



Herpetofauna of the Nakauvadra Range, Ra Province, Fiji

Author: Thomas, Nunia

Source: A Rapid Biodiversity Assessment of the Nakauvadra Range, Ra Province, Fiji: 43

Published By: Conservation International

URL: <https://doi.org/10.1896/054.057.0107>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Chapter 6

Preliminary Observations of Terrestrial Gastropods of the Nakauvadra Range, Ra Province, Fiji

Gilianne Brodie

Team members: Nunia Thomas and Dick Watling (NatureFiji-Mareqeti Viti) for opportunistic snail collections

SUMMARY

Even without dedicated sampling at least five different species of terrestrial gastropod were found. One species (*Parmarion martensi* Simroth 1893) is introduced and has documented agricultural pest and human health associations. All of the other species found are very likely to be unique to Fiji (endemic) and members of their families from other Pacific Island countries are listed as threatened on the IUCN Red List. Based on the previously recorded high diversity of terrestrial gastropods in Fiji, increased sampling effort in wetter conditions would undoubtedly reveal a higher diversity of both endemic and native species being present.

INTRODUCTION

The biodiversity of Fiji's terrestrial, gastropod snails is very high in respect to land area, with 49 native and 160 endemic species reported (Barker 2005). However, despite being of global significance, terrestrial snails in the Pacific Islands are under serious threat (Lydeard et al. 2004).

At least 20 introduced terrestrial-gastropod species are recorded as present in Fiji (Barker 2005), and so far these do not include two of the world's worst high-risk invasive snails *Achatina fulica* (Bowdich 1822) and *Euglandia rosea* (Ferussac 1818) (GISD, 2008). These latter two species are already a significant problem; for biodiversity loss, agricultural production and trade opportunities, in neighboring Pacific Island countries (Cowie 2008, SPC/LRD pers. comm.).

We need to listen and learn from what has occurred in other regional island states (e.g. Samoa, French Polynesia and Hawaii) as the risk of extinction of our unique Fijian endemic snail fauna, from habitat loss and invasive species, is extremely high.

METHODS

Living snails and dead snail shells were collected opportunistically by hand. No targeted surveys were formally conducted. Snails were generally found in leaf litter during the day or on higher vegetation or human infrastructure, such as tents, during the night. No targeted nocturnal searches were made for arboreal species.

Specimens were photographed, measured and preserved for future identification in 80% alcohol. DNA samples (small pieces of tail) were also taken from five living species to facilitate future investigations of genetic relatedness to (i) populations in other parts of Fiji and (ii) similar snails being studied in other parts of the Pacific Island region.

Classifications given were determined using Burch (1962) in combination with Barker (2005) and Cowie (2008). All of the identifications given are tentative except for the members of the genus *Placostylus*. All specimens will be lodged with the South Pacific Regional Herbarium/USP Marine Collections.

RESULTS

At least five different species of terrestrial snails were recorded (Table 6.1). Of these, two species were found in relatively large numbers (A3 and A4). A3 is the extremely hardy introduced species *Parmarion martensi* Simroth 1893 (Plate 10). A4 is a currently unidentified species that most likely belongs to the family Helicarionidae and is therefore very likely to be an Fijian endemic.

At least one, and possibly two species of the genus *Placostylus* were also found. Members of this genus in Fiji are also recorded as endemic (see Barker 2005). Only one *Placostylus* specimen was alive when captured (Plate 11) but the presence of several dead shells suggests that the species might be easier to locate when environmental conditions are less dry. Living specimens of two another likely endemics (A2 and A5) from the Family Helicarionidae were also found (Plate 12a & b).

DISCUSSION AND CONSERVATION SIGNIFICANCE

Considering the known decline in global land snail biodiversity, and the relevant importance of the Pacific Island endemic fauna to that biodiversity (Lydeard et al. 2004), the presence of living specimens of the Fijian endemic taxa *Placostylus* and unidentified members of the family Helicarionidae, which is considered to contain at least 18 endemic species unique to Fiji (Barker 2005), makes the Nakauvadra Range significant in global biodiversity terms. Both of these taxonomic groups have species from other regions already listed as critically endangered on the IUCN Red List (Brescia et al. 2008) and it is well known that threatened Pacific Island fauna are currently missing from the IUCN data source.

The presence of at least one introduced species (*Parmarion martensi*) in the middle of the forest range

is of considerable concern as such hardy alien species may be capable of contributing significantly to native species extinction (see Cowie 2008). In addition, *Parmarion martensi* is considered to be a vector for human related illness (Hollingsworth et al. 2007).

In a report to the Fiji Government Parkinson (1982) listed six relatively large species of *Placostylus* land snails as having potential value as specimen shells in the commercial shell trade industry (selling overseas). However, considerable habitat loss in the last 26 years and a strengthened understanding of the extinction risk to our unique fauna, due to habitat loss and invasive species, leads us to a very different view in regards to their conservation value today. Any use of *Placostylus* shells as an income source would need to be very carefully assessed via appropriate protocols (e.g. CITES regulations).

Most terrestrial snails are nocturnally active because of their need for damp conditions. Targeted sampling at night or during rainy overcast conditions would no doubt produce a substantial increase in the number of species found. Many species are arboreal (found in trees) and therefore spot-lighting in trees at night is necessary. Baiting may also be effective particularly to attract introduced species present.

CONCLUSIONS

Conservation and future research recommendations

The unique nature of Fiji's land snail fauna, and the high potential for its irretrievable loss by high risk invasive species, makes strategic planning for their long-term conservation vital.

These goals would be best achieved by:

- Relatively large scale habitat conservation in areas such as native forest, small islands and areas with significant deposits of limestone (needed by many terrestrial gastropod species for shell development).
- Including land snails in a more targeted manner in future surveys to capitalize on their suitability as excellent sentinel taxa for ecosystem change.
- Conducting investigations into the human health risks and feeding habits of *Parmarion martensi* to fully assess its potential to impact on humans and native fauna.

REFERENCES

- Barker, G. 2005. Priorities for additions to the Fijian protected natural areas network: an assessment based on complementarity in land snail assemblages. Unpublished Report prepared by Landcare Research New Zealand for the Wildlife Conservation Society, Suva.
- Burch, J. 1962. How to know the eastern land snails. Pictured-keys for determining the land snails of the United States occurring east of the Rocky Mountain Range. W.M.C. Brown Company Publishers, Iowa.
- Cowie, R. 2008. Samoan Snail Project. <http://www2.bishopmuseum.org/PBS/samoasnail/>. Accessed December 18, 2008.
- Global Invasive Species Database. 2008. <http://www.issg.org/database>. Accessed December 18, 2008.
- Hollingsworth, R. G., R. Kaneta, J. Sullivan, H. Bishop, Y. Qvarnstrom, A. da Silva, and D. Robinson. 2007. Distribution of *Parmarion* cf. *martensi* (Pulmonata: Helicarionidae), a New Semi-Slug Pest on Hawai'i Island, and Its Potential as a Vector for Human Angiostrongyliasis. *Pac. Sci.* 61(4): 457-467.
- Lydeard, C., R. Cowie, W. Ponder, A. Bogan, P. Bouchet, S. Clark, K. Cummings, T. Frest, O. Gargominy, D. Herbert, R. Hershler, K. Perez, B. Roth, M. Seddon, E. Strong, E. and F. Thompson. 2004. The global decline in nonmarine molluscs. *BioScience* 54(4): 321-330.
- Parkinson, B. 1982. The specimen shell resources of Fiji. Report prepared for the South Pacific Commission and the Government of Fiji.

Table 6.1. Preliminary summary of opportunistically - found specimens on Nakauvadra range.

USP Code	Brodie Code	Species	Common Name	No. found & collected
USP5819	A1	Family Bulimulidae <i>Placostylus</i> sp. 1 (adult dead shells only)	Flax shell	6
USP5820	A2 (DNA1)	Family Helicarionidae <i>Orpiella</i> sp?		1
USP5821	A3 (DNA2)	Family Ariophantidae <i>Parmarion martensi</i>		2
USP5822	A4	Family Helicarionidae (dead shells only) <i>Orpiella</i> sp?		Dead shells common along track, 7 collected (only one not weathered)
USP5823	A5 (DNA4)	Family Helicarionidae (living animals might = A4) <i>Orpiella</i> sp?		2
USP5824	A6 (DNA3)	Probably same as A3		1
USP5825	A7	<i>Placostylus</i> sp. 2 (shell not weathered, might be juvenile)		1
USP5826	A8 (DNA6)	Probably same as A3		2
USP5827	A9	Specimen died before living details recorded		1
USP5828	A10 (DNA5)	<i>Placostylus</i> sp. Very likely to be a living A1	Flax shell	1

Body form	Size	Status
Bulimoid shell present dextrally coiled, aperture edges thickened	40-50mm (shell height)	Endemic to Fiji
Heliform shell present (spire exceptionally flattened), dextrally coiled	8mm (shell diameter), 5mm (shell height)	Endemic likely but definitely native
Slug-like, reduced cap-like shell towards posterior	34mm (crawling length without tentacles)	Introduced
Heliform shell, dextrally coiled, spire flattened (thin aperture edge broken)	8-12 mm (shell height), 10-18 mm (shell diameter)	Endemic likely
Heliform shell, dextrally coiled, spire flattened (thin aperture edge intact)	10 mm (shell height), 17 mm (shell diameter)	Endemic likely
Slug - small reduced cap - like shell	35 mm crawling length	Introduced sp. likely
Fusiform shape shell	39 mm (shell height), 17 mm (shell width), aperture edge thin	Fiji endemic
Slug - small reduced caplike shell	Kept alive in sealed container for several weeks	Introduced sp. likely, extremely hardy
Cap - like shell	9 mm (shell diameter), 1 mm (shell height)	Unknown
Bulimoid shell present dextrally coiled	50 mm (shell height), aperture edge thickened	Fiji endemic