A SUBFOSSIL LAND SNAIL FAUNULE FROM KAWHIA

by P. G. Parkinson*

SUMMARY

An extensive deposit of subfossil land snails at Andersons Bluff, near the Hamilton Junior Naturalists’ Club’s reserve on the Kawhia Harbour, is described and discussed with reference to the means of preservation of land molluscs in subfossil deposits.

INTRODUCTION

In 1966 a large deposit of subfossil land snails was discovered at Andersons Bluff, a large limestone exposure on the farm of Mr. G. Anderson of Kawhia. Initial excavations revealed a well-preserved faunule of great diversity which was in several ways distinct from the faunule of the adjacent reserve, Te Kauri Park. Further excavations on this and nearby sites revealed a faunule of some sixty species of snails. This paper describes the work carried out at Andersons Bluff and briefly compares the results obtained with the extant Te Kauri Park faunule and with the faunules of other subfossil deposits in the area. This work formed the basis for a paper entered by the author in the ‘Royal Society of New Zealand Centennial Awards for Secondary School Science 1968’ competition.

ANDERSONS BLUFF

Andersons Bluff is a ridge of Oligocene limestone about 200 ft. in length at the western end of a long ridge. The south-eastern end contains a short three-chambered cave. Another cave, containing moa remains but no snails, occurs in a limestone outcrop nearby. Moa remains have not been found anywhere at Andersons Bluff. The bluff has been bush-clad in the past but the surrounding land has been taken for farming and there are now few trees left. The bluff no longer supports a living snail faunule and it appears that the disappearance of the living faunule, the last formation of subfossil deposit, and the conversion of the area to farmland, were simultaneous. Weathering is fast eroding the soft limestone, especially on the lower slopes of the bluff and any deposits which may have been present on the lower slopes in the past have been washed away. Deposits are still numerous on the top of the bluff and on its eastern end where they occur under virtually every loose slab of rock and in many small hollows and crevices in the boulders. The distribution of single species in the deposits is discontinuous and may indicate that the deposits were formed over a long period or that microhabitats at the bluff changed rapidly (Figs. 2a, 2b).

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FIG. 1: Map of Te Kauri Park showing major subfossil land snail deposits.
FIG. 2a: Andersons Bluff from the East end.

FIG. 2b: Sketch of Andersons Bluff showing chief features.
FIG. 3: Suggested origin of the Andersons Bluff deposits.
1. Stream wears its bed into limestone.
1a. Cavity forms around limestone joint.
2. Emergence of limestone ridge in bush.
2a. Snails breed in the enlarged crevices and joints and deposit forms, as the soil level drops.
3. Bush removed; erosion increases, mud slips form deposits weathered from all parts of the bluff except the top.
3a. Later erosion lowers the soil level. Snails locally extinct: This is the present situation at Andersons Bluff.
FORMATION OF THE DEPOSITS

A great many small land snail eggs (particularly of the paryphantid genus *Delos*) are preserved in the bluff deposits suggesting that the snails retired to rock crevices for breeding. This contention is reinforced by the overwhelming numbers of juvenile shells and protoconches found in the deposits. I have noticed that bushclad limestone is often a good collecting place for live snails and that these tend to aggregate in crevices and under ledges. A suggested origin for the deposits, based upon these observations is presented in Figure 3.

THE EXCAVATION OF ANDERSONS BLUFF

The deposit was scraped away by hand so that large shells were not crushed, then dried and sieved to remove large shells, stones and plant debris. Sieved grit was shaken in a muslin cloth to sift out dust, leaving shells and sandy loam behind. The cloth used was fine enough to retain even the smallest protoconches. The grit was then passed through an ordinary kitchen sieve to sort the shells into two size grades. These were returned to the cloth and washed separately in cold water. The coarse grade was dried and sorted but the fine grade was taken to clean water and left to soak a short time, after which the small shells were decanted, dried and sorted.

LAND SNAIL CHECKLISTS

To indicate relative abundance the following abbreviations are used:

- a: abundant
- co: common
- oc: occasional
- r: rare

THE ANDERSONS BLUFF FAUNULE

*Omphalorissa purchasi* (Pfeiffer)  
*Cylora cytora* (Gray)  
*C. torquilla* (Suter)  
*Liarre a hochstetteri carinella* (Pfeiffer)  
*Potamopyrgus zelandiae* (Gray)  
*Otoconcha dimidiata* (Pfeiffer)  
*Thalassohelix ziczac* (Gould)  
*Allodiscus adriana* (Hutton)  
*A. dimorphus* (Pfeiffer)  
*A. miranda* (Pfeiffer)  
*Thermia subincarnata* (Suter)  
*Serpho kivi* (Gray)  
*Therasiella celinde* (Gray)  

<table>
<thead>
<tr>
<th>Species</th>
<th>Abundance</th>
</tr>
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<tbody>
<tr>
<td><em>Omphalorissa purchasi</em></td>
<td>a</td>
</tr>
<tr>
<td><em>Cylora cytora</em></td>
<td>co</td>
</tr>
<tr>
<td><em>C. torquilla</em></td>
<td>r</td>
</tr>
<tr>
<td><em>Liarre a hochstetteri carinella</em></td>
<td>oc</td>
</tr>
<tr>
<td><em>Potamopyrgus zelandiae</em></td>
<td>r</td>
</tr>
<tr>
<td><em>Otoconcha dimidiata</em></td>
<td>r, local</td>
</tr>
<tr>
<td><em>Thalassohelix ziczac</em></td>
<td>r</td>
</tr>
<tr>
<td><em>Allodiscus adriana</em></td>
<td>r</td>
</tr>
<tr>
<td><em>A. dimorphus</em></td>
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<tr>
<td><em>A. miranda</em></td>
<td>oc</td>
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<tr>
<td><em>Thermia subincarnata</em></td>
<td>r</td>
</tr>
<tr>
<td><em>Serpho kivi</em></td>
<td>r</td>
</tr>
<tr>
<td><em>Therasiella celinde</em></td>
<td>co</td>
</tr>
</tbody>
</table>
Phenacohelix ponsonbyi (Suter)
P. giveni Cumber
P. pilula (Reeve)
Suteria ide (Gray)
Flammulina crebriflammis (Pfeiffer)
F. perdita (Hutton)
Charopa (Ptychodon) hectori (Suter)
C. (Ptychodon) pseudoleiodon (Suter)
C. (Ptychodon) lau (Pfeiffer)
C. (Ptychodon) varicosa (Pfeiffer)
C. (Ptychodon) colensoi (Suter)
C. Ptychodon) buccinella (Reeve)
C. (Ptychodon) reeftonensis (Suter)
C. (Subsectoia) caputspinulae (Reeve)
C. (Mocella) etta (Pfeiffer)
C. (Mocella) aff. prestoni (Sykes)
C. (Geminoropa) microrhina (Suter)
C. (Geminoropa) huttoni (Suter)
C. (Aeschrodomus) stipulata (Reeve)
Charopa (Charopa) coma (Gray)
C. (Charopa) pilshuryi (Suter)
C. (Charopa) anguiculus (Reeve)
Laoma microreticulata Suter
L. leimonias (Gray)
L. pirongaensis (Suter)
L. marina (Hutton)
L. erigone (Gray)
L. fulgurata Suter
L. ariel (Hutton)
L. mariae (Gray)
Paralaoma sericata (Suter)
P. raricostata (Suter)
Tornatellinops novoseelandica (Pfeiffer)
Rhytida greenwoodi (Gray)
Schizoglossa novoseelandica (Pfeiffer)
Delos coresta (Gray)
D. jeffreystana (Pfeiffer)

THE LIVING LAND SNAILS OF TE KAURI PARK
Omphalarissa purchasi (Pfeiffer)
Cytora cytora (Gray)
C. aff. pallida (Hutton)
Liarea hochstetteri carinella (Pfeiffer)
Potamopyrgus zelandiae (Gray)
Oloconcha dimidiata (Pfeiffer)
Thalassohelix ziczac (Gould)
Allodiscus adriana (Hutton)
A. dimorphus (Pfeiffer)
A. miranda (Pfeiffer)
Thermia subincarnata (Suter)
Serpho kiti (Gray)
Therasiella celinde (Gray)
Phenacohelix ponsonbyi (Suter)
P. giveni Cumber
P. pilula (Reeve)
Suteria ide (Gray)  
Flammulina perdita (Hutton)  
F. zebra (Le Guillou)  
Charopa (Ptychodon) hectori (Suter)  
C. (Ptychodon) pseudoideodon (Suter)  
C. (Ptychodon) tau (Pfeiffer)  
C. (Ptychodon) varicosa (Pfeiffer)  
C. (Ptychodon) colensoi (Suter)  
C. (Charopa) coma (Gray)  
C. (Charopa) anguicalus (Reeve)  
C. (Charopa) pilsburyi (Suter)  
C. (Aeschrodomus) stipulata (Reeve)  
C. (Sublectola) caputspinulae (Reeve)  
C. (Mocella) eta (Pfeiffer)  
C. (Mocella) aff. prestoni (Sykes)  
Laoma leimonias (Gray)  
L. pirongaensis Suter  
L. marina (Hutton)  
L. ariel (Hutton)  
L. erigone (Gray)  
L. fulgurata Suter  
L. glabriuscula (Pfeiffer)  
L. mariae (Gray)  
L. moellendorfi (Suter)  
Rhytida greenwoodi (Gray)  
Schizoglossa novoseelandica (Pfeiffer)  
Delos coresia (Gray)  
D. jeffreysiana (Pfeiffer)  
Paralaoma raricostata (Suter)

Note: Subfossils of Charopa (Mocella) segregata (Suter) have also been found in the area.

COMPARISON OF THE CHECKLISTS

Although the faunae in both checklists are similar, the relative abundance of particular species is seen to be quite different. This feature is typical of all the deposits examined and so is presumably related to the ecological condition of the site when the deposit was being formed. When more is known of the preferred environments of snails studies of subfossils may be useful in reconstructing the biological history of the sites. The study is also useful in constructing the range of genera and species. When time is short collectors tend to seek snails in sites well known to be productive e.g. Rhopalostylis sapida debris. The use of subfossil samples however gives a more general selection of the fauna of an area under examination. At Te Kauri Park, snail collecting had been in progress for several years before the subfossils were found and the extant faunule was believed to consist of about thirty species only. After the subfossils had been identified a general snail census confirmed the presence of many species which had previously been overlooked.
A subfossil deposit at Waitomo produced specimens of *Parysthanta* (*Powelliphanta*) and thus increased the northern range of the sub-genus by some 250 miles.

There is no evidence for the age of the deposits at Andersons Bluff. As the shells are well preserved it seems they are not very old and the oldest parts of the deposit probably do not date back more than a few centuries. No new species or distinctive forms have been found and there is no reason to suppose that the subfossils will clarify the evolution of the land pulmonates.

ACKNOWLEDGEMENTS

I wish to thank all those who took part in the Te Kauri Park land snail census of 1968 and who provided specimens for my examination. I am particularly grateful to Mr. C. Templar and Mr. S. Easterbrook-Smith for their help in collecting and sorting snails, and to Mr. F. M. Climo for his help in checking identifications and for encouragement.

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REFERENCES


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