AN ILLUSTRATED GUIDE TO THE LAND MOLLUSCA OF THE TE PAKI ECOLOGICAL REGION, NORTHLAND, NEW ZEALAND

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SUMMARY

One hundred and five species of terrestrial mollusca are recorded from the Te Paki Ecological Region. Most recorded species are illustrated. Specimens of the large land snails *Placostylus* and *Paryphanta* were not sought and only recorded when seen. Forty-five of the recorded species have not yet been named, and two, *Phrixgnathus* cf. *alfredi* and Punctid n.sp.a, are recorded for the first time in this paper. The Te Paki Ecological Region is special because of the high level of endemism of land mollusca found within it - thirty-four species are not known outside of this region. Four introduced species are present, with *Helix aspersa* present in the sandhills in huge numbers.

INTRODUCTION

The collection of mollusca by the three authors was carried out independently over a four year period, between 27 May 1987 and 13 May 1991. Parrish and Mayhill combined on a visit in March 1988 but generally collected in different areas. A total of 74 sites were collected (Appendix 1, Fig. 1).

Previous published papers on the molluscs of the Far North have been primarily taxonomic or pertaining to a single species e.g. *Placostylus ambagiosus*. Gardner (1967) after describing some new species from the Far North, gives a list of small species present at Te Paki and discusses earlier records made by Suter and Powell. The only other report on the distribution of micro land snails at Te Paki is Ogle et al. (1985). They record 51 species but the main thrust of their report is to relate snail numbers to vegetation types. They record the importance of manuka and particularly kanuka as a snail habitat in some areas and note the scarcity of snails in the "gumlands".

Our survey, while acknowledging the importance of the manuka and kanuka habitat, found that the larger, mainly unmodified forest remnants contained the greatest diversity of species e.g. Radar Bush (49 species), Unuwhao (47), Kohuronaki (41), Haupatoto Bush (32) and Whareana (31).

The nomenclature used in this paper is based upon Powell (1979), while the

numbering system of punctidae are those designated by Dr F.M. Climo. Although many species are not named, they have been known for some time by informal names and recognised by collectors through information correlated and distributed freely by Dr. Climo, who has also identified most of the snails in this survey. The area covered by this report is the Te Paki Ecological Region (McIntyre 1987), which covers the northern end of the Aupouri Peninsula, Northland (Fig. 1).

The Cape Maria van Diemen-North Cape block was isolated from the Northland mainland in past interglacial periods. The present low hilly topography was dissected from a former peneplain which has left remnant plateau surfaces, a cliffed northern coastline and a number of peaty swamps. The Cape Maria van Diemen and North Cape headlands are joined to the remainder by consolidated sand tombolos. The underlying rocks consist of Cretaceous basalts, flanked by Cretaceous, Oligocene and Miocene sediments with remnants of Pleistocene sands on some plateau surfaces and dune sands in the west. Basaltic, gabbroic and ultramafic rocks occur at Surville Cliffs with distinctive lateritic soils on them.

The area was extensively forested in pre-human times with kauri and broadleaf forest which is now reduced to small remnants surrounded by extensive scrub and regenerating forest. Southern and western parts of the region have been converted to pasture and pine plantations. The flora of the region has some plant species with subtropical affinities (*Cassythia, Todea, Ipomoea*) and species which are relics of past glacial periods (*Dacrydium colensoi, Podocarpus halli, Neomyrtus pedunculata*). The ultramafic derived soils of Surville Cliffs support a number of endemic (mostly subspecific) plant species (McIntyre 1987).

METHODS

The collection method was to search by naked eye leaf litter, the leaf bases of monocotyledon plants, beneath rocks, logs and bark and remove suitable litter for later sorting under a good light. Collection methods were not standardised and do not allow statistical comparisons of species diversity or abundance, although they do provide an indication. The collection sites were not predetermined by the authors, but were selected in the field as access and opportunity allowed. Generally the areas of forest remnants were targeted, as previous experience shows that these sites contain the greatest diversity and abundance of indigenous land snails.

Micro snail shells were also obtained by sorting through a sludge of soil and litter that we washed out of shells of *Placostylus ambagiosus* that had been collected by C. Smuts-Kennedy in February 1988.

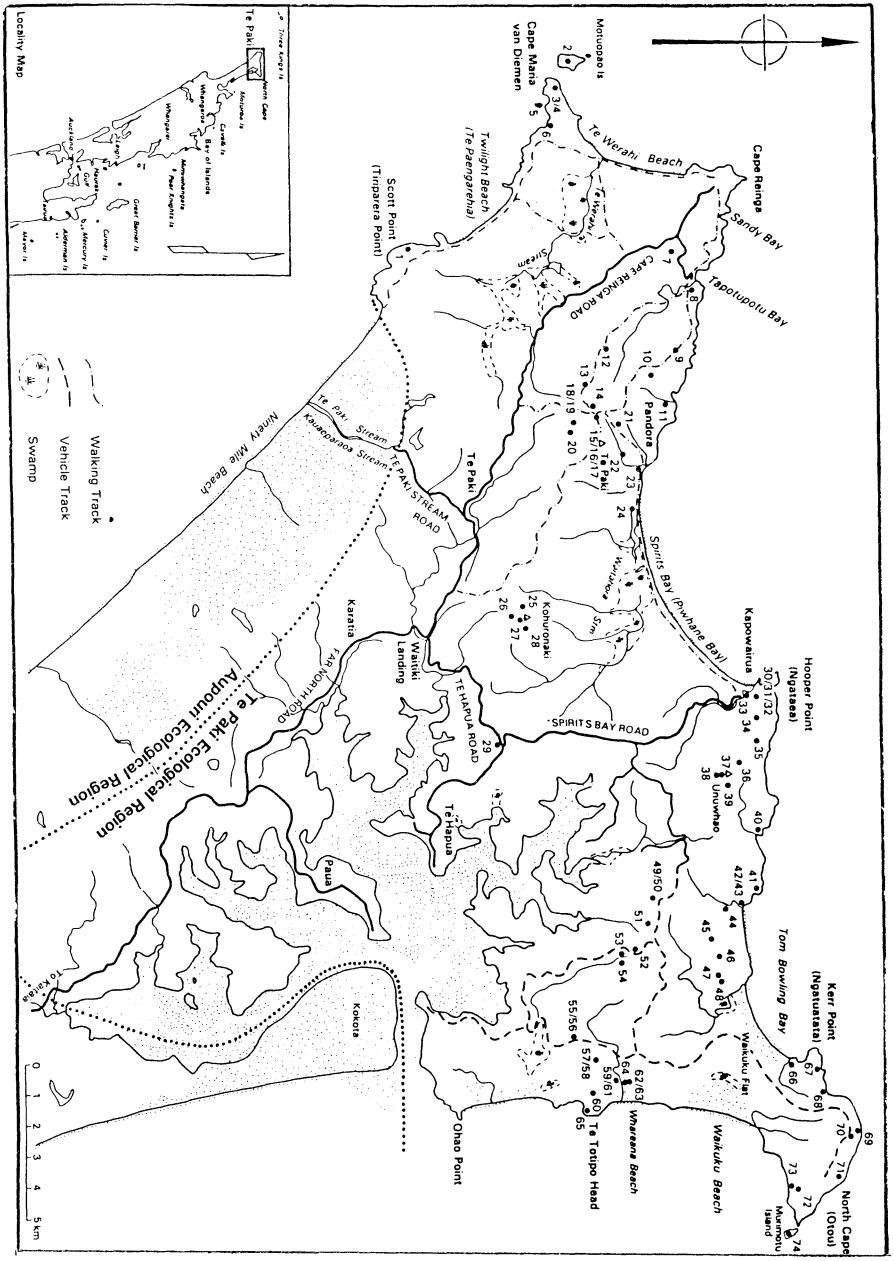


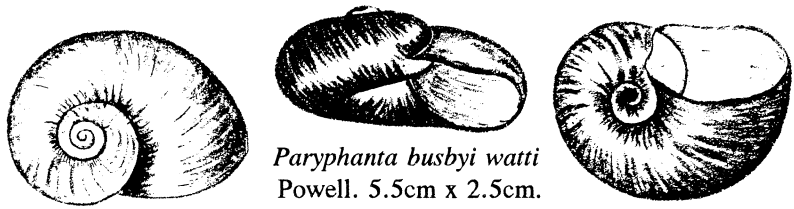
Fig. 1. Land mollusc study sites, Te Paki Ecological Region.

RESULTS

A total of 93 native landsnail species and subspecies, 2 introduced species, 1 marine species, 1 freshwater species and one slug were collected by the authors. *Austrosuccinea archeyi, Oxychilus* sp. and *Candidula intersecta* were noted but not collected. Additional records of species from previous collections include: *Tornatellides subperforata,* Punctid n.sp. 'north cape', *Phrixgnathus serratocostatus, Vallonia excentrica.* A full species list is given in Appendix 2 together with sites at which species were found and the numbers taken.

Illustrations of species are provided except for the leaf-vein slug (*Athoracophorus* sp.), and two snails which look almost identical to sister species (*Cytora pallida* and *Paracharopa* cf. *delicatula*).

ILLUSTRATION OF SPECIES



Paryphanta busbyi watti Powell. 5.5cm x 2.5cm.

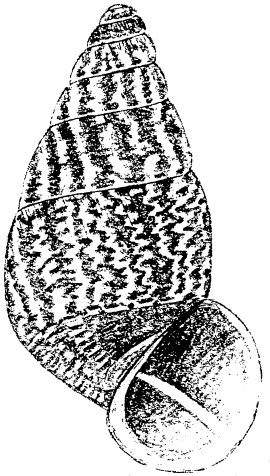
This subspecies must be regarded as highly threatened, for predation by pigs and rats is severe and populations are very low.

Placostylus ambagiosus ambagiosus Suter

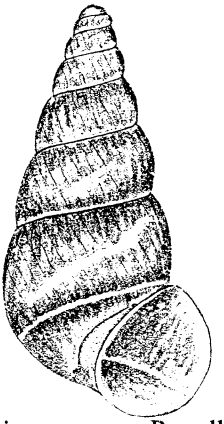
ambagiosus gardneri Powell

ambagiosus annectens Powell

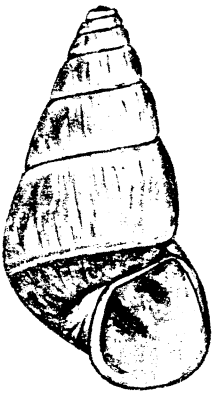
These magnificent snails (Sherley and Parrish 1989) occur in distinct colonies, each developing different shell features. Three subspecies with differing aperture details are illustrated, but differences also occur in size and colour. More than 15 distinct subspecies, both living and subfossil, have been noted. *P.a.ambagiosus* is 7.4cm x 3.5cm. *P.a.gardneri* is a subfossil. *P.a.annectens* is the largest of the mainland species which can grow to 9cm in length.



Liarea aupouria aupouria Powell, 11.8mm x 6mm.



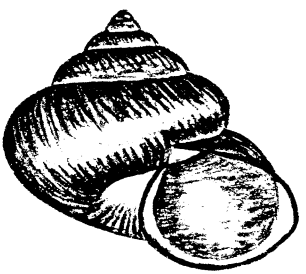
Liarea a. tara Powell 10.5mm x 4.5mm, Kerr Point.

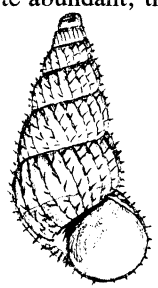


Liarea a. aupouria Powell, 10.5mm x 5mm, fossil consolidated dunes Cape Maria van Diemen collected A.W.B.Powell.

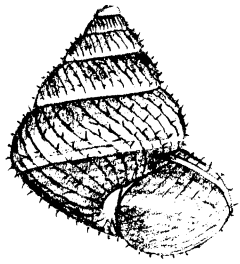
L.a.aupouria is the largest of the Liareas and is common across the area though it is replaced at North Cape by *L.a.tara.* It does seem to require a certain level of cover and was not present at marginal sites. In this regard manuka is not always a sign of modification at Te Paki and often shelters a rich diversity of snails. Old kanuka can also be nearly equated with full broadleaf forest as far as the snails are concerned (Ogle et al. 1985). The fossil *L.a.aupouria* shown above is wider proportionately than the other species, with a different shaped aperture. Our collecting shows that *L.a.tara* is not restricted to the North Cape, as it turned up at sites further west.

Cytora ampla (Powell), 6mm x 6mm, Unuwhao. This is the largest snail of the genus. It is endemic to the Te Paki Ecological Region, and quite abundant, though our survey did not find it at North Cape.

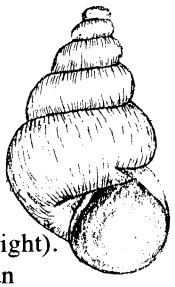




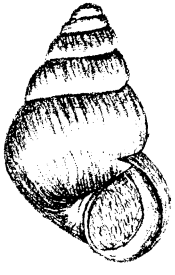
Cytora hispida Gardner, 1.4mm x 3.4mm, Tapotupotu. Another endemic which is reasonably abundant. The genus *Cytora* occurs throughout New Zealand but is nowhere as diverse as in the Far North, where there are six species, four of which are endemic.



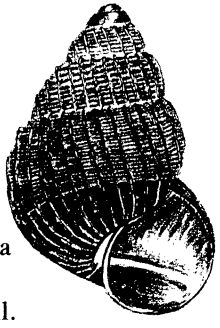
Cytora kerrana Gardner, 2.8mm x 3.8mm. Powell (1979) synonomised *C.kerrana* with *C.pallida,* on N.Gardner's advice. In outline the two shells are identical but there does seem to be a big difference in the nature of their respective epidermal processes. We have restored the species here and in fact record a *C.pallida* (genuine) as well, (though not figured).



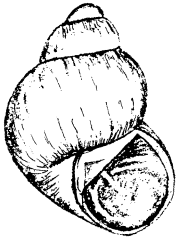
Cytora torquilla (Suter), 1.3mm x 1.8mm, Radar Bush (top right). Not at all common and it seems a bit shorter and dumpier than southern shells.



Cytora tepakiensis Gardner, 1.4mm x 2.5mm, Unuwhao. This has a sporadic distribution but is abundant in places. It is abundant on Motuopao Island, Murimotu Island and Unuwhao, so it can hardly have a habitat preference. Site modification always favours one species over another but seasonal breeding patterns can produce flushes.

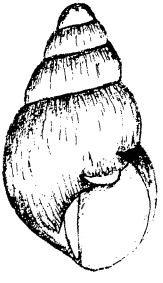


RIGHT: *Cytora* cf. *fasciata* (Suter), 2mm x 3.2mm. We only found this at Radar Bush, but it is not uncommon around South Hokianga and the specimen figured came from there. It has a distinctive and ornate shell.

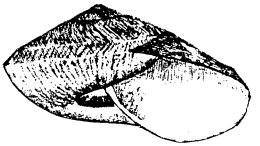


LEFT: *Omphalorissa purchasi* (Pfeiffer), 1.4mm x 1.9mm, site 15. This is surprisingly abundant and points to a reasonable rainfall.

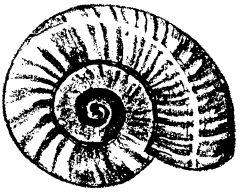
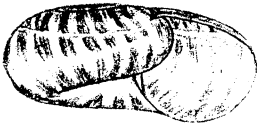
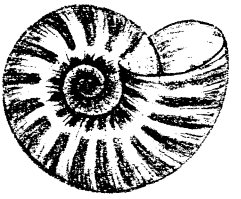
RIGHT: *Tornatellides subperforata* (Suter), 1.8mm x 2.8mm. There is only the one record of this species, which is the one drawn, from Cape Reinga, collected by S.Turner (from N.Gardner's collection). Our present survey did not actually sample the environs of Cape Reinga. It is mainly a coastal species.



Tornatellinops novoseelandica (Pfeiffer), 1.4mm x 2.8mm, Maungapika. A hardy prolific species, particularly in coastal situations which it often shares with the previous snail. Perhaps not quite at home in the deepest bush.

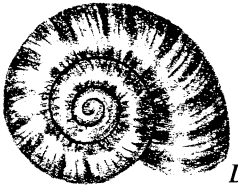
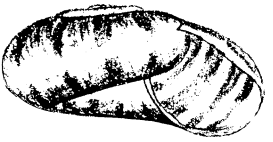
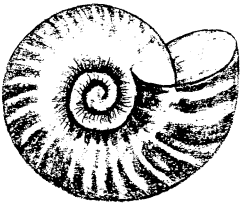


Rhytidarex duplicata (Suter), 1.9cm x 1cm, Waihi Stream. Because our survey relied on finding small species in leaf litter, the figures in the table for *Rhytidarex* could be misleading. It does appear to be much more abundant than our numbers allow, and it is common in the subfossil deposits. Some of these deposits have produced much larger shells than can be found today.

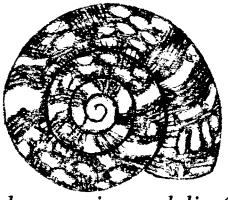
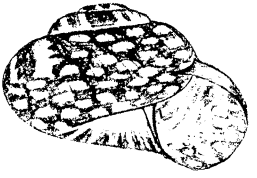
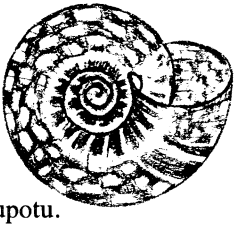
Delos cf. *coresia* (Gray), 3.8mm x 2mm, site 17.

The distinctive feature of the dominant *Delos* is the narrow yellow band spiralling the shell. This spiral is prominent against the red radial bands and it even shows on washed out specimens.

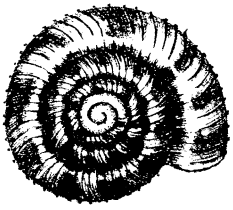
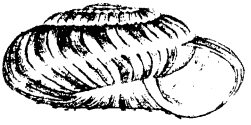
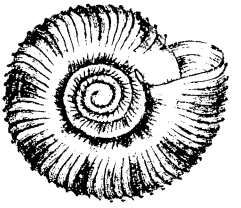
Delos cf. *coresia* 4.3mm x 2mm.

This is a reddish variation, without the yellow spiral, found only at Tapotupotu.

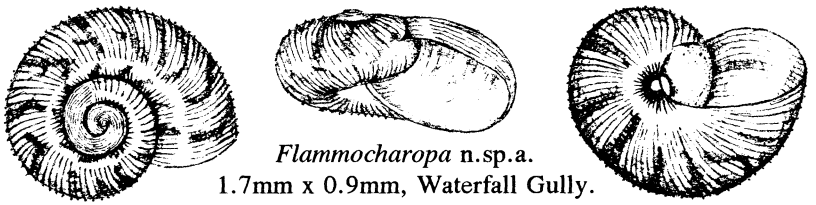
Delouagapia cordelia (Hutton), 5.8mm x 4mm, Tapotupotu.

D. Roscoe reports a subspecies in the far west of the region, but all our available specimens looked the same.

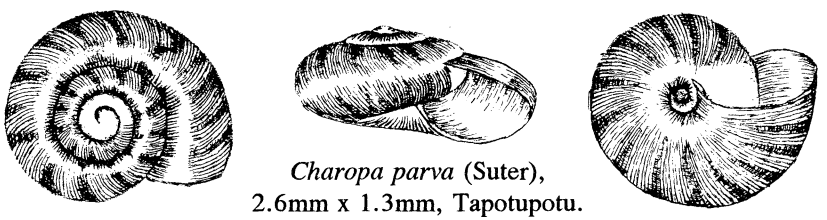
Charopa coma (Gray), 4.5mm x 2.2mm, Unuwhao.

Common throughout New Zealand but apparently rare in this region.



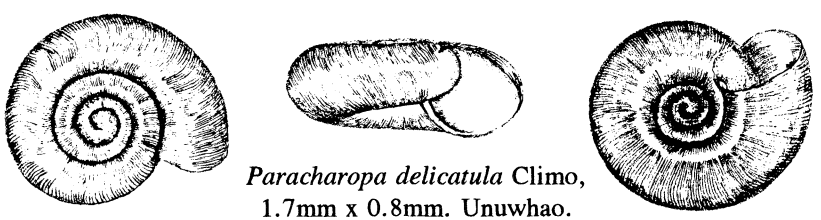
Flammocharopa n.sp.a.
1.7mm x 0.9mm, Waterfall Gully.

There is a group of these tiny *F. costulata*-type snails in the northern half of the North Island and some of them are quite rare. A coarser ribbed variation was found at two sites but this has not been illustrated. Lack of material has hampered study of the group though the form illustrated here is common.



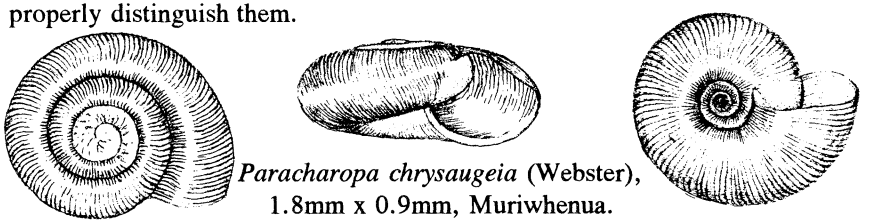
Charopa parva (Suter),
2.6mm x 1.3mm, Tapotupotu.

This is a widespread species which, with its relative *C. pilsbryi,* occurs throughout New Zealand. We only found a single specimen in this region however, and the one drawn was the only specimen in N.Gardner's collection.



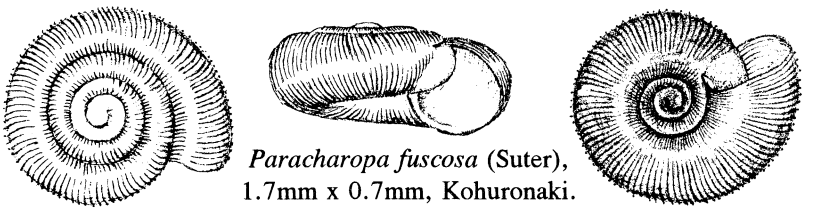
Paracharopa delicatula Climo,
1.7mm x 0.8mm. Unuwhao.

This is a prominent snail in the Te Paki Region, though it can also be found further south. It seems to be present in several colour forms but it is hard to properly distinguish them.



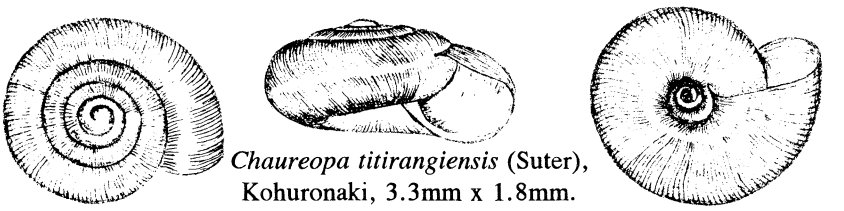
Paracharopa chrysaugeia (Webster),
1.8mm x 0.9mm, Muriwhenua.

A fairly common snail in North Auckland but we only found it at one site in this region. The genus can be recognised by the crinkly radials on the protoconch.



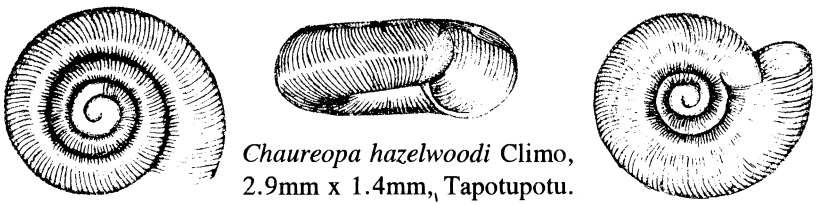
Paracharopa fuscosa (Suter), 1.7mm x 0.7mm, Kohuronaki.

This was not common and seemed to favour the area west of Spirits Bay. It seems more tightly coiled than typical *P. fuscosa* and the colour is more golden than reddish, but the specimens we found were fairly old.



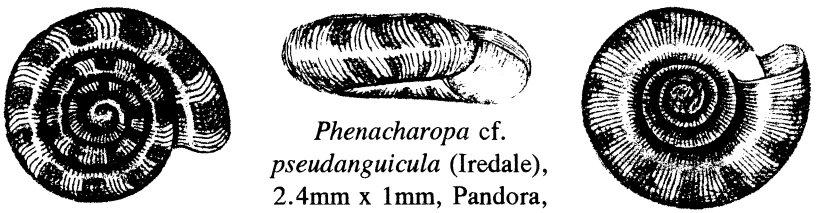
Chaureopa titirangiensis (Suter), Kohuronaki, 3.3mm x 1.8mm.

Uncommon. The specimens seen had variable umbilical widths. The illustrated specimen, from N.Gardner's collection, has the narrowest umbilicus seen.

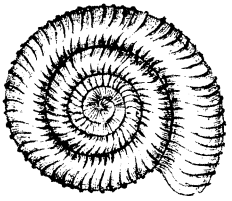
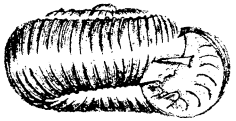
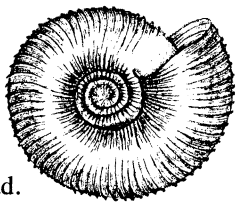


Chaureopa hazelwoodi Climo, 2.9mm x 1.4mm, Tapotupotu.

Our survey specimens were all juvenile and hard to identify, but this one illustrated was found subsequently and more distinctive. The genus can be identified by a large, smooth, shiny protoconch.

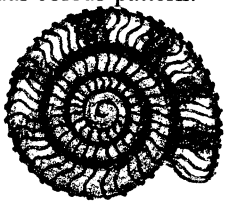
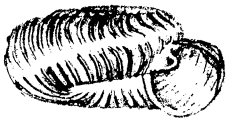
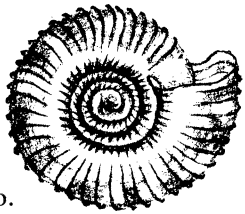


Phenacharopa cf. *pseudanguicula* (Iredale), 2.4mm x 1mm, Pandora, collected by N.Gardner. This undescribed species is widespread in New Zealand and has a flatter spire, closer ribs and wider umbilicus than *P. pseudanguicula.*

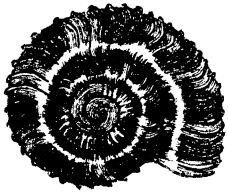
Huonodon hectori (Suter),
1.7mm x 0.8mm, Pandora Road.

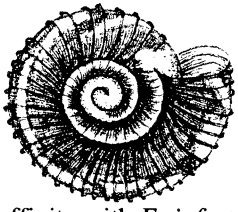
Found throughout New Zealand. All the shells we saw were plain without the usual colour pattern.

Fectola mira (Webster),
2.5mm x 1.3mm, Unuwhao.

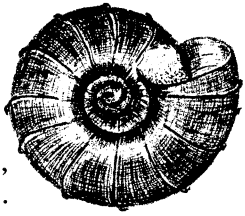
Quite common but the parietal lamella at the base of the columella is tucked around the corner and hard to find.





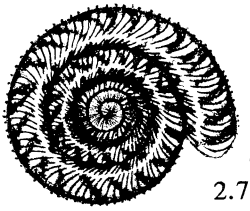
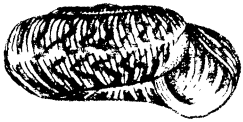
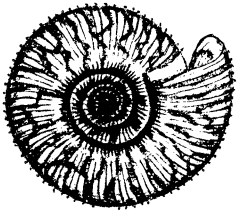
Fectola infecta (Reeve),
2.2mm x 1mm, Whareana in *Placostylus* shell. This is the only specimen found and though a juvenile it has most affinity with *F. infecta.*





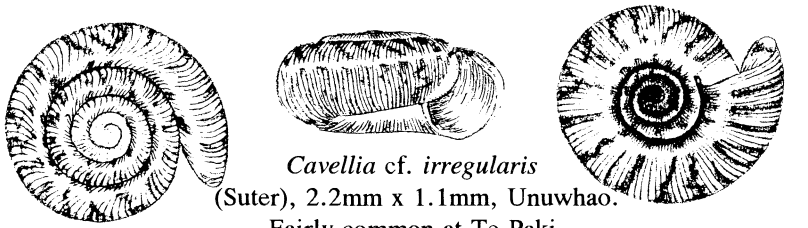
Fectola charopiformis (Gardner),
2.2mm x 1mm, Te Paki, site 16.

This species has no lamella amd only widely spaced weak ribs. Its range does not quite extend to Auckland and it was not plentiful in the Te Paki Region.

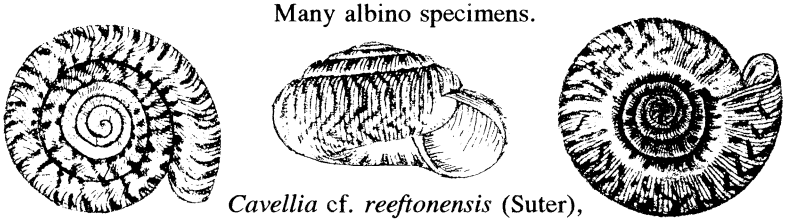




Cavellia buccinella (Reeve),
2.7mm x 1.4mm, Waterfall Gully.

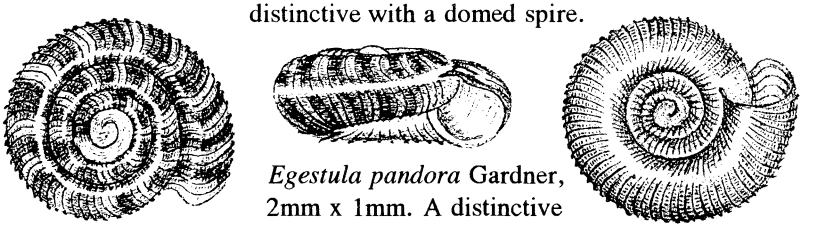
An abundant species in our survey, and most of the North Island.



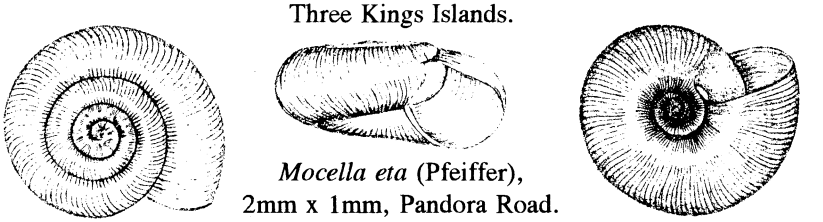
Cavellia cf. *irregularis* (Suter), 2.2mm x 1.1mm, Unuwhao. Fairly common at Te Paki. Many albino specimens.



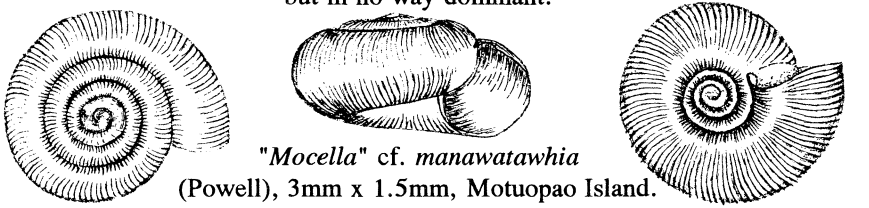
Cavellia cf. *reeftonensis* (Suter), 2.7mm x 1.4mm, Kohuronaki. Only a few of these were found. It is quite distinctive with a domed spire.



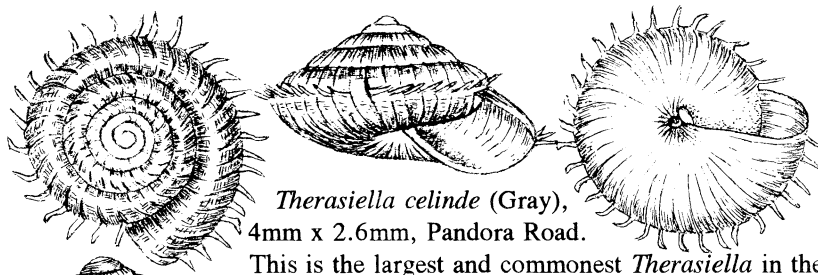
Egestula pandora Gardner, 2mm x 1mm. A distinctive Te Paki endemic which is quite abundant. Its closest relatives seem to be on the Three Kings Islands.



Mocella eta (Pfeiffer), 2mm x 1mm, Pandora Road. In Auckland this is the most prosperous native species. At Te Paki it is plentiful, but in no way dominant.

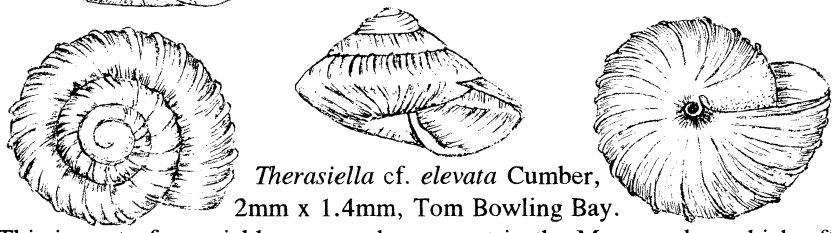


"*Mocella*" cf. *manawatawhia* (Powell), 3mm x 1.5mm, Motuopao Island. This was the commonest species in the Te Paki Region (occurs in greatest number of sites). Specimens from the mainland are flatter, even perhaps sunken.



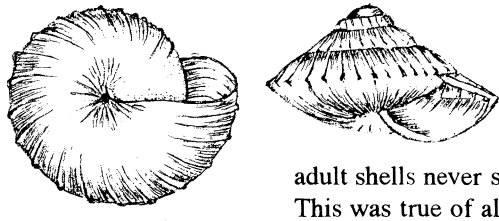
Therasiella celinde (Gray), 4mm x 2.6mm, Pandora Road.

This is the largest and commonest *Therasiella* in the region with narrower processes than its southern counterpart. The specimen (on left) from Pandora, 4.4mm x 3.4mm, is much taller and typifies the variations which all species in the genus exhibit.

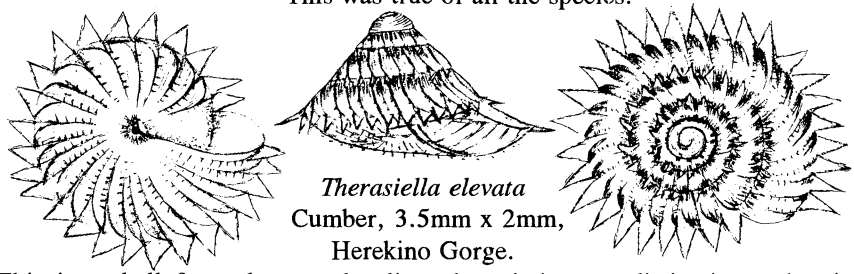


Therasiella cf. *elevata* Cumber, 2mm x 1.4mm, Tom Bowling Bay.

This is part of a variable group, also present in the Mangamukas which often have serrated processes, sometimes hairs on the base, but always seem to have a swelling on the collumella.

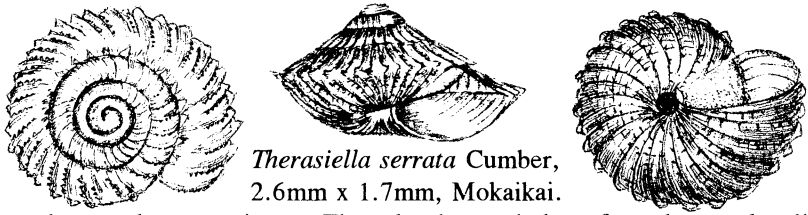


Therasiella elevata Cumber, 2mm x 1.5mm, Unuwhao, collected by Ogle, Nov 1986. This was very scarce and difficult to be certain of, for adult shells never seemed to have any processes left. This was true of all the species.



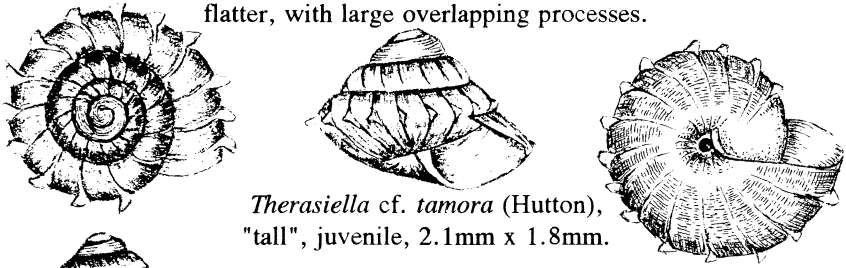
Therasiella elevata Cumber, 3.5mm x 2mm, Herekino Gorge.

This is a shell from the type locality where it is very distinctive and quite uniform. The Te Paki specimens have rounder bases and are not as tall.

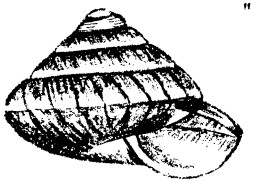


Therasiella serrata Cumber, 2.6mm x 1.7mm, Mokaikai.

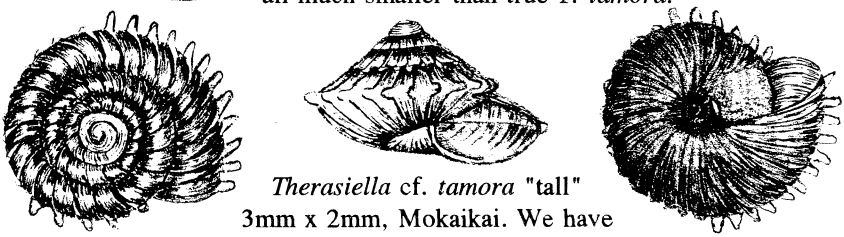
We only record two specimens. They closely match those from the type locality, Mangamuka. They occur as far south as the Ureweras, where they are much flatter, with large overlapping processes.



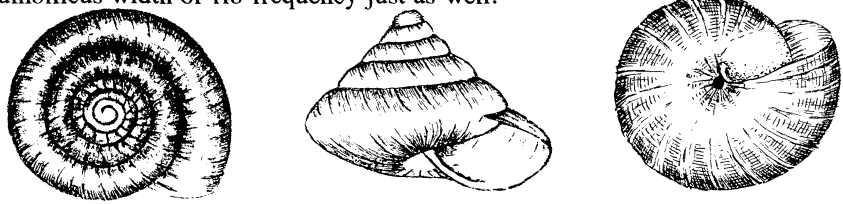
Therasiella cf. *tamora* (Hutton), "tall", juvenile, 2.1mm x 1.8mm.



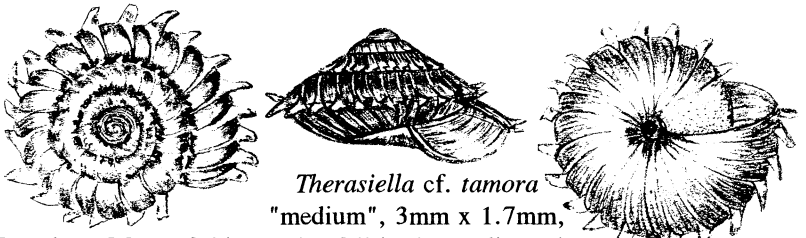
Therasiella cf. *tamora* "tall", 3.2mm x 2.4mm. Waitanoni Stream, collected by C.Ogle. There are huge variations in this species and they are all much smaller than true *T. tamora.*



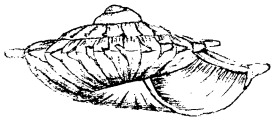
Therasiella cf. *tamora* "tall" 3mm x 2mm, Mokaikai. We have separated them into tall, medium and flat, but we could have separated them on umbilicus width or rib frequency just as well.



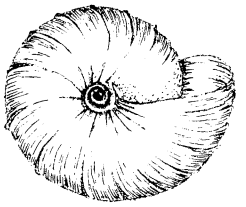
Therasiella cf. *tamora* "tall", 3.7mm x 2.9mm, Maukins Nook. At this site the shells are quite large and very tall with a minute umbilicus. Even without the processes it is a striking shell with the sides of the spire slightly concave.



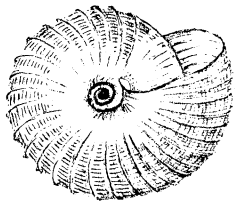
Therasiella cf. *tamora* "medium", 3mm x 1.7mm, Unuwhao. Most of this species fall in the medium class.



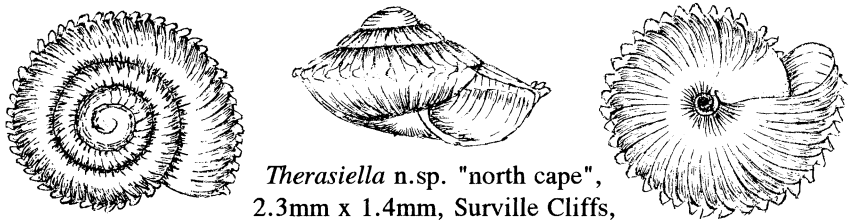
Therasiella cf. *tamora* "flat", 2.4mm x 1.2mm, Tapotupotu. Two sites close together contained only these very flat specimens.



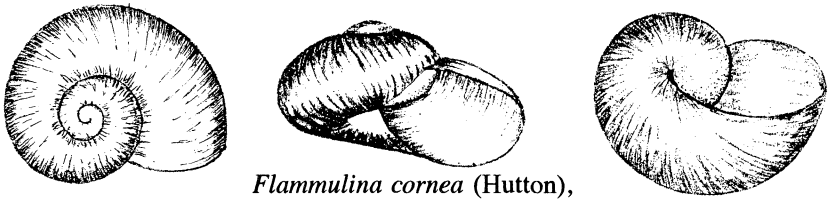
Therasiella cf. *tamora* 2.8mm, Pandora. A specimen with very widely spaced ribs and wide umbilicus.



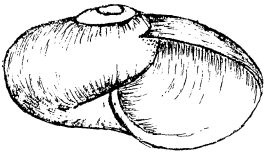
Therasiella n.sp. "north cape", Surville Cliffs. A specimen with a wider umbilicus.



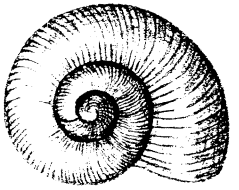
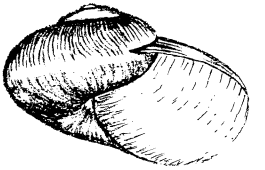
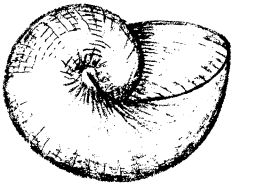
Therasiella n.sp. "north cape", 2.3mm x 1.4mm, Surville Cliffs, collected by Anderson, Carlin and Ogle, 4 March 1985. This distinctive species is apparently abundant in a small area, but almost absent in our survey.



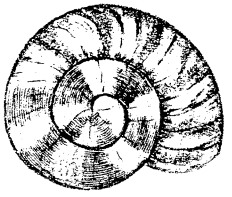
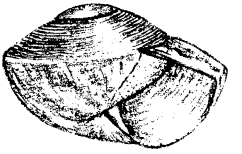
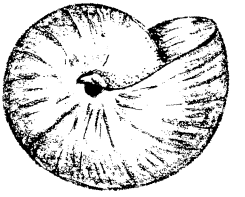
Flammulina cornea (Hutton), 4mm x 2.5mm, Auckland. A good Te Paki specimen was unavailable to draw but they do not seem any different from more southern shells. Good live snails are apparently easy to find in the Mangamuka Range just south of Kaitaia, (R.Rees pers.comm.), but as a rule they never seem to be abundant.



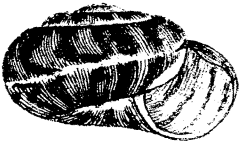
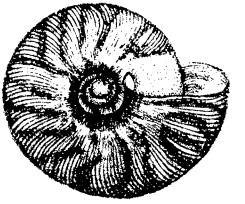
Flammulina perdita (Hutton), 2.6mm x 1.6mm. This is widespread in New Zealand but rare at Te Paki. We only found a few juveniles like the one shown.

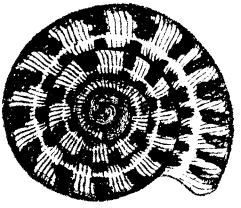
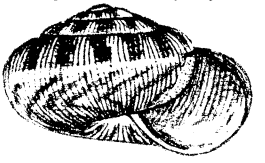
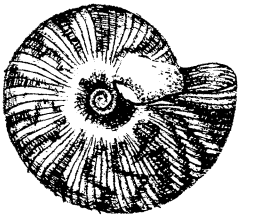
Flammulina tepakiensis Gardner, 4mm x 2.5mm, Pandora Road. We found this at several places but it must still rate as a rare species. A close relative, *F. olivacea* (Suter), is also a rare snail.

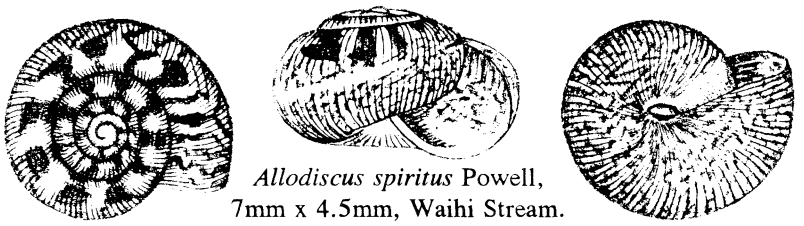
Therasia sp., 2.4mm x 1.7mm, Mokaikai. We found several juveniles which were hard to identify, and one *Therasia zelandiae* (Gray), which has not been illustrated.

Allodiscus basiliratus Gardner, 1.8mm x 1.3mm, Maungapika. A reasonably common Te Paki Region endemic which has a very close relative around Hokianga which is distinguished only by its smaller umbilicus.

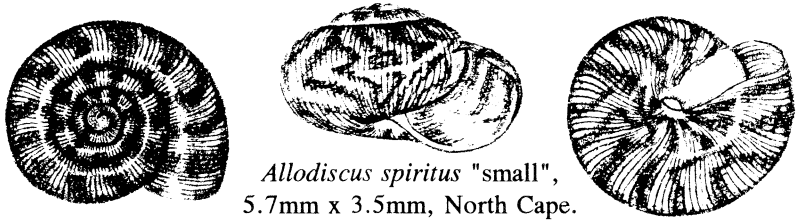




Allodiscus cf. *basiliratus*, 2mm x 1.3mm, Tapotupotu. Not very common and really only superficially similar to the previous species. It was identified as *Allodiscus adriana* (Hutton) in N. Gardner's (1967) list.



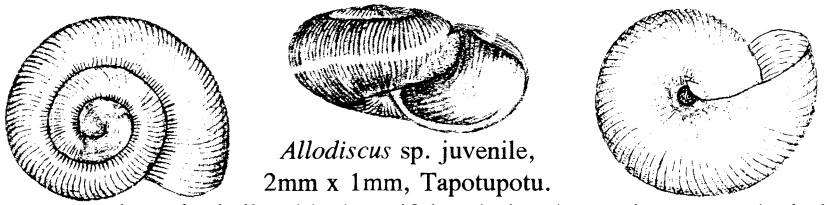
Allodiscus spiritus Powell, 7mm x 4.5mm, Waihi Stream.

A plentiful snail which does not extend into the North Cape block, east of Tom Bowling Bay. Instead, the following variation occurs.



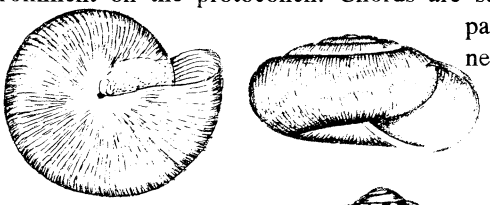
Allodiscus spiritus "small", 5.7mm x 3.5mm, North Cape.

Impoverished soil may have produced this variant (N.Gardner, pers. comm.).

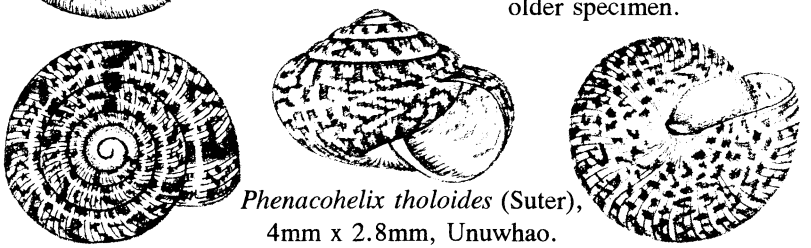


Allodiscus sp. juvenile, 2mm x 1mm, Tapotupotu.

A straw coloured shell with beautiful spiral microsculpture particularly prominent on the protoconch. Chords are strong in the umbilicus which is partially open in the juvenile, but nearly closed in older specimens.

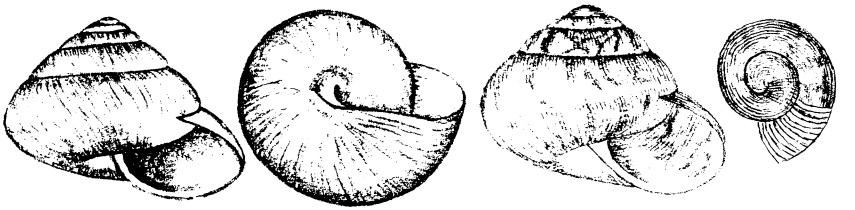


Allodiscus sp., 3.6mm x 1.9mm, Tapotupotu Road. The spirals are not so noticeable on this older specimen.



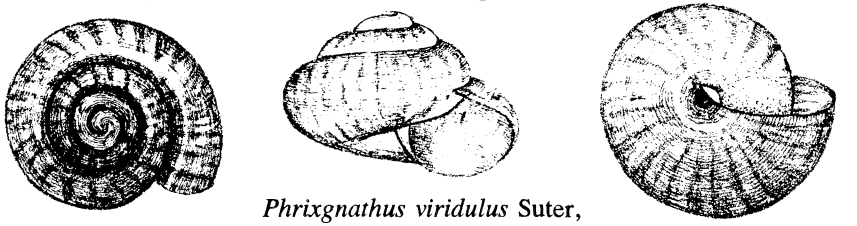
Phenacohelix tholoides (Suter), 4mm x 2.8mm, Unuwhao.

Perhaps the most prominent and hardiest small snail in the Te Paki Region.

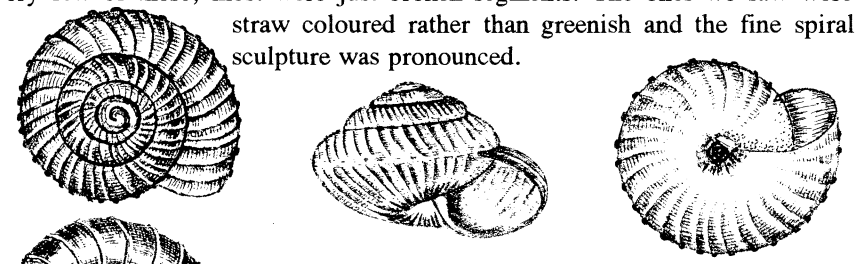


Serpho kivi (Gray), 12mm x 9.5mm, Herangi, collected P. Millener, subfossil. These are much larger than any living snails.

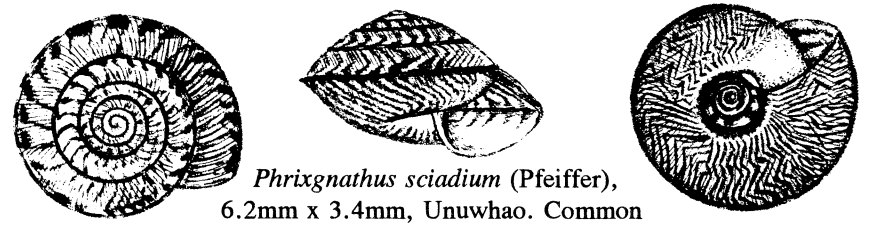
Serpho matthewsi (Suter), 7mm x 5.5mm. These two sister species occurred together at most sites, but this species was more numerous.



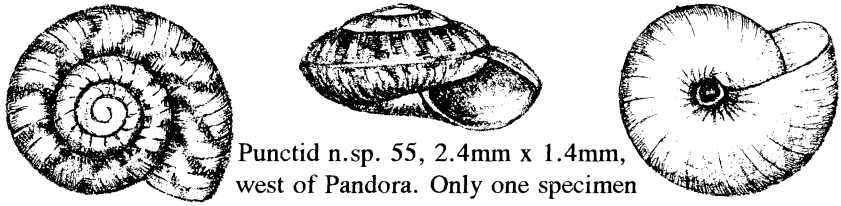
Phrixgnathus viridulus Suter, 2.4mm x 1.3mm, collected N.Gardner, Tapotupotu, Pandora Ridge. We found very few of these, most were just broken segments. The ones we saw were straw coloured rather than greenish and the fine spiral sculpture was pronounced.



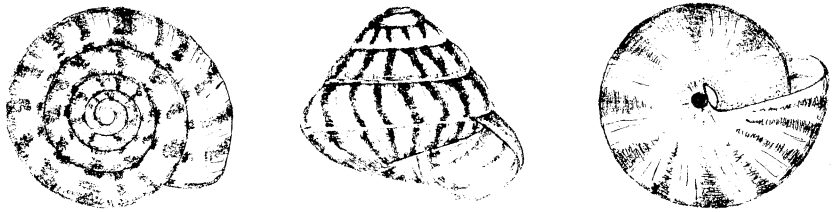
Punctid n.sp. 17, above, 2.4mm x 1.4mm, Tapotupotu; at left 1mm, Te Huka Bay. With one or two exceptions most of the punctids were scarce. This one like the last has strong spirals but also strong primary ribs.



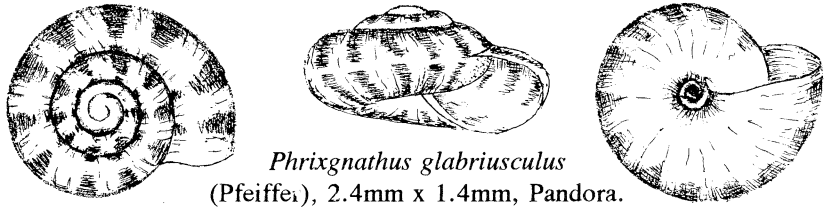
Phrixgnathus sciadium (Pfeiffer), 6.2mm x 3.4mm, Unuwhao. Common across most of Northland and also at Te Paki, where it showed little variation.



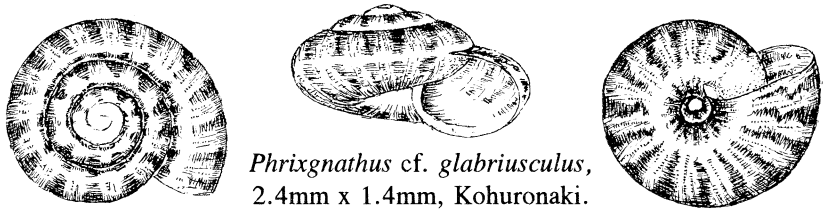
Punctid n.sp. 55, 2.4mm x 1.4mm, west of Pandora. Only one specimen was found near Pandora. Around Auckland this species is rare in mature, undisturbed bush, but can be abundant in modified or regenerating stands.



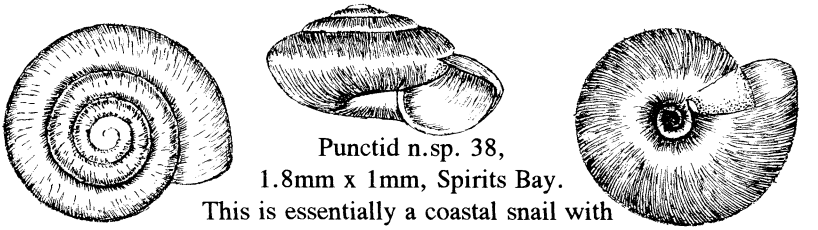
Phrixgnathus n.sp. *conella* group, 1.8mm x 1.6mm, Waihi Stream. Snails in this group are attractively coloured punctids restricted to the northern North Island. The one shown here was rare but it also occurs on the Poor Knights Islands.



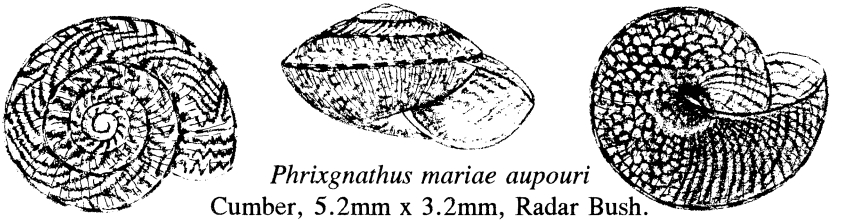
Phrixgnathus glabriusculus (Pfeiffer), 2.4mm x 1.4mm, Pandora. This is a shiny snail, usually with strong brown radial markings on a light background. It is an arboreal snail, reasonably common in the Te Paki Region.



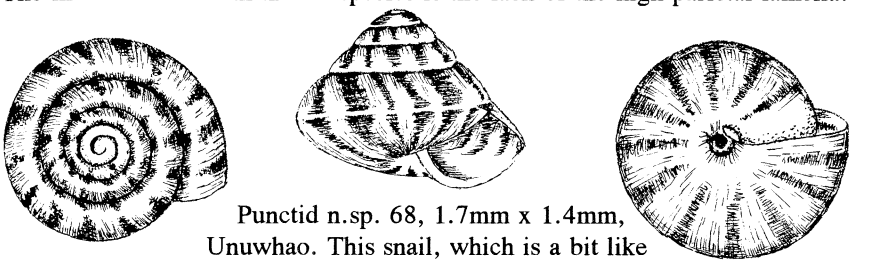
Phrixgnathus cf. *glabriusculus*, 2.4mm x 1.4mm, Kohuronaki. This species, found only at one site, has shell features which occupy the middle ground between *P. glabriusculus* and *P. moellendorffi* (Suter). It has a dull shell.



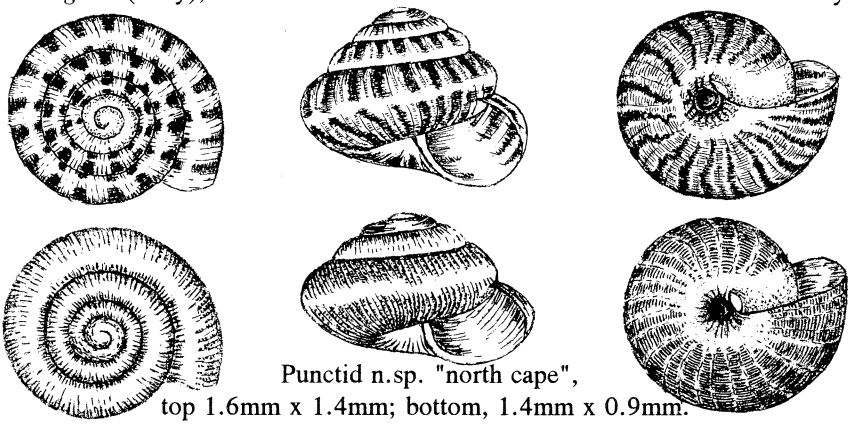
Punctid n.sp. 38,
1.8mm x 1mm, Spirits Bay.
This is essentially a coastal snail with quite a wide distribution. It is a plain shell with a partly angled body whorl.



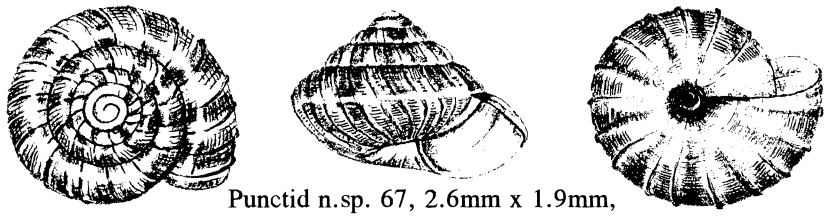
Phrixgnathus mariae aupouri
Cumber, 5.2mm x 3.2mm, Radar Bush.
The main difference in the subspecies is the lack of the high parietal lamella.



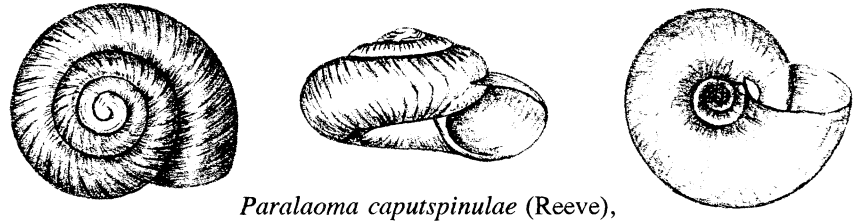
Punctid n.sp. 68, 1.7mm x 1.4mm,
Unuwhao. This snail, which is a bit like *P. erigone* (Gray), is endemic to Te Paki but was not common in our survey.



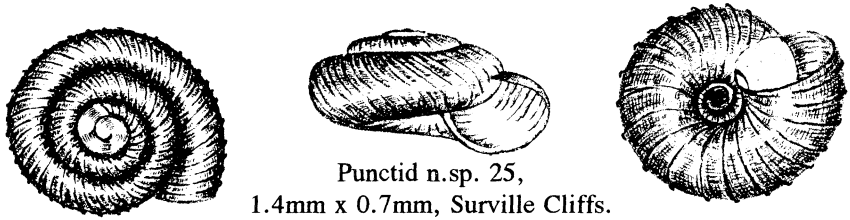
Punctid n.sp. "north cape",
top 1.6mm x 1.4mm; bottom, 1.4mm x 0.9mm.
Both collected by D.Roscoe, 8 October 1976, from 2 gullies east of the *Liarea aupouri tara* colony. It has a coloured and plain form.



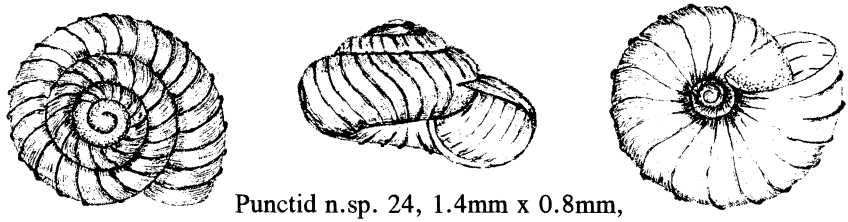
Punctid n.sp. 67, 2.6mm x 1.9mm, site 35, Waterfall Gully. At this site it was quite plentiful, but elsewhere not so common. It is a Northland snail, fairly common around Russell.



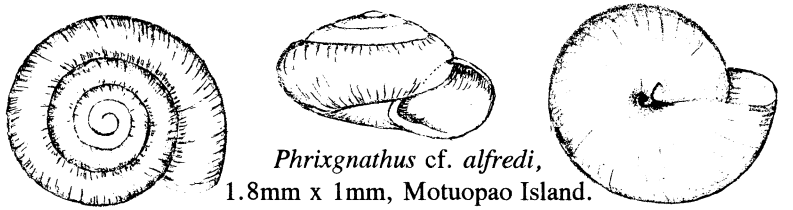
Paralaoma caputspinulae (Reeve), 2.4mm x 1.4mm, subfossil, Tom Bowling Bay, collected by P. Millener. At left, 1.9mm x 1.3mm, Recent Cape Maria van Diemen. Fairly widespread, but seldom abundant. In its usual coastal niche it seems to have been replaced as an abundant species by Punctid n.sp. 24.



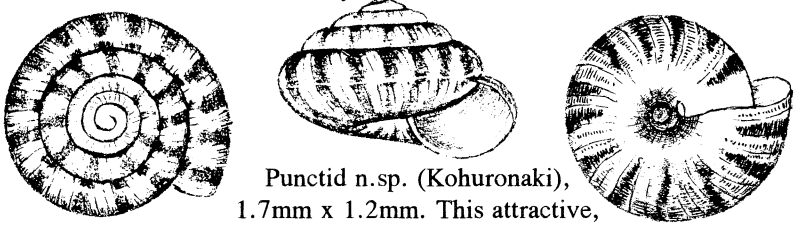
Punctid n.sp. 25, 1.4mm x 0.7mm, Surville Cliffs. Only one specimen recorded here. It has a rich brown shell, strong ribbing and prominent spiral microsculpture.



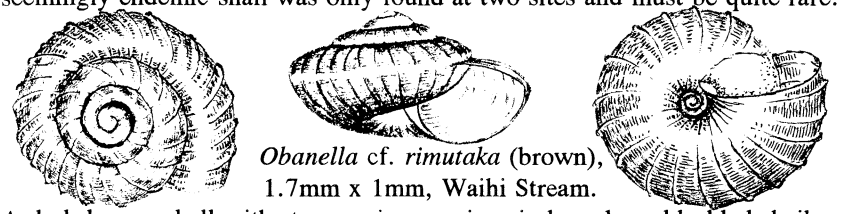
Punctid n.sp. 24, 1.4mm x 0.8mm, Spirits Bay. Large numbers of these snails were found in sandy coastal situations under pohutukawa or flax. We also record it from inland situations but not in any numbers. Ribs are thin and mostly rubbed off.



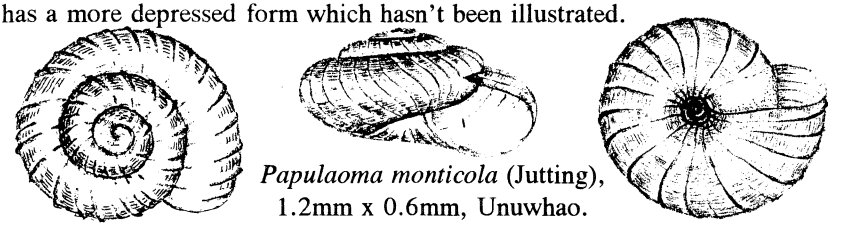
Phrixgnathus cf. *alfredi*,
1.8mm x 1mm, Motuopao Island.
A plain transparent shell which is related to one found around Hokianga. We only found it at one site.



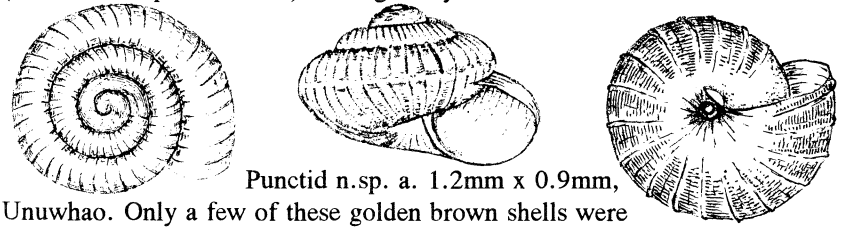
Punctid n.sp. (Kohuronaki),
1.7mm x 1.2mm. This attractive, seemingly endemic snail was only found at two sites and must be quite rare.



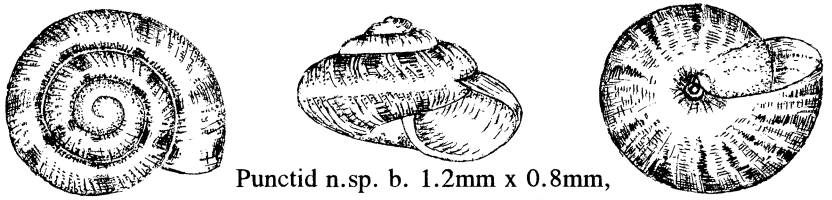
Obanella cf. *rimutaka* (brown),
1.7mm x 1mm, Waihi Stream.
A dark brown shell with strong microscopic spirals and weakly bladed ribs. It has a more depressed form which hasn't been illustrated.



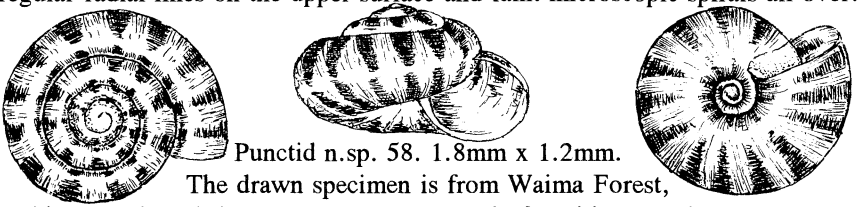
Papulaoma monticola (Jutting),
1.2mm x 0.6mm, Unuwhao.
This is a species described from New Guinea and present also in Australia (F.M. Climo pers. comm.). Though very small it was not uncommon.



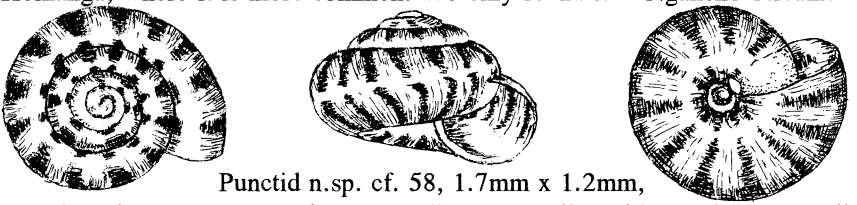
Punctid n.sp. a. 1.2mm x 0.9mm, Unuwhao. Only a few of these golden brown shells were found at two sites. It does not seem to have been seen before this survey.



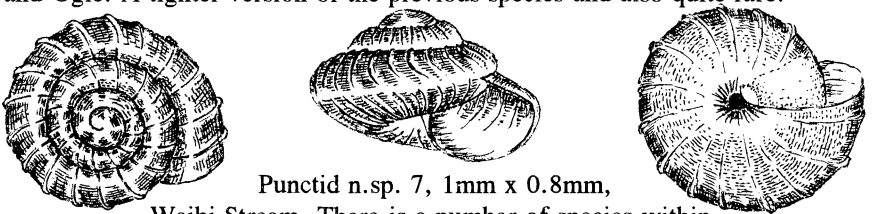
Punctid n.sp. b. 1.2mm x 0.8mm, Unuwhao. A yellowish shell with faint reddish radial bands. Sculpture of weak, regular radial lines on the upper surface and faint microscopic spirals all over.



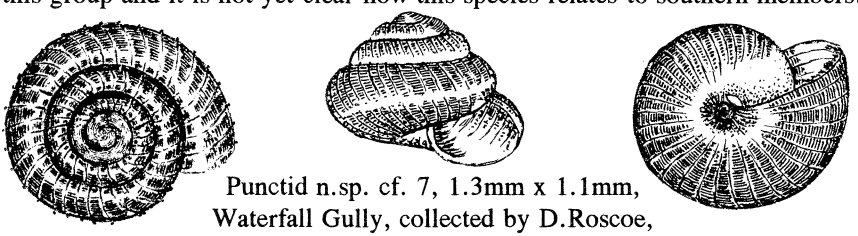
Punctid n.sp. 58. 1.8mm x 1.2mm. The drawn specimen is from Waima Forest, Hokianga, where it is more common. We only found it at Ngakeno Stream.



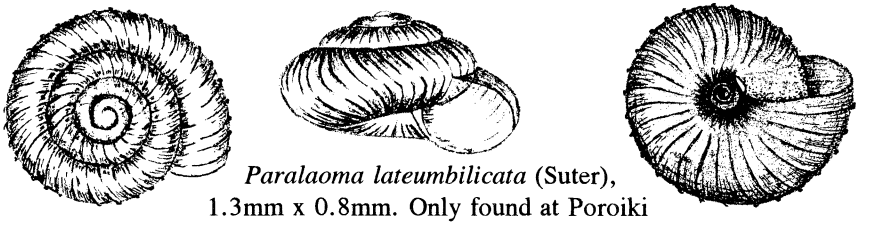
Punctid n.sp. cf. 58, 1.7mm x 1.2mm, Tawakewake Stream, east of Tom Bowling Bay, collected by Anderson, Carlin and Ogle. A tighter version of the previous species and also quite rare.



Punctid n.sp. 7, 1mm x 0.8mm, Waihi Stream. There is a number of species within this group and it is not yet clear how this species relates to southern members.

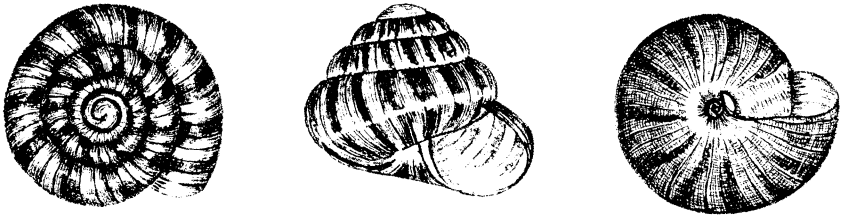


Punctid n.sp. cf. 7, 1.3mm x 1.1mm, Waterfall Gully, collected by D.Roscoe, 30 December 1978. Though rare at Te Paki, this is common further south.

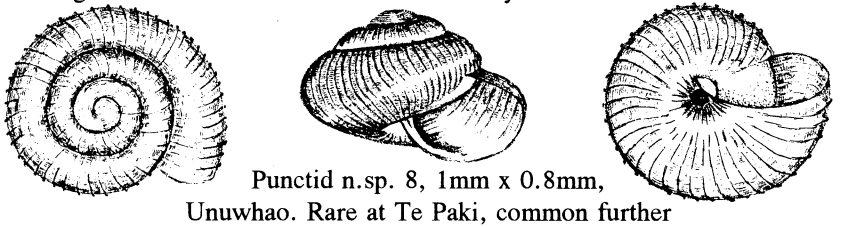


Paralaoma lateumbilicata (Suter), 1.3mm x 0.8mm. Only found at Poroiki Hill, and not common. The specimens do not look very typical of the species.

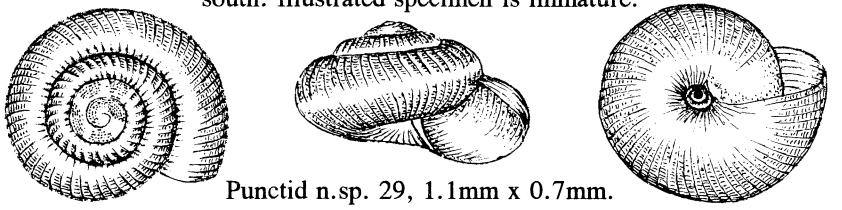
Laomarex minuta (Gardner), 2.2mm x 1.4mm, Waihi Stream. A Te Paki endemic which is widespread but never abundant.



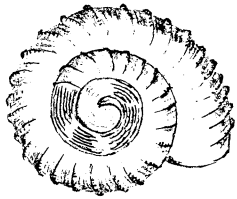
Punctid n.sp. 56, 1.4mm x 1.3mm, west of Pandora. The edges of the ribs on this shell are minutely serrated. It was rare.

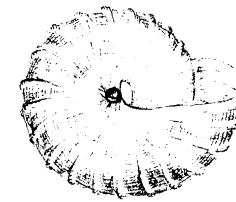


Punctid n.sp. 8, 1mm x 0.8mm, Unuwhao. Rare at Te Paki, common further south. Illustrated specimen is immature.



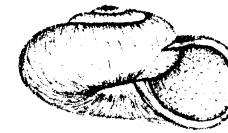
Punctid n.sp. 29, 1.1mm x 0.7mm. A common, hardy little snail, found in many parts of New Zealand.



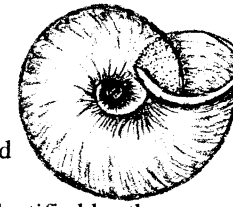
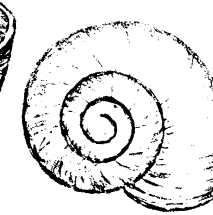


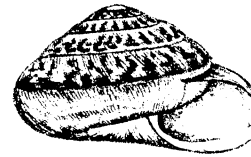
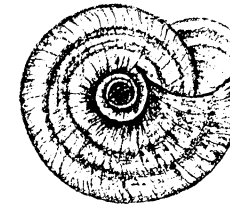
Phrixgnathus serratocostatus (Webster), 0.7mm x 0.4mm, collected by C.Ogle, 5 march 1985, under 1.5m high kanuka, hook grass and sedge. A very juvenile specimen and perhaps the only one ever found at Te Paki. It is widespread in New Zealand, though always elusive.

LEFT: *Cochlicopa lubrica* (Muller), 6mm x 2.5mm, Motuopao Island. A prolific introduced snail quite at home in a wide range of habitats.

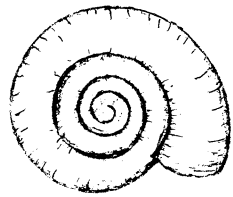


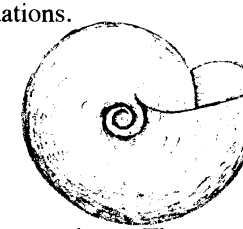
RIGHT: *Vallonia excentrica* (Sterki), 2.4mm x 1.2mm, Tapotupotu. A small white introduced snail which can live happily in grass and is easily overlooked. It can be identified by the expanded and thickened lip on the shell aperture.

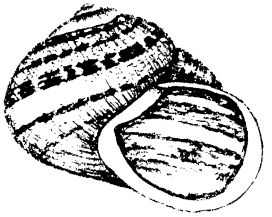




Candidula intersecta (Poiret), 1cm x 0.7cm, Tapotupotu, collected by R.Penniket. An introduced calciphyte snail very prominent in some coastal situations.

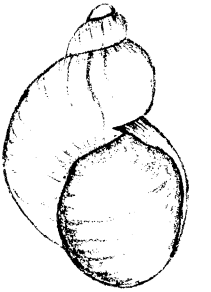




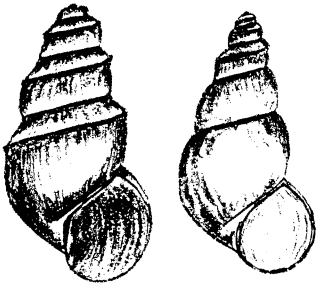
Oxychilus sp., 10.5mm x 5mm. Another introduced snail, one of a group which are impossible to separate on shell features alone. They are abundant in garden and pasture and can be found in many parts of New Zealand.



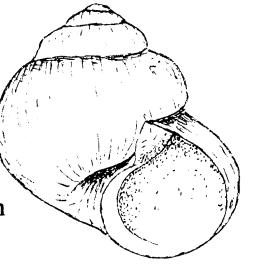
Helix aspersa (Muller), 3.2cm x 3cm, Spirits Bay. Behind the beach there are incredible numbers of these snails providing endless food for thrushes. Even the smallest anvil stone is surrounded by a big mound of broken shells.



Austrosuccinea archeyi (Powell), 6.5mm x 10mm, Spirits Bay, collected by N. Douglas, 9 October 1979. Present behind many of the beaches and also at several subfossil deposits. It is well documented by Powell (1933, 1950) and Quick (1951). It seems to live in areas distinct from *Helix* which much preferred the prickly *Solanum linnaenum* as a food source.



Potamopyrgus antipodarum (Gray), 1.4mm x 2.8mm, left; and 1.2mm x 3mm, right.
A freshwater snail which can often be found in leaf litter samples. We suspect that even small seepages will support it, for it is sometimes found far from an established stream. It was prolific in the Kapowairau Lagoon.



Suterilla neozelanica (Murdoch), 2mm x 2.2mm.
This is a marine snail essentially restricted to the splash zone but often found with land snails just above the high tide mark.

DISCUSSION

It is a pity that greater protection has not been afforded this unique fauna. Comparisons made with earlier collectors such as N.W. Gardner and D.J. Roscoe, indicate numbers of snails are reduced, and in some former areas of good habitat, minute land snails are almost in total eclipse. The waterfall at Kapowairau is a particular example. This has been brought about by numbers of horses allowed to wander over large areas - gates are left open even when there are good fences. Cattle on Unuwhao have done considerable damage, and pigs ruin good ecological remnants. The very small gully remnants left after the

burn off to plant pines were fertile ground for small species and smaller populations of *Paryphanta* and *Placostylus*. Within two years pigs had rooted and destroyed the ground floor and most of the fauna.

An area such as the Te Paki Ecological Region is indeed very special and endemism is such that of 98 species collected, 34 have not been found elsewhere. There is no other region that has the potential to equal this.

ACKNOWLEDGEMENTS

We would like to thank the following people for their contributions towards this paper: Norman Gardner who made his collection freely available. Jack Grant-Mackie and Joan Sutherland for access to Auckland University collections. Bruce Hazelwood for lots of helpful advice. Frank Climo and Dave Roscoe for species identifications and clarification. Frank Climo for commenting on the manuscript. Terry Conaghan for drafting the map and Judy Roberts for typing the manuscript.

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APPENDIX 1. LIST OF COLLECTION SITES

Richard Parrish (R.P.) = 42 sites. Pauline Mayhill (P.M.) = 20 sites. Jim Goulstone (J.G.) = 12 sites. For all sites a six figure grid reference is given from the NZMS 260 series, sheets MO2 And NO2, 1:50 000.

1. Scott Point. 838 425 (R.P.) 15/3/88.
2. Motuopao Island. 777 480 (R.P.) 27/9/88, 20/10/89.
3. Cape Maria van Diemen, west. 786 473 (R.P.) 29/7/88.
4. Cape Maria van Diemen, west. 786 473 inside *Placostylus* shells, C. Smuts-Kennedy (per R.P.) 2/88.
5. Taupiri Island. 792 468 (R.P.) 3/10/90.
6. Cape Maria van Diemen, east. 797 472 (R.P.) 29/7/88, 25/10/88.
7. Tapotupotu Road Bush. 840 510 (R.P.) 19/3/88.
8. Tapotupotu Lagoon. Amongst flax under large pohutukawas fringing the lagoon. 852 515 (J.G.) 13/5/91.
9. Tirikawa Bush. 872 510 (R.P.) 20/3/88.
10. Darkies Ridge. 879 503 (R.P.) 20/10/89.
11. West of Pandora. 888 506 (R.P.) 24/10/89.
12. Tapotupotu Stream. 871 488 (R.P.) 24/10/88.
13. Tapotupotu. 882 482 (P.M.) 3/88.
14. Headwaters of Tapotupotu Stream Tributary. 889 483 (R.P.) 16/3/88.
15. Te Paki, western side. This lot was sorted from 2 litres of taraire litter, just off the Pandora Road. (J.G.) 11/5/91.
16. Same as 15 from 2 litres of rimu litter.
17. Same as 15 from 2 litres of tree fern litter.
18. Radar Bush. 894 477. Litter collected by G. Carlin and C. Ogle, sorted by R.P. 3/85.
19. Radar Bush. 894 477 (R.P.) 29/8/90.
20. Radar Bush. 897 476 (P.M.) 3/88.
21. Pandora Road. 894 492 (P.M.) 3/88.
22. Kautewhakapeke (Pandora) Stream. 904 493 (R.P.) 22/3/88.
23. Pandora Stream, just behind the beach under pohutukawa, flax and scrub in half a litre of litter. 908 408 (J.G.) 12/5/91.
24. Spirits Bay west, under a large pohutukawa, amongst flax, overlooking the beach and lagoon in 2 litres of litter. 922 497 (J.G.) 12/5/91.
25. Kohuronaki. 955 458 (R.P.) 5/4/89.
26. Kohuronaki. 957 456 G. Sherley per R.P. 4/4/89.
27. Kohuronaki. 958 458 (P.M.) 3/88.
28. Kohuronaki. 961 459 (R.P.) 4/4/89.
29. Te Hapua turnoff. 997 452 (P.M.) 3/88.
30. Maungapiko west. 983 534 - C. Smuts-Kennedy - inside *Placostylus* shells (per R.P.) 2/88.
31. Maungapiko Hill west. 983 534 (R.P.) 28/7/88.
32. Maungapiko Hill west, between large boulders under karaka in the *Placostylus* Reserve. 983 534 (J.G.) 11/5/91. The 2 litres of litter collected produced many pieces of *Placostylus, Rhytida* and *Helix,* which were not recorded.
33. Spirits Bay. 983 530 (P.M.) 3/88.
34. Waterfall Gully. A narrow, dark damp gully just above the waterfall. Two litres of litter collected. 990 524 (J.G.) 13/5/91.
35. Waterfall Gully - Unuwhao. About halfway up the valley behind the waterfall under pohutukawa

in 2 litres of litter. 998 527 (J.G.) 9/5/91.

36. Waihi Stream. Puriri, kanuka, cabbage trees and rushes alongside the stream surrounded by manuka heath. Some were collected live, the rest from 2 litres of litter. 005 527 (J.G.) 10/5/91.
37. Unuwhao. North side of summit under large kanuka in 2 litres of litter. 008 522 (J.G.) 10/5/91.
38. Unuwhao. South side of summit - very steep with a lot of kiekie. 4 litres of litter. 008 521 (J.G.) 10/5/91.
39. Unuwhao. 012 524 (P.M.) 3/88.
40. Matirarau Bay. 026 533 (R.P.) 23/10/89.
41. Te Huka Bay. 047 523 (R.P.) 22/10/88.
42. Te Huka Bay west. 050 527 - C. Smuts-Kennedy inside *Placostylus* shells (per R.P.) 2/88.
43. Te Huka Bay west. 050 527 (R.P.) 27/5/87.
44. Te Huka Bay east. 052 523 C. Smuts-Kennedy, inside *Placostylus* shells, (per R.P.) 2/88.
45. Akura Stream. 062 517 (R.P.) 18/3/88.
46. Muriwhenua remnant. 067 520 (P.M.) 3/88.
47. Middle Road, Muriwhenua. 073 519 (P.M.) 3/88.
48. Muriwhenua. 075 520 (P.M.) 3/88.
49. Poroiki Hill. 048 499 (R.P.) 18/3/88.
50. Poroiki Hill. 048 499 (P.M.) 3/88.
51. Taumataroa Flat. 056 497 (P.M.) 3/88.
52. Near Taumataroa Flat. 064 494 (R.P.) 17/3/88.
53. Haupatoto. 065 488 (P.M.) 3/88.
54. Haupatoto Bush. 068 488 (R.P.) 17/3/88.
55. Ponaki Stream headwaters. 093 474 (R.P.) 16/3/88.
56. Ponaki Stream headwaters. 093 474 (P.M.) 3/88.
57. Ngakengo Stream headwaters. 099 480 (P.M.) 3/88
58. Ngakengo Stream headwaters. 099 480 (R.P.) 16/3/88.
59. Whareana. 105 486 (R.P.) 16/3/88.
60. Whareana. 110 479 (R.P.) 16/3/88.
61. Whareana. 105 486 (P.M.) 3/88.
62. Whareana. 106 489 (R.P.) 27/5/87 & 27/7/88.
63. Whareana. 106 489 C. Smuts-Kennedy, inside *Placostylus* shells, (per R.P.) 2/88.
64. Whareana. 106 488 (P.M.) 3/88.
65. Maukins Nook. 115 477 (R.P.) 27/5/87 and 16/3/88.
66. Waikukupa. 101 542 (P.M.) 3/88.
67. Kerr Point. 103 550 (P.M.) 3/88.
68. Between Kerr Point and Surville Cliffs. 110 553 (R.P.) 1/4/89.
69. Surville Cliffs. 123 563 (R.P.) 27/7/88 & 30/8/90.
70. Surville Cliffs. 125 560, C. Smuts-Kennedy, inside *Placostylus* shells, (per R.P.) 2/88.
71. Surville Cliffs. 138 557 (P.M.) 3/88.
72. North Cape. 142 543, C. Smuts-Kennedy, inside *Placostylus* shells , (per R.P.) 2/88.
73. Ngaroko Stream. 141 541 (R.P.) 30/3/89.
74. Murimotu Island. 156 541 (R.P.) 23/10/88.

APPENDIX 2. LAND SNAIL RECORDS FROM THE TE PAKI ECOLOGICAL REGION.

The first figure is the site number, the figure in brackets is the number of shells found. The asterisk denotes that this number was not recorded. Un-named, numbered species refer to those which will be described by Dr F.M. Climo and he has designated these numbers.

Placostylus ambagiosus (Suter). 2(5 live seen), 46*,48*,51*,61*,64*,71*.
Paryphanta busbyi watti Powell. 20*, 21*,27*,38*,39*,48*.
Rhytidarex duplicata (Suter). 7(3),8(5),9(2),10(1),12(3),13*,16(1),17(1),20*,21*,27*,29*,31(2), 32(6),34(3),35(1),36(2),38(1),39*,42(1),43(1),47*,48*,49(2),51*,52(1),54(1),60(1),62(3),67*,73(1).
Delos cf. *coresia* a (Gray). 3(7),6(2),7(2),9(1),10(3),16(1),17(2),18(1),20*,27*,30(1),36(1),38(1), 43(3),46*,55(1),60(7),67*,68(3),71*,73(3).
Delos cf. *coresia* b. 8(5), 16(1).
Delouagapia cordelia (Hutton). 2(10),5(4),6(2 albino),7(2),19(1),20*,22(1),27*,32(2),33*,46*, 51*,54(3),67*,69(7),70(1).
Omphalorissa purchasi (Pfeiffer). 2(1),7(1),10(9),12(1),13(8),14(1),15(7),16(2),17(6),18(12),20*, 22(1),27*,28(1),36(1),39*,51*,52(22),53*,54(3),56*,57*,58(6),59(2),60(44),61*,62(2),63(1),64*.
Liarea aupouria aupouria Powell. 8(80),9(3),11(6),12(10),15(10),16(10),17(8),18(14),19(1),20*, 21*,22(17),25(13),27*28(12),29*,34(14),35(10),37(17),38(31),41(1),49(1),52(8),53*,54(10), 55(1),56*,60(4),61*,64*,68(41).
Liarea aupouria tara Powell. 39*,47*,48*,51*,67*,69(5),71*.
Cytora ampla (Powell). 7(41),8(1),9(1),10(1),11(1),12(4),13(4),15(4),16(9),17(5),18(1),19(3),20*, 21*,25(5),26(2),27*,29*,35(2),37(5),38(14),39*,42(1),43(2),47*,51*,52(5),53*,54(5),61*.
Cytora hispida Gardner. 2(1),7(17),8(12),13*,15(3),18(1),20*,23(1),27*,28(2),31(1),51*,53*, 54(2),60(1),61*,62(2),63(1),67*.
Cytora kerrana Gardner. 4(2),11(3),13*,14(2),15(1),16(1),18(1),20*,21*,23(8),25(3),27*,28(1), 34(9),35(1),36(2),38(5),39*,41(6),46*,47*,50*,58(1),60(1),61*,62(2),65(1),67*,68(2),69(10), 70(8),71*,72(1).
Cytora tepakiensis Gardner. 2(60),7(2),10(1),14(1),34(11),38(21),39*,60(1),68(5),74(16).
Cytora torquilla (Suter). 20*,51*.
Cytora n.sp. *fasciata* group 20*.
Cytora pallida (Hutton). 21*.
Tornatellinops novoseelandica (Pfeiffer). 2(24),3(5),4(4),5(11),6(116),7(9),8(3),9(1),10(1),24(2), 27*,31(2),32(11),34(2),36(1),37(1),41(1),46*,53*,56*,62(2),65(1),72(1),74(1).
Charopa coma (Gray). 12(8),39*.
Flammocharopa n.sp.a. 13*,16(1),20*,34(6),36(2),38(6),61*,62(1),64*.
Flammocharopa cf. n.sp.a. 20*,46*.
Charopa parva (Suter). 62(1).
Paracharopa delicatula Climo. 2(10),3(5),4(1),5(2),7(1),10(1),11(1),16(2),20*,25(1),27*,28(1), 29(14),36(6),38(4),39*,40(7),41(5),46*,49(1),51*,52(3),53*,54(5),55(4),56*,58(4),62(7),65(1).
Paracharopa cf. *delicatula.* 20*,46*.
Paracharopa chrysaugeia (Webster). 46*.
Paracharopa fuscosa (Suter). 13*,18(6),25(1),27*,28(5),51*.
Chaureopa titirangiensis (Suter). 39*,40(3),54(1).
Chaureopa hazelwoodi Climo. 47*, discovered after main survey at 879 484* (P.M.).
Phenacharopa cf. *pseudanguicula* (Iredale). 20*,46*.
Huonodon hectori (Suter). 13*,17(1),20*,28(1),35(1),39*,49(3),52(3),53*,57*,61*.
Fectola mira (Webster). 7(16),10(3),13*,16(1),18(1),20*,21*,25(5),27*,29*,38(1),39*,41(1),49(1),

51*,52(6),54(8),55(1),56*,57*,58(16),59(1),60(10),61*,62(9),64*,65(2).
Fectola infecta (Reeve). 63(1).
Fectola charopiformis (Gardner). 7(11),16(5),20*,27*,53*,54(6),59(1),62(12),63(1).
Cavellia buccinella (Reeve). 7(4),9(7),12(4),14(4),15(8),16(9),17(6),18(1),20*,21*,22(3),23(1
25(5),27*,28(6),29*,34(1),37(3),38(2),39*,40(3),41(5),43(4),45(3),47*,48*,52(16),53*,54(45)
55(6),58(8),59(1),60(26),61*,62(35),63(4),64*,65(2),72(1),73(3).
Cavellia cf. *irregularis* (Suter). 7(7),9(1),10(5),12(1),13*,14(1),18(2),21*,22(3),25(2),27*,28(4
29*,34(1),35(7),36(11),38(8),39*,40(2),41(3),45(3),46*,47*,48*,50*,52(15),53*,54(33),55(8)
58(10),60(40),62(3),64*,65(1).
Cavellia cf. *reeftonensis* (Suter). 20*,51*,56*,61*.
Egestula pandora Gardner. 7(43),8(2),9(2),10(2),12(25),13*,14(25),15(11),16(24),17(24),18(4
19(1),20*,21*,22(2),25(3),27*,29*,37(1),39*,49(1),50*,51*,52(4),53*,54(3),56*,57*,58(37)
62(1),64*.
Mocella eta (Pfeiffer). 8(1),17(2),25(2),27*,28(4),29*,34(1),35(25),36(2),38(2),39*,46*,47*,48
50*,51*,52(3),54(4),55(1),56*,57*,58(7),60(1),61*,62(7),64*,65(1).
"Mocella" cf. *manawatawhia* (Powell). 2(3),3(3),4(1),5(13),6(5),7(3),8(1),10(3),12(1),13*,14(1)
15(3),16(6),17(2),18(2),20*,21*,22(1),25(3),27*,28(6),29*,31(1),32(8),34(8),35(2),36(3),37(1
38(8),39*,40(1),43(1),45(10),46*,47*,48*,49(4),50*,51*,52(14),53*,54(5),55(1),57*,58(1
60(13),62(9),64*,73(1).
Therasiella celinde (Gray). 7(6),8(1),12(2),13*,14(2),15(18),18(1),19(1),20*,21*,22(1),23(2),24(7
25(10),27*,28(1),29*,34(1),35(3),36(7),38(2),39*,40(4),41(1),43(1),45(1),46*,47*,49(1),50*
52(18),53*,54(14),56*.73(1).
Therasiella elevata Cumber. 13*,20*,51*,53*,56*,57*.
Therasiella cf. *elevata* Cumber. 21*, 41(6),48*,53*,65(1).
Therasiella serrata Cumber. 12(1),14(1).
Therasiella cf. *tamora* (Hutton), tall. 25(1),28(1),36(1),58(1),60(4),85(3).
Therasiella cf. *tamora* (Hutton), medium. 10(1),11(1),14(2),16(12),27*,29*,34(1),38(20),39*,43(2
44(1),47*,48*,52(1),53*,54(7),58(4),62(1),68(4),69(4).
Therasiella cf. *tamora* (Hutton), flat. 8(5),12(2),68(1).
Therasiella n.sp. "north cape". 41(1).
Flammulina cornea (Hutton). 18(1),20*,67*.
Flammulina perdita (Hutton). 16(1).
Flammulina tepakiensis Gardner. 16(2),20*,28(1),39*.
Therasia sp. 13*,34(1),51*,57*.
Therasia zelandiae (Gray). 18(1).
Allodiscus basiliratus Gardner. 2(18),3(41),4(2),5(2),11(1),15(10),16(3),17(4),20*,31(2),34(10
35(1),37(2),38(1),48*,60(1),62(1),69(1).
Allodiscus cf. *basiliratus* Gardner. 8(9),13*,48*,69(1).
Allodiscus spiritus Powell. 8(1),12(1),13*,15(1),17(1),20*,22(1),23(4),25(1),26(1),27*,29*,34(2
35(1),36(6),38(2),39*,41(1),46*,47*,49(1),50*51*,52(21),53*,54(2),55(1),60(1),62(3),64*,65(1)
Allodiscus spiritus, small. 28(1),73(2).
Allodiscus sp. 7(3),9(1),14(1),48*.
Phenacohelix tholoides (Suter). 1(5),2(70),3(4),5(1),6(143),7(13),8(21),11(1),12(5),13*,14(1),
15(1),17(1),20*,21*,23(4),25(3),26(1),27*,28(1),29*,31(1),32(16),33*,36(27),38(4),39*,40(5),
41(9),45(4),46*,48*,50*,52(7),53*,54(22),55(6),56*,57*,58(2),60(5),62(5),64*,65(7),67*,
68(3),69(2),70(1),71*.
Serpho kivi (Gray). 7(3),11(1),12(1),13*,20*,21*,25(1),26(1),27*,28(2),29*,39*,48*,49(3),50*,
51*,52(1),54(3),55(3),56*,60(1).

Serpho matthewsi Suter. 7(2),12(2),15(1),18(2),19(1),20*,21*,22(1),25(1),27*,29*,38(2),39*,48*, 51*,52(4),53*,54(3),56*,57*,58(3),60(1),62(2),71*.
Phrixgnathus viridulus Suter. 17(1),39*,67*.
Punctid n.sp.17. 29*,39*,41(1),54(1).
Phrixgnathus sciadium (Pfeiffer). 7(7),9(2),10(7),11(1),12(3),13*,18(5),19(1),20*,21*,25(14),27*, 28(18),29*,37(2),38(6),39*,42(1),43(6),46*,52(5),60(5),61*,62(3),64*,67*.
Punctid n.sp.55. 11(1).
Phrixgnathus n.sp. *conella* group. 36(2),61*.
Phrixgnathus glabriusculus (Pfeiffer). 27*,39*,46*,49(6),52(1),53*,55(1).
Phrixgnathus cf. *glabriusculus*. 27*
Punctid n.sp.38. 10(1),24(6),27*,55(2),62(2),65(1),67*.
Phrixgnathus mariae aupouria Cumber. 15(4),16(1),17(3),25(1),26(2),28(1),35(3),38(1).
Punctid n.sp.68. 15(1),16(1),20*,21*,27*,29*,38(5),46*,53*,54(2),58(2).
Punctid n.sp.67. 18(1),35(13),46*,47*,51*,53*,71*.
Paralaoma caputspinulae (Reeve). 2(2),3(1),5(1),6(23),16(1),25(1),31(1),73(1).
Punctid n.sp.25. 69(1).
Punctid n.sp.24. 2(78),3(21),4(2),5(59),6(200+),8(60),20*,24(50+),27*,31(3),32(12),33*,48*, 63(1),71*,73(4).
Phrixgnathus cf. *alfredi* (Suter). 2(4).
Punctid n.sp. (Kohuronaki). 25(1),41(9).
Obanella cf. *rimutaka*. 20*,27*,34(1),36(3),47*,52(1),53*.
Obanella cf. *rimutaka* (depressed). 20*,21*.
Papulaoma monticola (Jutting). 7(1),8(1),16(1),34(7),35(3),36(10),38(30),57*,59(1),60(1),61*,67*, 71*.
Punctid n.sp.a. 34(7),36(1).
Punctid n.sp.b. 38(1).
Punctid n.sp.58. 20*.
Punctid cf. n.sp.58. 60(1).
Punctid n.sp.7. 35(1),36(2),37(1),48*.
Punctid cf. n.sp.7. 46*,48*.
Paralaoma lateumbilicata (Suter). 50*.
Laomarex minuta (Gardner). 7(7),13*,20*,27*,29*,36(7),39*,40(2),46*,52(1),54(2),62(11),64*, 65(1).
Laomarex cf. *minuta*. 20*.
Punctid n.sp.56. 39*,57*.
Punctid cf. n.sp.56. 39*.
Punctid n.sp.3. 39*.
Punctid cf. n.sp.33. 20*.
Punctid n.sp.8. 20*,39*.
Punctid n.sp.29. 17(1),20*,27*,34(4),39*,41(7),61*,64*.
Cochlicopa lubrica (Muller). 2(17),3(1),5(22).
Helix aspersa (Muller). 2(1000s).
Suterilla neozelanica (Murdoch). 24(2).
Potamopyrgus antipodarum (Gray). 18(1),33*,66*.

Not in the table above but appearing in the illustrations:

Austrosuccinea archeyi (Powell). Present in the sand dunes in many places, living and subfossil.
Phrixgnathus serratocostatus (Webster). This was collected by Ogle, Anderson and Carlin in 1985
Tornatellides subperforata (Suter). A single specimen was found in Norman Gardner's collectio
from Cape Reinga, (collected by S. Turner).
Oxychilus sp. Several juveniles were seen at Waitaki Landing, (J.G.), and at Spirits Bay campin
ground, (R.P.).
Vallonia excentrica (Sterki). O.J. Marston, Tapotpotu, 3/92.
Candidula intersecta (Poiret). Spirits Bay camping ground, (P.M.). Tapotupotu, O.J. Marston, 3/92
R. Penniket, 5/72.
Punctid n.sp. "north cape". D. Roscoe, 8/10/76.
Athoracophorus sp. with large elongated eggs. Seen at Whareana (R.P.), Muriwhenua, site 46
(P.M.).