	4727 Tyenna 4771 2740	Kershaw Nov 75 (QVM)
Charopidae "Swallet"	4225 Trappes Inlet 4267 2585	KB 28 Jan 01
Charopidae "Swallet"	4325 Wedge River 4370 2543	KB 28 Jan 01
Charopidae "Swallet"	4424 Mt Anne 4484 2438	Don Driscoll Jan 02
Charopidae "Swallet"	4423 Scotts Peak 4440 2342	Don Driscoll Jan 02
Charopidae "Swallet"	4722 Tomalah (as Mulathena)	Bashford (QVM)
Cystopelta bicolor	3247 Togari Block 3273 4734	KB 7 Sep 92
Cystopelta bicolor	3347 Jones Plain 3342 4704	KB 4 Oct 91
Cystopelta bicolor	3546 East Creek 3508 4681	KB 21 July 99
Cystopelta bicolor	3646 Crayfish Creek 3623 4672	KB 2 Oct 99
Cystopelta bicolor	3245 Lovells Creek 3208 4544	KB 18 July 99
Cystopelta bicolor	3345 Malompto Road 3317 4588	KB 20 July 99
Cystopelta bicolor	3445 Tayatea Trail 3481 4536	KB 26 Dec 88
Cystopelta bicolor	3745 Meunna 3723 4518	KB 11 May 99
Cystopelta bicolor	3845 Calder Road 3833 4518	KB 5 May 99
Cystopelta bicolor	3945 Kaloma Camp 3919 4568	KB 22 Oct 94
Cystopelta bicolor	4045 Cam River 4019 4512	Mesibov 30 July 97 (QVM)
Cystopelta bicolor	3344 Sumac Lookout 3327 4456	KB 3 Oct 91
Cystopelta bicolor	3444 Rapid River 3404 4424	KB 3 Oct 91
Cystopelta bicolor	3944 Henrietta 3914 4411	Mesibov 12 Dec 96 (QVM)
Cystopelta bicolor	3143 Big Eel Creek 3180 4303	Mesibov 16 Dec 90 (QVM)
Cystopelta bicolor	3243 Balfour 3251 4303	KB 1 Nov 91
Cystopelta bicolor	3343 Julius Depot 3352 3351	Mesibov 12 Jan 93 (QVM)
Cystopelta bicolor	3443 Dodds Creek 3433 4384	Mesibov 12 Nov 93 (QVM)
Cystopelta bicolor	3543 Mount Bertha 3597 4338	KB 2 June 99
Cystopelta bicolor	3743 West Takone 3750 4397	KB 13 May 99
Cystopelta bicolor	3843 Oonah 3857 4362	KB 14 May 99
Cystopelta bicolor	4243 Isandula 4264 4308	KB 30 Apr 99
Cystopelta bicolor	3242 Balfour 3247 4299	KB 1 Nov 91
Cystopelta bicolor	3542 Savage River Pipeline 3558 4227	Coy et al (1993)
Cystopelta bicolor	3341 Leigh River 3352 4198	KB 23 Oct 98
Cystopelta bicolor	3541 Pipeline Road	Bob Mesibov
Cystopelta bicolor	3641	Smith + Kershaw (1981)
Cystopelta bicolor	3741 Magnet Range	Kershaw 7 June 86 (QVM)
Cystopelta bicolor	3841 Fingerpost 3853 4146	Mesibov 18 Sep 91 (QVM)
Cystopelta bicolor	4141 Winterbrook Falls 4143 4106	KB 25 Mar 95
Cystopelta bicolor	3540	Smith + Kershaw (1981)
Cystopelta bicolor	3640 Magnet Range	Ron Kershaw
Cystopelta bicolor	3740 Butler Road 3712 4064	KB 25 Oct 98
Cystopelta bicolor	3840 Waratah 3806 4092	Mesibov 28 Oct 91 (QVM)
Cystopelta bicolor	3439 Guthrie Creek 3408 3927	KB 23 Oct 98
Cystopelta bicolor	3939 Mt Cripps 3970 3990	Mesibov 21 Dec 93 (QVM)
Cystopelta bicolor	4039 Vale of Belvoir 4072 3981	Mesibov 21 Dec 93 (QVM)
Cystopelta bicolor	4439 Westmoreland Falls 4489 3918	KB 26 Mar 89
Cystopelta bicolor	3338 Pieman River 3397 3855	KB 23 Oct 98
Cystopelta bicolor	3438 Pieman River	Ron Kershaw
Cystopelta bicolor	4338 Arm River 4344 3843	KB 21 Sep 01
Cystopelta bicolor	3437 Duck Creek 3408 3763	Mesibov 6 Mar 99 (QVM)
Cystopelta bicolor	3637	Smith + Kershaw (1981)

Cystopelta bicolor	4237 Mt Oakleigh 4210 3705	KB 11 Jan 91
Cystopelta bicolor	4337 Rowallan Track 4337 3791	KB 22 Sep 01
Cystopelta bicolor	3535 Heemskirk 3543 3593	Kershaw 3 Apr 88 (QVM)
Cystopelta bicolor	3836 Anthony Road 3854 3680	Coy et al (1993)
Cystopelta bicolor	3936	Smith + Kershaw (1981)
Cystopelta bicolor	4136 Pelion West 4194 3682	KB 12 Jan 91
Cystopelta bicolor	4236 Mt Doris 4212 3645	KB 10 Jan 91
Cystopelta bicolor	3634 Henty River 3620 3460	Kershaw 3 Apr 88 (QVM)
Cystopelta bicolor	3834 Queenstown 3804 3404	KB 11 June 96
Cystopelta bicolor	4234 Cynthia Bay 4245 3487	KB 20 Mar 93
Cystopelta bicolor	3533 Ocean Beach 3563 3322	KB 15 June 96
Cystopelta bicolor	3633 Hogarth Falls 3633 3318	KB 12 June 96
Cystopelta bicolor	4233 Shadow Lake 4289 3383	KB 28 Jan 00
Cystopelta bicolor	4333 Derwent Bridge 4357 3355	Kershaw 15 Nov 86 (QVM)
Cystopelta bicolor	4433 Derwent Bridge 4452 3345	Kershaw 15 Nov 86 (QVM)
Cystopelta bicolor	3632 Teepookana 3655 3273	KB 13 June 96
Cystopelta bicolor	4132 Frenchmans Cap track 4125 322	KB 28 Jan 00
Cystopelta bicolor	4432	Forestry Tas (Tarraleah samples)
Cystopelta bicolor	3931 Andrew River 3950 3124	Steve Smith 22 Mar 88 (QVM)
Cystopelta bicolor	4431 Mossy Marsh 4496 3155	KB 10 Jan 01
Cystopelta bicolor	4531	Forestry Tas (Tarraleah samples)
Cystopelta bicolor	4631 Glenmark 4695 3190	KB 28 Dec 97
Cystopelta bicolor	4731 Victoria Valley Falls 4761 3140	KB 28 Dec 97
Cystopelta bicolor	3930 Mt McCutcheon 3907 3077	KB 2 Mar 00
Cystopelta bicolor	4030 Franklin River 4055 3003	Eberhard 24 Mar 88 (QVM)
Cystopelta bicolor	4530 Wayatinah 4593 3097	KB 26 Jan 99
Cystopelta bicolor	3829 Pine Landing 3858 2994	KB 27 Jan 00
Cystopelta bicolor	4529 Tiger Road 4546 2949	KB 31 Jan 99
Cystopelta bicolor	3628 Hibbs Lagoon	I Cameron (QVM)
Cystopelta bicolor	3728 Hobbs Creek 3752 2878	KB 1 Mar 00
Cystopelta bicolor	3927	Smith + Kershaw (1981)
Cystopelta bicolor	4027	Smith + Kershaw (1981)
Cystopelta bicolor	4127	Smith + Kershaw (1981)
Cystopelta bicolor	4727 Waterfalls Track 4756 2742	KB 8 Mar 98
Cystopelta bicolor	3926	Smith + Kershaw (1981)
Cystopelta bicolor	4026	Smith + Kershaw (1981)
Cystopelta bicolor	4126 Serpentine Dam 4173 2655	KB 27 Jan 01
Cystopelta bicolor	4426 Ragged Range 4443 2626	KB 15 Mar 98
Cystopelta bicolor	4526 Needles Shelter 4514 2655	KB 1 Dec 92
Cystopelta bicolor	4626 Junee Cave 4668 2681	KB 15 Mar 98
Cystopelta bicolor	4025	Smith + Kershaw (1981)
Cystopelta bicolor	4125	Smith + Kershaw (1981)
Cystopelta bicolor	4325 Wedge River 4370 2543	KB 28 Jan 01
Cystopelta bicolor	4725 Styx River 4724 2596	KB 9 Dec 01
Cystopelta bicolor	5025 Ringwood Track 5068 2557	KB 22 July 95
Cystopelta bicolor	5125 Collinsvale 5127 2543	KB 6 Mar 89
Cystopelta bicolor	5225 Ki Creek 5222 2516	KB 7 Nov 96
Cystopelta bicolor	4024	Smith + Kershaw (1981)
Cystopelta bicolor	4124	Smith + Kershaw (1981)
Cystopelta bicolor	4424 Mt Anne 4484 2438	Don Driscoll Jan 02
Cystopelta bicolor	4724	Smith + Kershaw (1981)
Cystopelta bicolor	4824 Herons Creek 4820 2427	KB 25 Dec 97
Cystopelta bicolor	5024 Jeffreys Track 5037 2489	KB 7 Dec 97
Cystopelta bicolor	5124 Cathedral Rock 5170 2453	KB 25 Apr 89
Cystopelta bicolor	5224 Pillinger Drive 5213 2478	KB 2 Nov 99
Cystopelta bicolor	4223 White Monolith Range	J. Friend 16 Feb 87 (QVM)

Cystopelta bicolor	4423 Scotts Peak 4440 2342	Don Driscoll Jan 02
Cystopelta bicolor	4923 New Road Franklin 4950 2309	KB 18 Dec 02
Cystopelta bicolor	5123 Snug Tier 5157 2320	KB 8 Dec 90
Cystopelta bicolor	4322 Mt Hesperus 4378 2264	KB 28 Feb 99
Cystopelta bicolor	4722 Tahune Park 4772 2284	KB 6 May 90
Cystopelta bicolor	4822 Willies Saddle 4870 2222	KB 3 Feb 96
Cystopelta bicolor	5122 Tobys Hill 5105 2227	KB 30 Sep 00
Cystopelta bicolor	4121	Smith + Kershaw (1981)
Cystopelta bicolor	4721 Riveaux Creek	NRCP collections (Coy, 1993)
Cystopelta bicolor	4821 Hartz Hut 4810 2171	KB 9 May 87
Cystopelta bicolor	4020	Smith + Kershaw (1981)
Cystopelta bicolor	4320 Norold Creek 4386 2089	Steve Smith 13 Feb 87 (QVM)
Cystopelta bicolor	4920 Francistown 4989 2053	KB 27 Sep 87
Cystopelta bicolor	5020 Esperance 5022 2009	KB 26 Dec 85
Cystopelta bicolor	4219 Melaleuca Inlet 4298 1956	KB 15 Jan 91
Cystopelta bicolor	4319 Melaleuca 4324 1960	KB 14 Jan 91
Cystopelta bicolor	4819 Hastings Caves 4873 1967	KB 9 Nov 96
Cystopelta bicolor	4919	Smith + Kershaw (1981)
Cystopelta bicolor	5219 Mt Mangana 5232 1985	KB 13 Jan 86
Cystopelta bicolor	4318 Half Woody Hill 4339 1889	Brian Smith 5 March 92 (QVM)
Cystopelta bicolor	4818 Coal Hill	Arthur Clarke
Cystopelta bicolor	4817 South Cape Bay 4871 1716	KB 12 Mar 00
Cystopelta bicolor	4917 Rescherche Bay 4907 1747	KB 27 Dec 85
Cystopelta petterdi	2458 Ridges Road 2432 5822	KB 15 Dec 96
Cystopelta petterdi	5758 Mount Tanner 5704 5848	KB 24 Sep 00
Cystopelta petterdi	2457 Yates Creek 2479 5782	KB 16 Dec 96
Cystopelta petterdi	2557 Raffertys Creek 2511 5781	KB 12 Dec 96
Cystopelta petterdi	2456 Gentle Annie 2456 5636	KB 15 Dec 96
Cystopelta petterdi	2556 Yarra Creek 2524 5673	KB 13 Dec 96
Cystopelta petterdi	5856 Badger Hill 5888 5670	KB 25 Sep 00
Cystopelta petterdi	5956 Walkers Lookout	Rob Taylor
Cystopelta petterdi	2355 Seal River 2387 5592	KB 16 Dec 96
Cystopelta petterdi	2455 Red Hut Road 2438 5573	KB 17 Dec 96
Cystopelta petterdi	5954 Mt Strzelecki	Brian Smith 31 Oct 95 (QVM)
Cystopelta petterdi	5953 Cape Barren Is 5930 5310	George Davis 27 Nov 76 (QVM)
Cystopelta petterdi	5952	Smith + Kershaw (1981)
Cystopelta petterdi	5746 Mt Cameron	R. Upson 28 Sep 73 (QVM)
Cystopelta petterdi	3845 Oldina 3884 4598	KB 4 May 99
Cystopelta petterdi	3945 Seabrook Creek 3961 4542	Mesibov 15 Jan 96 (QVM)
Cystopelta petterdi	4045 Somerset 4021 4552	KB 5 Jun 98
Cystopelta petterdi	5545 Mount Horror 5599 4507	Kershaw 14 Sep 85 (QVM)
Cystopelta petterdi	5645 Mount Horror 5612 4531	KB 18 Jan 96
Cystopelta petterdi	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Cystopelta petterdi	6045 Ansons Bay 6036 4548	Bashford 9 Nov 90 (QVM)
Cystopelta petterdi	4244 Paton Park 4240 4420	KB 27 Mar 99
Cystopelta petterdi	4644	Smith + Kershaw (1981)
Cystopelta petterdi	4744 Yorktown 4753 4418	Kershaw 22 June 85 (QVM)
Cystopelta petterdi	4844	Smith + Kershaw (1981)
Cystopelta petterdi	4944 Land O' Cakes Ck 4986 4482	KB 17 Mar 01
Cystopelta petterdi	5044 Pipers River 5031 4471	Kershaw 22 June 85 (QVM)
Cystopelta petterdi	5144 Retreat 5142 4435	KB 26 Nov 00
Cystopelta petterdi	5244 Wyena 5212 4478	Tim Kingston 25 Aug 93 (QVM)
Cystopelta petterdi	5344 Jetsonville 5388 4462	Kershaw 1 June 85 (QVM)
Cystopelta petterdi	5444 Mt Stronach 5477 4423	KB 24 May 03
Cystopelta petterdi	5544 Branxholm 5574 4480	Kershaw 14 Sep 85 (QVM)

Cystopelta petterdi	5644 Cascade River 5692 4401	KB 30 Jan 96
Cystopelta petterdi	5744 Frome Road 5773 4430	KB 22 Jan 96
Cystopelta petterdi	5844 Southern Cross Ck 5818 4474	KB 24 Jan 96
Cystopelta petterdi	5944 Tinkle Creek 5909 4458	KB 18 Jan 00
Cystopelta petterdi	4243 Gawler River 4275 4345	KB 29 Apr 99
Cystopelta petterdi	4743 Dazzler Range 4706 4392	Kershaw 22 May 86 (QVM)
Cystopelta petterdi	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Cystopelta petterdi	4943 Norfolk Reach 4937 4321	KB 11 Jan 97
Cystopelta petterdi	5043	Smith + Kershaw (1981)
Cystopelta petterdi	5143 Lilydale Falls 5177 4353	KB 12 Jan 97
Cystopelta petterdi	5243 Lisle Block 5266 4329	KB 5 Feb 96
Cystopelta petterdi	5343 Sideling 5357 4331	KB 2 Feb 96
Cystopelta petterdi	5443 Mackenzie Rivulet 5474 4340	KB 10 Jan 96
Cystopelta petterdi	5543 Tulendeena 5535 4383	KB 15 Feb 96
Cystopelta petterdi	5643 Gold Creek 5681 4384	KB 30 Jan 96
Cystopelta petterdi	5743 Weldborough 5794 4367	KB 24 Jan 96
Cystopelta petterdi	5843 Murdochs Road 5892 4397	KB 31 Jan 96
Cystopelta petterdi	5943 Goulds Country 5904 4324	KB 27 Oct 90
Cystopelta petterdi	4542 Railton 4507 4268	KB 30 Sep 91
Cystopelta petterdi	4842 Frankford 4818 4209	Kershaw 9 Nov 84 (QVM)
Cystopelta petterdi	4942 Notley Gorge 4925 4216	KB 18 Mar 01
Cystopelta petterdi	5142 Hollybank 5175 4276	KB 12 Aug 95
Cystopelta petterdi	5242 Patersonia Rivulet 5275 4275	KB 5 Feb 96
Cystopelta petterdi	5342 Barrow Falls 5328 4215	KB 8 Jan 96
Cystopelta petterdi	5442 Mt Maurice 5440 4248	KB 9 Jan 96
Cystopelta petterdi	5542 Mt Maurice 5518 4251	KB 12 Jan 96
Cystopelta petterdi	5642 Mathinna Plains 5604 4221	KB 11 Jan 96
Cystopelta petterdi	5742 Mount Victoria 5703 4258	KB 17 Jan 96
Cystopelta petterdi	5842 Toms Gully 5895 4223	KB 21 Sept 96
Cystopelta petterdi	5942 Toms Gully 5904 4219	KB 21 Sept 96
Cystopelta petterdi	6042 Binalong Bay Road	Tim Hume 6 Nov 78 (QVM)
Cystopelta petterdi	4841 Black Sugarloaf	Sarah Lloyd
Cystopelta petterdi	4941 Bridgenorth	R. Vogelpoel 3 Dec 84 (QVM)
Cystopelta petterdi	5041	Smith + Kershaw (1981)
Cystopelta petterdi	5141 Launceston	Petterd and Hedley (1909)
Cystopelta petterdi	5241	Smith + Kershaw (1981)
Cystopelta petterdi	5341 Mount Barrow 5358 4198	KB 8 Jan 96
Cystopelta petterdi	5441 Beckett Creek 5433 4167	KB 6 Feb 96
Cystopelta petterdi	5541 Tombstone Creek 5570 4168	KB 11 Jan 96
Cystopelta petterdi	5641 Mathinna Plains 5623 4196	KB 11 Jan 96
Cystopelta petterdi	5841 Ryans Creek 5862 4184	KB 1 Feb 96
Cystopelta petterdi	6041 Loila Tier 6035 4177	KB 21 Sep 96
Cystopelta petterdi	4440 Gog Range 4467 4049	Mesibov 16 Dec 91 (QVM)
Cystopelta petterdi	4540 Garden of Eden Creek 4532 408	KB 31 Jan 93
Cystopelta petterdi	4640 Elizabeth Town 4669 4096	Mesibov 2 Dec 96 (QVM)
Cystopelta petterdi	4840 Westbury 4853 4069	Kershaw 16 June 85 (QVM)
Cystopelta petterdi	5040	Smith + Kershaw (1981)
Cystopelta petterdi	5140 Kate Reed SRA 5124 4074	KB 31 Aug 01
Cystopelta petterdi	5540 Roses Tier 5568 4094	KB 7 Feb 96
Cystopelta petterdi	5940	Smith + Kershaw (1981)
Cystopelta petterdi	6040 Hendersons Lagoon 6049 4070	KB 22 Sep 96
Cystopelta petterdi	5539 Ben Lomond Rivulet 5525 3914	KB 31 Dec 98
Cystopelta petterdi	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Cystopelta petterdi	4338 Maggs Mountain 4335 3816	Jim Nelson 22 Sep 01
Cystopelta petterdi	4738 Quamby Bluff 4755 3896	KB 22 Sep 95
Cystopelta petterdi	4838 Liffey Falls 4802 3834	KB 28 Mar 99

Cystopelta petterdi	5738 Fingal Tier	Bob Mesibov
Cystopelta petterdi	5838 Fingal Tier	Bob Mesibov
Cystopelta petterdi	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Cystopelta petterdi	6038 Heritage Falls 6003 3803	KB 28 Oct 90
Cystopelta petterdi	4837 Cathcart Bluff 4873 3733	Mesibov 2 Jan 94 (QVM)
Cystopelta petterdi	4937 Poatina 4987 3713	Kershaw 16 June 85 (QVM)
Cystopelta petterdi	5637 St Pauls Dome	Mesibov 28 Nov 01
Cystopelta petterdi	5937 Douglas-Apsley 5976 3718	Mesibov 2 July 88 (QVM)
Cystopelta petterdi	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Cystopelta petterdi	5936 Douglas-Apsley 5983 3677	Mesibov 27 July 88 (QVM)
Cystopelta petterdi	6036	Mesibov (Douglas-Apsley survey)
Cystopelta petterdi	5634 Lake Leake 5657 3492	KB 5 July 00
Cystopelta petterdi	5734 Lost Falls	Bob Mesibov
Cystopelta petterdi	4833 Waddamana 4809 3360	Mesibov 16 Sep 78 (QVM)
Cystopelta petterdi	5033 Alma Pass 5060 3349	KB 4 Apr 92
Cystopelta petterdi	5233 Tunbridge Tier 5223 3363	KB 12 Sep 98
Cystopelta petterdi	5733 Big Sassy Creek 5746 3332	KB 23 Nov 97
Cystopelta petterdi	5632 Tooms White Gum 5693 3234	KB 23 Nov 97
Helicarion cuvieri	5759 Palana	Phil Colman (Aust Mus)
Helicarion cuvieri	5859 North East River	Hans Wapstra
Helicarion cuvieri	2358	Smith + Kershaw (1981)
Helicarion cuvieri	5658	Smith + Kershaw (1981)
Helicarion cuvieri	5758	Smith + Kershaw (1981)
Helicarion cuvieri	2557 Raffertys Creek 2511 5781	KB 12 Dec 96
Helicarion cuvieri	2456 Grassy River 2489 5640	KB 26 Sep 98
Helicarion cuvieri	2556 Yarra Creek 2524 5673	KB 13 Dec 96
Helicarion cuvieri	5756 Pickford Creek 5782 5694	KB 26 Sep 00
Helicarion cuvieri	2355 Seal River 2387 5592	KB 16 Dec 96
Helicarion cuvieri	5955	Smith + Kershaw (1981)
Helicarion cuvieri	6054 Badger Corner 6009 5458	KB 26 Sep 00
Helicarion cuvieri	5953 Cape Barren Island 5930 5310	George Davis 27 Nov 70 (QVM)
Helicarion cuvieri	3152 Three Hummock 3196 5221	KB 1 Feb 97
Helicarion cuvieri	3252 Three Hummock Is. 3252 5242	KB 1 Feb 97
Helicarion cuvieri	6042	Smith + Kershaw (1981)
Helicarion cuvieri	3051 Hunter Island 3096 5117	KB 28 Jan 97
Helicarion cuvieri	3151 Hunter Island 3102 5107	KB 29 Jan 97
Helicarion cuvieri	3251 Three Hummock Is. 3218 5174	KB 31 Jan 97
Helicarion cuvieri	3049 Woolnorth Point 3070 4941	KB 5 Sep 00
Helicarion cuvieri	3148 Welcome River 3110 4855	KB 5 Sep 00
Helicarion cuvieri	3248 Boundary Road 3204 4805	KB 4 Sep 00
Helicarion cuvieri	3047 Blue Bog 3077 4702	KB 6 Sep 00
Helicarion cuvieri	3147 Flewin Road 3130 4721	KB 6 Sep 00
Helicarion cuvieri	3247 Togari Block 3273 4734	KB 7 Sep 92
Helicarion cuvieri	3347 Jones Plain 3342 4704	KB 4 Oct 91
Helicarion cuvieri	3447 Lake Mikany 3475 4714	KB 23 July 99
Helicarion cuvieri	3647 Cowrie Point 3614 4760	KB 23 July 99
Helicarion cuvieri	3747 Rocky Cape 3773 4708	KB 2 Oct 91
Helicarion cuvieri	3146 Dismal Swamp 3190 4630	KB 4 Oct 91
Helicarion cuvieri	3246 Togari Block 3247 4638	KB 16 Sep 92
Helicarion cuvieri	3346	Smith + Kershaw (1981)
Helicarion cuvieri	3646 Crayfish Creek 3623 4672	KB 2 Oct 99
Helicarion cuvieri	3746 Lake Llewellyn 3793 4682	KB 2 Oct 99
Helicarion cuvieri	3946 Table Cape	Petterd (1879)
Helicarion cuvieri	5846 Gladstone 5864 4625	Mesibov 18 Aug 87 (QVM)
Helicarion cuvieri	3145 Arthur/Frankland Jcn 3128 4503	KB 25 Dec 88

Helicarion cuvieri	3245 Leensons Road 3277 4552	KB 24 Oct 98
Helicarion cuvieri	3345 Malompto Road 3317 4588	KB 20 July 99
Helicarion cuvieri	3445 Tayatea Trail 3481 4536	KB 26 Dec 88
Helicarion cuvieri	3545 Peegra Road 3587 4538	KB 1 June 99
Helicarion cuvieri	3645 Dip Falls 3635 4559	KB 27 Dec 88
Helicarion cuvieri	3745 Detention Falls 3759 4597	KB 2 Oct 91
Helicarion cuvieri	3845 Oldina 3881 4585	KB 4 May 99
Helicarion cuvieri	3945 Kaloma Camp 3919 4568	KB 22 Oct 94
Helicarion cuvieri	4045 Burnie Fern Glade 4094 4506	KB 10 Jun 96
Helicarion cuvieri	4745 Greens Beach	Bob Green (QVM)
Helicarion cuvieri	4845 Low Head	P. Mereen 14 Apr 51 (QVM)
Helicarion cuvieri	5645 Little Mount Horror 5684 4598	KB 8 Feb 96
Helicarion cuvieri	5845 Old Chum Dam 5875 4546	KB 6 Sep 99
Helicarion cuvieri	6045 Ansons River 6034 5540	KB 3 Sep 88
Helicarion cuvieri	3344 Lake Chisholm 3373 4445	KB 26 Dec 88
Helicarion cuvieri	3444 Milkshake Hills 3457 4482	KB 26 Dec 88
Helicarion cuvieri	3644 Rabalga Road 3624 4498	KB 24 Oct 98
Helicarion cuvieri	3744 West Takone 3721 4404	KB 13 May 99
Helicarion cuvieri	3844 Jessie Gorge 3823 4479	KB 7 May 99
Helicarion cuvieri	4144 The Gnomon 4190 4409	KB 28 Mar 99
Helicarion cuvieri	4244 Paton Park 4240 4420	KB 27 Mar 99
Helicarion cuvieri	4344 Leven River	Petterd (1879)
Helicarion cuvieri	4744 York Town 4775 4433	Brian Smith 21 June 94 (QVM)
Helicarion cuvieri	4844 Kelso 4815 4470	Kershaw 22 June 85 (QVM)
Helicarion cuvieri	4944 Hillwood 4975 4400	Kershaw 30 Mar 85 (QVM)
Helicarion cuvieri	5144 Retreat 5142 4435	KB 26 Nov 00
Helicarion cuvieri	5444 Mt Stronach 5477 4423	KB 24 May 03
Helicarion cuvieri	5644 Cascade River 5692 4401	KB 30 Jan 96
Helicarion cuvieri	5844 Southern Cross Ck 5818 4474	KB 24 Jan 96
Helicarion cuvieri	6044 Big Lagoon Creek 6050 4401	KB 2 Sep 88
Helicarion cuvieri	3043 Temma 3090 4300	Mesibov 19 Apr 93 (QVM)
Helicarion cuvieri	3143 Big Eel Creek 3180 4303	Mesibov 16 Dec 90 (QVM)
Helicarion cuvieri	3243 Balfour 3251 4303	KB 1 Nov 91
Helicarion cuvieri	3443 Dodds Creek 3433 4384	Mesibov 12 Nov 93 (QVM)
Helicarion cuvieri	3543 Mount Bertha 3597 4338	KB 2 June 99
Helicarion cuvieri	3843 Oonah 3815 4356	KB 25 May 99
Helicarion cuvieri	3943	Smith + Kershaw (1981)
Helicarion cuvieri	4243 Purton Flat 4209 4378	KB 27 Mar 99
Helicarion cuvieri	4343 Champion Park 4337 4370	KB 26 Mar 95
Helicarion cuvieri	4443 Torquay	Petterd (1879)
Helicarion cuvieri	4743 Dazzler Range 4764 4349	D'Orazio 29 June 92 (QVM)
Helicarion cuvieri	4843 Holwell Gorge 4808 4321	KB 11 Jan 97
Helicarion cuvieri	4943 Norfolk Reach 4937 4321	KB 11 Jan 97
Helicarion cuvieri	5043	Smith + Kershaw (1981)
Helicarion cuvieri	5143 Bangor 5139 4380	Daniel Soccol Aug 93 (QVM)
Helicarion cuvieri	5343 Carins Creek 5340 4352	KB 2 Feb 96
Helicarion cuvieri	5443 Ringarooma	Petterd (1879)
Helicarion cuvieri	5543 Hogarth Rivulet 5516 4343	KB 10 Jan 96
Helicarion cuvieri	5743 Rattler Range 5744 4353	Mesibov 1990 (QVM)
Helicarion cuvieri	5943 Goulds Country 5904 4324	KB 27 Oct 90
Helicarion cuvieri	3242 Balfour 3247 4299	KB 1 Nov 91
Helicarion cuvieri	3542 Savage River Pipeline 3558 4227	Coy et al (1993)
Helicarion cuvieri	3842	Smith + Kershaw (1981)
Helicarion cuvieri	3942 St Valentines Peak 3937 4228	W. Lovell 11 Mar 90 (QVM)
Helicarion cuvieri	4342 Castra Rivulet 4306 4295	D'Orazio 2 Feb 93 (QVM)
Helicarion cuvieri	4542 Railton 4507 4268	KB 30 Sep 91

Helicarion cuvieri	4842 Dunkards Creek 4862 4259	KB 8 Mar 97
Helicarion cuvieri	4942 Gravelly Beach	Augustus Simson (QVM)
Helicarion cuvieri	5042	Smith + Kershaw (1981)
Helicarion cuvieri	5142 Prossers Forest 5147 4236	KB 12 Aug 95
Helicarion cuvieri	5642 Mount Victoria 5663 4226	KB 16 Jan 96
Helicarion cuvieri	5742 Mount Victoria 5712 4223	KB 17 Jan 96
Helicarion cuvieri	5842 Rayners Hill 5880 4223	KB 1 Feb 96
Helicarion cuvieri	5942 Ericksons Road 5938 4253	KB 11 Jun 88
Helicarion cuvieri	3341 Leigh River 3352 4198	KB 23 Oct 98
Helicarion cuvieri	3441 Donaldson River 3409 4101	KB 23 Oct 98
Helicarion cuvieri	3741	Smith + Kershaw (1981)
Helicarion cuvieri	3841 Wandle River 3820 4193	Mesibov 27 Oct 91 (QVM)
Helicarion cuvieri	5041 Cataract Gorge 5094 4110	KB 27 June 96
Helicarion cuvieri	5141 Cataract Gorge	Ron Kershaw
Helicarion cuvieri	5241	Smith + Kershaw (1981)
Helicarion cuvieri	5441 Sunset Ridge 5455 4198	KB 6 Feb 96
Helicarion cuvieri	5541 Tombstone Creek 5570 4168	KB 11 Jan 96
Helicarion cuvieri	5641 Mathinna Plains 5623 4196	KB 11 Jan 96
Helicarion cuvieri	5741 Mathinna Falls 5751 4174	KB 15 Jan 96
Helicarion cuvieri	5841 Ryans Creek 5862 4184	KB 1 Feb 96
Helicarion cuvieri	6041 Loila Tier 6035 4177	KB 21 Sep 96
Helicarion cuvieri	3640	Smith + Kershaw (1981)
Helicarion cuvieri	3740 Butler Road 3712 4064	KB 25 Oct 98
Helicarion cuvieri	3840 Waratah 3806 4092	Mesibov 28 Oct 91 (QVM)
Helicarion cuvieri	4440 Gog Range 4461 4058	Mesibov 16 Dec 91 (QVM)
Helicarion cuvieri	4540 Alum Cliffs 4525 4026	KB 28 Mar 98
Helicarion cuvieri	5040	Smith + Kershaw (1981)
Helicarion cuvieri	5840	Smith + Kershaw (1981)
Helicarion cuvieri	5940 South Sister 5977 4011	KB 4 Sep 88
Helicarion cuvieri	3439 Guthrie Creek 3408 3927	KB 23 Oct 98
Helicarion cuvieri	3639	Smith + Kershaw (1981)
Helicarion cuvieri	3939 Mt Cripps 3970 3990	Mesibov 21 Dec 93 (QVM)
Helicarion cuvieri	4039 Vale of Belvoir 4072 3981	Mesibov 21 Dec 93 (QVM)
Helicarion cuvieri	4139 Pencil Pine Creek	Bob Green 20 Apr 80 (QVM)
Helicarion cuvieri	4339	Smith + Kershaw (1981)
Helicarion cuvieri	4539 Chudleigh	Petterd (1879)
Helicarion cuvieri	5639 River Tyne 5652 3987	KB 30 Dec 98
Helicarion cuvieri	5739 Tower Hill 5709 3984	KB 31 Dec 98
Helicarion cuvieri	5939	Smith + Kershaw (1981)
Helicarion cuvieri	6039 St Patricks Head 6035 3964	KB 26 Oct 90
Helicarion cuvieri	3238 Pieman River 3261 3860	Mesibov 1 June 93 (QVM)
Helicarion cuvieri	3338 Pieman River 3397 3855	KB 23 Oct 98
Helicarion cuvieri	3438 Wilsons Road 3401 3816	KB 23 Oct 98
Helicarion cuvieri	3538	Smith + Kershaw (1981)
Helicarion cuvieri	4338 Arm River 4344 3843	KB 21 Sep 01
Helicarion cuvieri	5738 Fingal 5785 3875	D'Orazio 3 Aug 92 (QVM)
Helicarion cuvieri	5838 Valley Road 5894 3836	D'Orazio 3 Aug 92 (QVM)
Helicarion cuvieri	5938 Thompsons Marshes 5990 3838	KB 11 June 88
Helicarion cuvieri	6038 Heritage Falls 6003 3803	KB 28 Oct 90
Helicarion cuvieri	3437 Big Rocky Creek 3418 3710	KB 22 Oct 98
Helicarion cuvieri	3837 Anthony Road 3868 3707	KB 25 Oct 98
Helicarion cuvieri	4137 Oakleigh Creek 4197 3700	KB 9 Jan 1991
Helicarion cuvieri	4237 Mt Oakleigh 4210 3705	KB 11 Jan 91
Helicarion cuvieri	4337 Maggs Mountain	Bob Green (QVM)
Helicarion cuvieri	5437 Brambletye, Conara	Greg Blake 29 Apr 92 (QVM)
Helicarion cuvieri	5537 North of Avoca	Forestry Tasmania

Helicarion cuvieri	5637 St Pauls Dome	Mesibov 28 Nov 01
Helicarion cuvieri	5937 Organ Hill 5991 3725	Mesibov 30 July 88 (QVM)
Helicarion cuvieri	6037 Heritage Falls 6003 3797	KB 28 Oct 90
Helicarion cuvieri	3536 Heemskirk River 3518 3692	KB 22 Oct 98
Helicarion cuvieri	4136 Pelion West 4179 3676	KB 12 Jan 91
Helicarion cuvieri	4236 Mt Oakleigh 4213 3698	KB 11 Jan 91
Helicarion cuvieri	5936 Douglas-Apsley 5965 3662	Mesibov 4 July 88 (QVM)
Helicarion cuvieri	6036 Douglas-Apsley 6018 3685	Mesibov 31 May 88 (QVM)
Helicarion cuvieri	3735 Zeehan 3724 3516	Kershaw 4 Apr 88 (QVM)
Helicarion cuvieri	4835 Hydro Creek 4885 3555	KB 11 May 92
Helicarion cuvieri	5035 Snowy Knob 5017 4533	KB 12 Sep 98
Helicarion cuvieri	5735	Smith + Kershaw (1981)
Helicarion cuvieri	4234 Cynthia Bay 4245 3487	KB 20 Mar 93
Helicarion cuvieri	4534 Pine Tier Lagoon 4576 3403	KB 31 Jan 99
Helicarion cuvieri	5534	Smith + Kershaw (1981)
Helicarion cuvieri	5634 Lake Leake	Dick Bashford (QVM)
Helicarion cuvieri	5734	Smith + Kershaw (1981)
Helicarion cuvieri	6034	Smith + Kershaw (1981)
Helicarion cuvieri	3533 Ocean Beach 3563 3322	KB 15 June 96
Helicarion cuvieri	3633 Hogarth Falls 3633 3318	KB 12 June 96
Helicarion cuvieri	3733	Smith + Kershaw (1981)
Helicarion cuvieri	3933 Bubs Hill	Arthur Clarke 1987
Helicarion cuvieri	4233 Shadow Lake 4289 3383	KB 28 Jan 00
Helicarion cuvieri	4333 Watersmeet 4308 3375	KB 28 Jan 00
Helicarion cuvieri	4533 Derwent Bridge 4513 3338	Kershaw 15 Nov 86 (QVM)
Helicarion cuvieri	4733 Waddamana 4796 3371	KB 31 Jan 99
Helicarion cuvieri	4833 Diamond Tier	Bob Mesibov
Helicarion cuvieri	4933 Steppes 4905 3394	KB 25 Dec 98
Helicarion cuvieri	5033 Alma Pass 5060 3349	KB 4 Apr 92
Helicarion cuvieri	5733 Big Sassy Creek 5746 3332	KB 23 Nov 97
Helicarion cuvieri	6033 Coles Bay 6077 3338	KB Easter 85
Helicarion cuvieri	3632 Teepookana 3655 3273	KB 13 June 96
Helicarion cuvieri	4132 Frenchmans Cap track 4125 322	KB 28 Jan 00
Helicarion cuvieri	4232 King William Saddle 4275 3260	Mesibov 17 Feb 94 (QVM)
Helicarion cuvieri	4432	Forestry Tas (Tarraleah samples)
Helicarion cuvieri	5532	Smith + Kershaw (1981)
Helicarion cuvieri	5632 Tooms White Gum 5693 3234	KB 23 Nov 97
Helicarion cuvieri	5732	Smith + Kershaw (1981)
Helicarion cuvieri	5832 Mayfield Bay 5835 3225	KB 10 Feb 02
Helicarion cuvieri	6032 Hazards Beach 6067 3279	KB Easter 85
Helicarion cuvieri	4031 Frenchmans Cap	B. Mc Causland Apr 1980 (QVM)
Helicarion cuvieri	4431 Mossy Marsh 4496 3155	KB 10 Jan 01
Helicarion cuvieri	4531 Tarraleah 4530 3165	Hickman Jan 54 (QVM)
Helicarion cuvieri	5231 Oatlands	Petterd (1879)
Helicarion cuvieri	5331 Oatlands	Petterd (1879)
Helicarion cuvieri	5631	Smith + Kershaw (1981)
Helicarion cuvieri	5731 Brookerana For Res 5710 3193	KB 23 Nov 97
Helicarion cuvieri	6031 Schouten Island	Rob Taylor c.1992
Helicarion cuvieri	3930 Mt McCall 3973 3077	KB 2 Mar 00
Helicarion cuvieri	4530 Wayatinah 4593 3097	KB 26 Jan 99
Helicarion cuvieri	4730 Dee River 4713 3017	Tim Kingston 12 Oct 95 (QVM)
Helicarion cuvieri	5130	Smith + Kershaw (1981)
Helicarion cuvieri	5630 Maclaines Creek 5688 3015	Mesibov 15 Apr 91 (QVM)
Helicarion cuvieri	5730 Ravens Hill 5709 3034	Mesibov 19 Apr 91 (QVM)
Helicarion cuvieri	3829 Pine Landing 3858 2994	KB 27 Jan 00
Helicarion cuvieri	4529 Tiger Road 4546 2949	KB 31 Jan 99

Helicarion cuvieri	4629 Thunderbolt 4640 2970	Owen Seeman 22 May 00 (QVM)
Helicarion cuvieri	5529 Sand River 5589 2926	KB 5 July 98
Helicarion cuvieri	5629 Buckland 5656 2997	Mesibov 23 Apr 91 (QVM)
Helicarion cuvieri	5729 Orford	Petterd (1879)
Helicarion cuvieri	3628 Hibbs Lagoon	McNiven + West 1991 (QVM)
Helicarion cuvieri	3728 Hobbs Creek 3752 2878	KB 1 Mar 00
Helicarion cuvieri	3928 Perches Lake 3923 2863	Steve Smith 9 Sep 87 (QVM)
Helicarion cuvieri	4028	Smith + Kershaw (1981)
Helicarion cuvieri	4528	Smith + Kershaw (1981)
Helicarion cuvieri	4728 Montos Creek 4732 2814	KB 4 Feb 95
Helicarion cuvieri	4828 Hamilton	Petterd (1879)
Helicarion cuvieri	4928 Gretna 4910 2840	KB 20 Aug 88
Helicarion cuvieri	5528 Prossers Plains	Petterd (1879)
Helicarion cuvieri	5628 Prosser River 5699 2880	KB 26 July 98
Helicarion cuvieri	5728 Prosser River 5709 2880	KB 26 July 98
Helicarion cuvieri	5828 Four Mile Creek 5878 2805	KB 24 Mar 96
Helicarion cuvieri	5928 Bishop + Clerk 5915 2841	KB 17 Nov 00
Helicarion cuvieri	3927	Smith + Kershaw (1981)
Helicarion cuvieri	4027	Smith + Kershaw (1981)
Helicarion cuvieri	4127	Smith + Kershaw (1981)
Helicarion cuvieri	4327 Clear Hill 4398 2740	KB 15 Mar 98
Helicarion cuvieri	4527 Florentine 4513 2707	KB 19 Apr 87
Helicarion cuvieri	4627 Lake Fenton 4691 2748	KB 4 May 91
Helicarion cuvieri	4727 Waterfalls Track 4756 2742	KB 8 Mar 98
Helicarion cuvieri	5027 Mt Dromedary 5097 2705	KB 13 Nov 95
Helicarion cuvieri	5127 Mt Dromedary 5131 2701	KB 13 Nov 95
Helicarion cuvieri	5427 Pawleena 5497 2707	KB 9 Aug 98
Helicarion cuvieri	5527 Nelsons Tier 5559 2712	KB 9 Aug 98
Helicarion cuvieri	5627 Sandspit River 5690 2711	KB 6 Oct 90
Helicarion cuvieri	5727 Wielangta 5704 2727	KB 3 Sep 94
Helicarion cuvieri	3926	Smith + Kershaw (1981)
Helicarion cuvieri	4026	Smith + Kershaw (1981)
Helicarion cuvieri	4126 Serpentine Dam 4173 2655	KB 27 Jan 01
Helicarion cuvieri	4426 Ragged Range 4443 2626	KB 15 Mar 98
Helicarion cuvieri	4526 Needles Shelter 4514 2655	KB 2 Mar 86
Helicarion cuvieri	4626	Smith + Kershaw (1981)
Helicarion cuvieri	4726	Smith + Kershaw (1981)
Helicarion cuvieri	5026 Mt Dromedary 5088 2696	KB 13 Nov 95
Helicarion cuvieri	5126 Mt Dromedary 5103 2697	KB 13 Nov 95
Helicarion cuvieri	5226 Catchpole Gully 5284 2627	KB 7 June 90
Helicarion cuvieri	5326 Basin Hills 5302 2614	KB 28 Dec 00
Helicarion cuvieri	5426 Sorell	Legrand (1871)
Helicarion cuvieri	5526 White Hill 5556 2613	KB 24 Feb 02
Helicarion cuvieri	5626 Wielangta Road 5687 2683	KB 1 Apr 91
Helicarion cuvieri	5726 Bream Creek 5708 2639	KB 14 Nov 92
Helicarion cuvieri	4125	Smith + Kershaw (1981)
Helicarion cuvieri	4325 Wedge River 4370 2543	KB 28 Jan 01
Helicarion cuvieri	4425 Creepy Crawley 4497 2580	KB 9 Apr 88
Helicarion cuvieri	4525 Weld River 4562 2590	Steve Smith 16 Nov 86 (QVM)
Helicarion cuvieri	4725 Styx River 4724 2596	KB 9 Dec 01
Helicarion cuvieri	5025 Ringwood Track 5068 2557	KB 22 July 95
Helicarion cuvieri	5125 Goat Hills 5180 2570	KB 20 Dec 88
Helicarion cuvieri	5225 Knocklofty 5240 2521	KB 17 Apr 00
Helicarion cuvieri	5325 Craigow Hill 5335 2595	KB 9 Oct 93
Helicarion cuvieri	5725 Lagoon Bay 5782 2524	KB 8 Oct 94
Helicarion cuvieri	4024	Smith + Kershaw (1981)

Helicarion cuvieri	4224 West shore Lake Pedder	QVM records
Helicarion cuvieri	4424 Condominium Creek 4479 2434	KB 9 Apr 88
Helicarion cuvieri	4524	Smith + Kershaw (1981)
Helicarion cuvieri	4624	Smith + Kershaw (1981)
Helicarion cuvieri	4724 Lake Skinner 4750 2455	KB 10 Feb 88
Helicarion cuvieri	5024 Mt Misery	Bob Mesibov
Helicarion cuvieri	5124 Neika 5195 2455	KB 14 Feb 90
Helicarion cuvieri	5224 Mt Nelson-Taroona 5285 2468	KB 11 Feb 87
Helicarion cuvieri	5524 Lime Bay 5582 2437	KB 7 Dec 02
Helicarion cuvieri	5724 Richardsons Road 5783 2466	KB 6 July 97
Helicarion cuvieri	4223 Folded Range 4294 2353	J. Friend 16 Feb 87 (QVM)
Helicarion cuvieri	4423 Scotts Peak 4424 2345	KB 9 Apr 88
Helicarion cuvieri	4623 Mt Weld 4655 2383	Doran/Bashford 2002 (QVM)
Helicarion cuvieri	4723 Reuben Falls 4720 2369	Bashford 17 Jan 95 (QVM)
Helicarion cuvieri	4823	Smith + Kershaw (1981)
Helicarion cuvieri	4923 Bermuda Hill 4916 2321	KB 8 Jul 95
Helicarion cuvieri	5123 Pelverata Falls 5107 2332	KB 23 Feb 86
Helicarion cuvieri	5223 Margate	Legrand (1871)
Helicarion cuvieri	5523	Smith + Kershaw (1981)
Helicarion cuvieri	5623 Koonya	Kershaw 12 Apr 77 (QVM)
Helicarion cuvieri	5723 Camp Falls 5772 2315	KB 18 Apr 01
Helicarion cuvieri	4422 Junction Creek 4406 2278	KB 28 Feb 99
Helicarion cuvieri	4622 Blakes Opening 4696 2287	KB 5 Apr 98
Helicarion cuvieri	4722 Tahune Park 4772 2284	KB 6 Apr 86
Helicarion cuvieri	4822	Smith + Kershaw (1981)
Helicarion cuvieri	5022 Tobys Hill 5098 2223	KB 18 Dec 02
Helicarion cuvieri	5122 Snug Tiers 5125 2297	KB 7 May 94
Helicarion cuvieri	5222 Barnes Bay	Legrand (1871)
Helicarion cuvieri	5622 Palmers Lookout 5676 2209	KB 15 Feb 01
Helicarion cuvieri	5722 Fortescue Bay 5785 2226	KB 13 Jan 86
Helicarion cuvieri	4121	Smith + Kershaw (1981)
Helicarion cuvieri	4721 Cook Creek 4708 2180	KB 11 Feb 95
Helicarion cuvieri	4821 Kermandie River 4896 2167	Bashford 21 Dec 95 (QVM)
Helicarion cuvieri	5121 Garden Island Creek 5148 2157	KB 22 Nov 98
Helicarion cuvieri	5221 Bruny Island	Legrand (1871)
Helicarion cuvieri	5321 Church Hill 5328 2125	KB 4 Aug 00
Helicarion cuvieri	5621 Remarkable Cave 5685 2178	KB 30 Jan 86
Helicarion cuvieri	5721 Safety Cove 5701 2181	KB 11 Feb 86
Helicarion cuvieri	4920 Francistown 4989 2053	KB 27 Sep 87
Helicarion cuvieri	5020 Esperance 5022 2009	KB 26 Dec 85
Helicarion cuvieri	5120 Garden Island	Legrand (1871)
Helicarion cuvieri	5220 Cooleys Gully 5259 2039	KB 6 Apr 01
Helicarion cuvieri	4219 Melaleuca Inlet 4298 1956	KB 15 Jan 91
Helicarion cuvieri	4319 Melaleuca 4323 1923	KB 14 Jan 91
Helicarion cuvieri	4819 Thermal Pool 4896 1929	KB 9 Nov 96
Helicarion cuvieri	5119 Mickeys Bay 5153 1913	KB 23 May 98
Helicarion cuvieri	5219 Mt Mangana 5232 1985	KB 13 Jan 86
Helicarion cuvieri	4318 Half Woody Hill 4338 1889	Brian Smith 5 Mar 92 (QVM)
Helicarion cuvieri	4518 New River 4592 1802	Mesibov 26 Jan 94 (QVM)
Helicarion cuvieri	4618 Precipitous Bluff	Arthur Clarke 1988
Helicarion cuvieri	4818 Moonlight Ridge 4872 1870	KB 11 Nov 89
Helicarion cuvieri	4918 Ida Bay 4932 1892	KB 6 Dec 92
Helicarion cuvieri	5118 Taylors Bay	Legrand (1871)
Helicarion cuvieri	4417 De Witt Island 4482 1733	Steve Smith 14 Dec 87 (QVM)
Helicarion cuvieri	4717 Blackhole Plain	Tim Hume (QVM)
Helicarion cuvieri	4817 South Cape Bay 4871 1716	KB 12 Mar 00

Helicarion cuvieri	4917 Rescherche Bay	Legrand (1871)
Helicarion rubicundus	5724 Richardsons Road 5783 2466	KB 6 July 97
Helicarion rubicundus	5723 Tessellated Pavement 5759 237	KB 10 Nov 85
Helicarion rubicundus	5722 Balts Road	Helen Otley 1999 (FPB records)
Austrochloritis victoriae	2360 The Springs	Petterd and Hedley (1909)
Austrochloritis victoriae	2460 Lake Martha Lavinia 2481 6068	KB 14 Dec 96
Austrochloritis victoriae	2457 South of Pegarah	George Cunningham 1998
Austrochloritis victoriae	2557 Naracoopa 2515 5784	KB 25 Sep 98

8.2 APPENDIX 2 JOHNSTON'S TABLE, UPDATED FOR THESIS SPECIES LIST

This appendix is a version of the appendix given by Petterd (1879) and prepared by R.M. Johnston, with the species names used in this thesis used, and records re-allocated where necessary.

Key to symbols: a. common, b. not common, c. rare (from original), ? = dubious record (either original or in this thesis, includes cases where it is not clear which species this record refers to), * = record discounted in this thesis. The evaluations a, b and c are taken from Johnston's original.

	ISLANDS IN BASS STRAIT	RINGAROOMA	BLUE TIER	MYRTLE BANK/BEN LOMOND	LAUNCESTON	ST PATRICKS RIVER	MT WELLINGTON, HUON	RECHERCHE BAY	ORFORD	HAMILTON	OATLANDS	PORT DAVEY	MACQUARIE HARBOUR	PIEMAN	CIRCULAR HEAD	MT BISCHOFF, SURREY HILLS	TABLE CAPE, EMU BAY	GADS HILL, MIDDLESEX PLAINS	"LEVEN AND TORQUAY"	CHUDLEIGH	# LOCALITIES
Succinea australis	a	a			a		a		a						a				a		7
Victaphanta milligani													a		a	c					3
Victaphanta lampra		a	a	a	a	a									a	a	a	a	a	a	11
Tasmaphena lamproides															b						1
Tasmaphena sinclairi					c		b	a					a		c	a	a		b	a	9
Tasmaphena quaestiosa											a										1
Tasmaphena ruga					a		a	b	a						b				c		6
Tasmaphena "Whinray"	b																				1
Prolesophanta "Marriotts"												?				?					?
Prolesophanta nelsonensis		*	*		a		c	a				*				*		c	a	c	6
Prolesophanta "Strzelecki"		p	p																		2
Prolesophanta "Togari"															c						1
Prolesophanta "Francistown"												?									?
Prolesophanta dyeri					b											b				b	3
Caryodes dufresnii	*	a	a	a	a	a	a	a	a	a	a	a	a	a	a	c	a	a	a	a	19
Anoglypta launcestonensis		a	a	a		a															4
Bothriembryon tasmanicus								a	a			a	a						a		5
Paralaoma caputspinulae					a		a								a		a		a	b	6
Paralaoma halli		a			a		a	a							a	a	a	a	a	a	10
Pedicamista coesa	*							a							a						2
Pasmaditta jungermanniae					a																1
Laomavix collisi	a						a								a		a		a		5
Miselaoma weldii															a						1
Trocholaoma parvissimia		c			c		c									a		c			4
Trocholaoma spiceri		*					c									c					3
Magilaoma penolensis	a														a		a		a		4
Planilaoma luckmanii					a		a										a				3
Discocharopa mimosa					c											c				c	3
Discocharopa vigens							c														1
Discocharopa lottah					c																1
Charopidae Skemps				b																	1
Allocharopa legrandi							a?	a	?						a	b	a	b	a?	a?	7
Allocharopa kershawi					a	a															2
Allocharopa tarravillensis															c						1
Allocharopa "Wellington"							c														1
Elsothera ricei		a			a		a?		a		a						?	?	a?	a?	6

	ISLANDS IN BASS STRAIT	RINGAROOMA	BLUE TIER	MYRTLE BANK/BEN LOMOND	LAUNCESTON	ST PATRICKS RIVER	MT WELLINGTON, HUON	RECHERCHE BAY	ORFORD	HAMILTON	OATLANDS	PORT DAVEY	MACQUARIE HARBOUR	PIEMAN	CIRCULAR HEAD	MT BISCHOFF, SURREY HILLS	TABLE CAPE, EMU BAY	GADS HILL, MIDDLESEX PLAINS	"LEVEN AND TORQUAY"	CHUDLEIGH	**# LOCALITIES**
Elsothera limula			a	b	b										b?	b?	b	b		a	**7**
Pernagera kingstonensis					a		c	a								a		a		a	**6**
Pernagera officeri	a	a	a		a		c								a		a		a		**8**
Pernagera architectonica							c														**1**
Pernagera tasmaniae							a														**1**
Pernagera "Waratah"																a					**1**
Dentherona dispar							c									a				a	**3**
Dentherona subrugosa			c	a			c													a	**4**
Roblinella agnewi							c														**1**
Roblinella gadensis																a		a			**2**
Roblinella roblini					c																**1**
Roblinella curacoae					b		c	c													**3**
Geminoropa hookeriana																c					**1**
Geminoropa antialba																a		a			**2**
Letomola barrenense	b														*						**1**
Bischoffena bischoffensis																a		a			**2**
Oreomava johnstoni																c					**1**
Thryasona diemenensis	a	a	a	a	a	a	a	a				a	a		a	a	a	a	a	a	**16**
Thryasona marchianae					a		b												c		**3**
Mulathena fordei							c	a				c				c					**4**
Stenacapha vitrinaformis							c														**1**
Stenacapha savesi															c						**1**
Stenacapha ducani																a	a	a	a		**4**
Stenacapha hamiltoni		a		a	a		a	a					a		a	a	a	a	a	a	**12**
Helicarion cuvieri	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	**20**

8.3 APPENDIX 3 PROVISIONAL ALLOCATION OF SPECIES TO GENERA

This appendix gives a provisional and very rough allocation of species listed in this thesis to existing or new genera, based largely on comments made in the 'Taxonomy' section under each species in Chapter 4. For those families containing new genera these are indicated by the first letter of the family name followed by a number, and the same practice is used for unclear genera (groups of species that may belong to existing genera or may represent a new genus) within each family.

SUCCINEIDAE (1 genus)

Succinea

Succinea australis

PUPILLIDAE (1 genus)

Pupilla

Pupilla australis

RHYTIDIDAE (5-6 genera)

Victaphanta

Victaphanta milligani

Victaphanta "W Arthurs"

Unclear R1 (probably Victaphanta or Strangesta)

Victaphanta lampra

Tasmaphena

Tasmaphena sinclairi

Tasmaphena ruga

Tasmaphena quaestiosa

Austrorhytida

Tasmaphena lamproides

Austrorhytida sp. "Raffertys"

New genus R1

Tasmaphena sp. "Whinray"

Prolesophanta

Prolesophanta dyeri

Prolesophanta nelsonensis

Prolesophanta sp. "Marriotts"

Prolesophanta sp. "Strzelecki"

Prolesophanta sp. "Francistown"

Prolesophanta sp. "Togari"

CARYODIDAE (2 genera)

Caryodes

Caryodes dufresnii

Anoglypta

Anoglypta launcestonensis

BULIMULIDAE (1 genus)

Bothriembryon

Bothriembryon tasmanicus

PUNCTIDAE (10-13 genera)

Gratilaoma

Paralaoma halli

Paralaoma

Paralaoma caputspinulae

New genus P1

Paralaoma mucoides

Unclear P1

Paralaoma sp. "Hartz"

Pasmaditta

Pasmaditta jungermanniae

Pasmaditta sp. "Blue Tier"

Pedicamista

Pedicamista coesus

Pedicamista sp. "Southport"

Unclear P2

Pedicamista sp. "Chisholm"

Unclear P3

Pedicamista sp. "Bull Hill"

Laomavix

Laomavix collisi

Miselaoma

Miselaoma weldii

Trocholaoma

Trocholaoma parvissima

New genus P2

Trocholaoma spiceri

Magilaoma

Magilaoma penolensis

CHAROPIDAE (25-31 genera)

Planilaoma

Planilaoma luckmanii

Unclear C1

Planilaoma "Pelverata"

Planilaoma "Breaksea"

New genus C1

Discocharopa mimosa

Unclear C2

Discocharopa lottah

New genus C2

Discocharopa vigens

Elsothera

Elsothera limula

Elsothera ricei

Allocharopa

Allocharopa legrandi

Allocharopa kershawi

Allocharopa "Wellington"

Allocharopa tarravillensis

Allocharopa sp. "Franklin"

Allocharopa sp. "Ravens Hill"

Allocharopa sp. "Mc Gregors"

Allocharopa sp. "Sandspit"

Allocharopa sp. "Victoria Valley"

Allocharopa sp. "Mystery Creek"

Allocharopa sp. "Christ College"

Allocharopa sp. "Douglas"

Allocharopa sp. "Teepookana"

Allocharopa sp. "Junee"

Allocharopa sp. "Pelverata"

Allocharopa sp. "Dromedary"

Allocharopa sp. "Quarry"

Pernagera

Charopidae sp. "Skemps"

Pernagera kingstonensis

Pernagera officeri

Pernagera sp. "Paradise"

New genus C3

Pernagera architectonica

Pernagera tasmaniae

Roblinella agnewi (possible)

New genus C4

Pernagera sp. "Waterfall"

Unclear C3

Pernagera "Waratah"

Dentherona

Dentherona dispar

Dentherona subrugosa

New genus C5

Geminoropa hookeriana

Unclear C4

Geminoropa "Hastings"

Geminoropa

Geminoropa antialba

Geminoropa sp. "Moonlight"

New genus C6

Roblinella gadensis

"*Elsothera*" sp. "Needles" (possible)

Roblinella sp. "Mystery" (possible)

Roblinella

Roblinella roblini

Roblinella sp. "Bubs Hill" (probable)

Roblinella sp. "Tahune"

Unclear C5 (Possibly Geminoropa or Roblinella)

Roblinella sp. "Bishop"

Unclear C6 (Possibly Geminoropa or Roblinella)

Roblinella sp. "Flash Tier"

New genus C7

Roblinella curacoae

Pillomena

Pillomena dandenongensis

Bischoffena

Bischoffena bischoffensis

Oreomava

Oreomava johnstoni

Oreomava sp. "Hibbs Lagoon"

New genus C8

Letomola barrenensis

New genus C9

Thryasona marchianae

Thryasona sp. "Wedge"

Thryasona

Thryasona diemenensis

Mulathena

Mulathena fordei

New genus C10

Flammulops cf. *excelsior*

Stenacapha

Stenacapha hamiltoni

Stenacapha ducani

Stenacapha savesi

Stenacapha sp. "Hunter"

Stenacapha "vitrinaformis" (Possibly different genus)

New genus C11

"*Stenacapha*" sp "Flinders"

New genus C12

Charopidae sp. "Swallet"

CYSTOPELTIDEA (1 genus)

Cystopelta

Cystopelta petterdi

Cystopelta bicolor

HELICARIONIDAE (1 genus)

Helicarion

Helicarion cuvieri

Helicarion rubicundus

CAMAENIDAE (1 genus)

Austrochloritis

Austrochloritis victoriae

In total, the fauna of 106 species is considered likely to include between 48 and 58 genera.