Land Snails as Models for Biodiversity Assessment in Sri Lanka

Annual Report
March 2005

Darwin Initiative for the Survival of Species

Annual Report

1. Darwin Project Information

Project Ref. Number	E1 DPO 1
Project Title	Land snails as models for biodiversity assessment in Sri Lanka
Country	Sri Lanka
UK Contractor	The Natural History Museum (NHM)
Partner Organisation	Wildlife Heritage Trust of Sri Lanka (WHT)
Darwin Grant Value	£68,500
Start/End dates	1.12.2003-30.11.2005
Reporting period Report number	1.4.2004 – 31.3.2005 3
Authors, date	Fred Naggs & Dinarzarde Raheem 20.5.2005

2. Project background

The project seeks to build on the success of the 1999-2002 project Land snail diversity in Sri Lanka by conducting taxonomic studies as a basis for understanding the origins and dynamics of the fauna and establishing conservation strategy.

3. Project purpose and outputs

- Taxonomic and systematic revisions with descriptions of new species
- Advanced training and research experience for Dinarzarde Raheem, the 1999-2002 Sri Lankan project manager.
- Training and work experience in electronic media communication for Hasantha Sanjeewa.
- At least five research papers on the following subject areas: taxonomy and systematics, distribution and conservation.
- Expansion of the interactive CD-ROM guide and publication of a new edition.
- A new field guide structured to show species associated with different habitat types and including pest and exotic species.
- Provision of an IUCN Red List evaluation of the Sri Lankan land snails.
- An assessment of the distribution of land snail diversity in Sri Lanka and of key areas for conservation.

Our projected timetable anticipated that the project could start at the beginning of October but the grant approval process resulted in a December 2003 start date when Fred Naggs was away on fieldwork and he could not commence work on the project until January 2004. The Darwin Secretariat is aware of a three-month delay in our projected outputs. Following invited participation in the 2005 IUCN Sampled Red List Index

Species workshop we intend to write a paper on the subject of how land snails can play a role in threatened species evaluation.

4. Progress

This project followed from the 1999 - 2002 project *Land snail diversity in Sri Lanka*. The original project was a survey based capacity building programme to provide training and establish resources on land snails in Sri Lanka. The large number of newly discovered species and recognition that major revisions of the snail fauna were required were the main justification for the current project. The first stage in dealing with the taxonomy was to review the status of species collected in the 1999-2002 surveys and our revised assessment is given in Appendix I.

Our project's activity milestones for papers submitted has been reached with one brief paper published, three substantial papers accepted for publication and a further substantial paper submitted as detailed in Section 7, Tables 1 & 2. In addition we are working on a further four papers and planning two additional papers. A selection of the papers written by Dinarzarde Raheem will be submitted to the University of Cambridge as a PhD dissertation.

Hasantha Sanjeewa completed six months successful training and work experience on the project and made a significant contribution to compiling data for the CD-ROM.
The sequence and timing of particular papers has not corresponded with our original proposals but the anticipated output will be covered and significantly exceeded. The changing of schedules was influenced by the invitation for Fred Naggs to present a paper on our work at the World Congress of Malacology in Perth, Western Australia in July. This visit to Australia and four brief visits to Sri Lanka were funded externally.
As notified in report 2, the unexpected change in the Sri Lankan government resulted in one of our wider objectives, close involvement in the setting up of a Sri Lankan biodiversity authority and institute, being unachievable within the time-scale of the project. The current government is unstable and, particularly post-tsunami, has no advocates in government to push this biodiversity initiative forward. As previously notified, the change in government resulted in a new Sri Lankan Minister of Environment and our institutional partnership in Sri Lanka was transferred to The Wildlife Heritage Trust of Sri Lanka. As Rohan Pethiyagoda is the managing trustee of the WHT, he continues as our main project partner in Sri Lanka.

Our wider objectives are now focussed on promoting a range of faunal studies in Sri Lanka and using our snail project work as a model for extending snail work to a wider geographical area. A number of the new targets have been met and these objectives have been developed into a long-term strategy with existing and new partners.
Fred Naggs was invited to participate in the IUCN Sampled Red List Index Species Selection Workshop held at the Zoological Society of London in March 2005. The decision reached at the meeting was that although snails are a key indicator group it is currently impractical to include snails in the SRLIS programme. We now plan to write an article *High diversity and high extinction rates: how can land snails play a role in assessing conservation priorities*.

Work plan for the next reporting period:

Submit papers for publication in peer reviewed international journals on the following subjects

1) New Sri Lankan species of Cyclophoridae (*Theobaldius, Japonia*)

2) New Sri Lankan species of *Glessula*.

3). The value of village home gardens for the conservation of Sri Lankan rainforest land snails

4). Land snails in Sri Lankan fragmented rainforests: patterns, processes and implications.

5). The native and endemic land-snail fauna of the wet lowlands of south-western Sri Lanka.

We also plan to prepare papers ready for publication in popular journals on:

1) The Indian Ocean tsunami: importance as a fossilisation event and impact on lowland snail faunas

2) High diversity and high extinction rates: how can land snails play a role in assessing conservation priorities?

5. Partnerships

We have a very strong partnership with the Wildlife Heritage Trust and have worked closely with the WHT in the past year to highlight the significance of the Sri Lankan biota. With Rohan Pethiyagoda we have brought teams of researchers together and produced a volume *Contributions to biodiversity exploration and research in Sri Lanka*, to be published as a supplement to The Raffles Bulletin of Zoology on 31st May 2005. An outcome of this collaborative work has been the recognition that Sri Lanka exhibits a biota that possesses components that are distinct from those of the Indian Western Ghats, with which it forms a global biodiversity hotspot, and includes some discrete ancient lineages that are not represented in India. Our snail work in support of this interpretation is in a paper submitted to the *Biological Journal of the Linnean Society*, which analyses molecular information, and in a historical biogeographic interpretation of the systematics in a paper accepted for publication in the *Records of the Australian Museum*. Some of the findings based on other taxa are summarised in Bossuyt et al . 2004. Local endemism within the Western Ghats-Sri Lanka biodiversity hotspot. *Science* **306**: 479-481, Bossuyt et al., letters to *Science* **308**: 199. We have formed links with colleagues in India and Nepal who wish to participate in an expanded programme and with colleagues in Thailand who also wish to bring their contacts in Laos, Cambodia, Vietnam and Malasysia into a regional programme.

6. Impact and sustainability

Contributions to biodiversity exploration and research in Sri Lanka contains 21 papers and the project principals are contributing authors on nine of these. This will be a significant contribution to Sri Lankan biodiversity work when it is published in a few

weeks. The paper and letters in Science have generated considerable interest, particularly among biodiversity and conservation researchers and evolutionary biologists interested in South Asia. Zeylanica, published by WHT [Rohan Pethiyagoda (Managing Editor) and Fred Naggs (on Editorial Board)] was suspended while Rohan Pethiyagoda was in government but publication will now be resumed. There is now likely to be sufficient research activity on the Sri Lankan biota for Zeylanica, previously the Journal of South Asian Natural History, to focus on Sri Lanka rather than the whole of South Asia.

Fred Naggs gave an invited presentation, The current status of and future prospects for Sri Lankan landsnails, at the National workshop on current status of invertebrate fauna in Sri Lanka held in Colombo on 5th August 2004. Organised by Ministry of Environment & Natural Resources. A one-page feature article on our work was published in a Sri Lankan national newspaper (Appendix II).

Our invited paper *Sri Lankan snail diversity: faunal origins and future prospects* at the World Malacological Congress in Perth, Western Australia was presented to an international audience and led to a number of future potential partners seeking to engage in collaborative projects. The conference paper has been accepted for publication and our results referred to in the correspondence in *Science*. A number of Sri Lankan snail species distribution patterns support the hypothesis that the varied topography in Sri Lanka has allowed altitudinal biotic shifts to occur in response to past climate change and that this has contributed to the high levels of diversity and endemism. The remaining wet forests are highly fragmented and there are few places in which such biotic altitudinal adjustments can occur in response to future climate change. Within Sri Lanka we propose working with the WHT in implementing a conservation programme that addresses this problem. The need is to establish altitudinal corridors linking forest fragments. WHT have purchased an abandoned tea estate in what would have originally been cloud forest. A planting programme is underway to restore native cloud forest. We propose carrying out detailed snail surveys of forests in the area to establish a baseline for faunal recovery in the project area by monitoring snail diversity. We are exploring the potential to establish forest corridors in Sri Lanka with financial support from the World Land Trust.

7. Outputs, outcomes and dissemination

The order of papers submitted to journals has varied slightly from our timetable with the addition of the invited presentation and paper from the international conference in Perth. However, we have already reached the paper output target for the project with five additional papers in preparation and a further two planned. We have worked closely with our project partner in encouraging colleagues to work on the Sri Lankan biota and the additional eight papers in press on non-molluscan topics for which project principals are contributing authors are included in table 2.

As previously reported, submission of data on threatened snail species for IUCN red listing was not undertaken,. Following invited participation in the 2005 IUCN Sampled Red List Index Species workshop we intend to write a paper on the subject of how land snails can play a role in threatened species evaluation. This will be from the perspective of assessing and monitoring threatened habitats rather than that of the IUCN approach based on a global assessment of individually threatened species.

Table 1. Project outputs (According to standard output measures)

Code no.	Quantity	Description
8	16 weeks	Fred Naggs made four visits to Sri Lank
11A	10	Listed in Table 2
11B	3	Raheem, D., and Naggs, F. Submitted July 2004. The Sri Lankan endemic semi-slug Ratnadvipia (Limacoidea: Ariophantidae) and a new species from southwestern Sri Lanka. Accepted for publication in *Systematics and Biodiversity.* Naggs, F. and Raheem, D. Sri Lankan snail diversity: faunal origins and future prospects. Submitted October 2004. accepted for publication *Records of the Western Australia Museum.* Wade, C., Mordan, P.B., and Naggs, F. Submitted February 2005. Evolutionary relationships among the Pulmonate land snails and slugs (Pulmonata, Stylommatophora). Accepted for publication *Biological Journal of the Linnean Society subject to changes.* Resubmitted March 2005.
14b	3	Invited speaker at the World Congress of Malacology. Perth, Australia. July 2004. Invited speaker at the National Workshop on Current Status of Invertebrate Fauna in Sri Lanka. Colombo, August 2004. Invited expert at IUCN Sampled Red List Index workshop. London, March 2005
15a	1	Leading one full page article in the Life Style supplement of the Sri Lankan national newspaper Sunday Island 24th October 2004

Table2: Publications

Journal	Detail	Publisher	Available from	Cost
web	**Naggs, F**. 2004. Lack of local information allows invasion of slug and snail pests in Sri Lanka. Case study 30.	BioNET-INTERNATIONAL	http://www.bionet-intl.org/case_studies/case30.htm	
booklet	**Naggs, F**. 2004. Lack of information allows invasion of slug and snail pests in Sri Lanka. Case study 30 in Davies, H, King, N and Smith, R. (eds) Taxonomy: targeting invasives. BioNET-INTERNATIONAL.	BioNET-INTERNATIONAL		
journals	Bossuyt *et al* including **R. Pethiyagoda**. 2004. Local endemism within the Western Ghats-Sri Lanka biodiversity hotspot.	*Science* **306**: 479-481		
	Bossuyt *et al* including **R. Pethiyagoda**. 2004. Biodiversity in Sri Lanka and the western Ghats.	Letters to *Science* **308**: 199		
	Naggs, F, Raheem, **D**., Ranawana, K., and Mapatuna, Y. 2005 (In Press: publication date 31.5.2005). The Darwin Initiative project on Sri Lankan land snails: patterns of diversity in Sri Lankan forests. Contributions to biodiversity exploration and research in Sri Lanka.	*Raffles Bulletin of Zoology,* Supplement **12**: 23-31.		
	Pethiyagoda, R. *2005. Exploring Sri Lanka's biodiversity.*	*Raffles Bulletin of Zoology,* Supplement **12**: 1-4.		
	Bahir, M.M. Ng, P.K.L. Crandell, K., and **Pethiyagoda, R**. 2005. A conservation assessment of the freshwater crabs of Sri Lanka.	*Raffles Bulletin of Zoology*, Supplement **12**: 121-126.		
	Pethiyagoda, R., and Kottelat, M. 2005. A review of the barbs of the Puntius filamentosus group (Teleosti: Cyprinidae) of southern India and Sri Lanka.	*Raffles Bulletin of Zoology,* Supplement **12**: 127-144.		

	Pethiyagoda, R., and Kottelat, M. 2005. The identity of the south Indian barb *Puntius mahecola* (Teleosti: Cyprinidae).	*Raffles Bulletin of Zoology, Supplement **12**: 145-152*		
	Gower, D.J., Bahir, M.M., Mapatuna, Y., **Pethiyagoda, R., Raheem, D.**, and Wilkinson, M. 2005. Molecular phylogenetics of Sri Lankan *Ichthyophis* (Amphibia: Gymnophiona: Ichthyophiidae), with discovery of a cryptic species.	*Raffles Bulletin of Zoology,* Supplement **12**: 153-162.		
	Manamendra-Arachchi, K., and **Pethiyagoda, R**. 2005. The Sri Lankan shrub-frogs of the genus *Philautus* Gistel, 1848 (Ranidae: Rhacophorinae), with description of 27 new species.	*Raffles Bulletin of Zoology, Supplement **12**: 163-305.*		
	Bahir, M.M., Meegaskumbura, M., Manamendra-Arachchi, K., Schneider, C.J., and **Pethiyagoda, R.** 2005. Reproduction and terrestrial direct development in Sri Lankan shrub frogs (Ranidae: Rhacophorinae: Philautus).	*Raffles Bulletin of Zoology*, Supplement **12**: 237-239.		

8. Project expenditure

Table 3: Project expenditure during the reporting period

Item	Budget	Expenditure	Balance
Rent, rates heating, overheads etc			
Office costs			
Travel and subsistence			
Printing			
Conferences seminars etc			
Capital items/equipment			
NHM Overheads (revised)			
Subsistence			
Salaries (specify) D Raheem H Lokugamage TOTAL			

9.Monitoring, evaluation and lessons

We are working to clearly defined objectives that can primarily be measured as published outputs.

Project summary	Measurable indicators	Progress and achievements April 2004 to March 2005	Actions required/planned for next period
Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve • The conservation of biological diversity, • The sustainable use of its components, and • The fair and equitable sharing of the benefits arising out of the utilisation of generic resources			
Purpose Provide a leading example of post-survey taxonomic revision, new species descriptions and wide dissemination of information for biotic inventories in Sri Lanka.	Provide a baseline of land snail species diversity and distributions by: 1. employing original project manager for two years to work up and publish discoveries at NHM. 2. employing best of original project's field/research assistants at the NHM for six months to contribute to the publication of comprehensive Sri Lankan snail information resource	1. Significant progress made in interpreting systematics of Sri Lankan snail fauna by preparation, submission acceptance and publication of papers, presentations at international meetings. *2.* Employment of Hasantha Sanjeewa April – September 2004 to add data to CD-ROM. *3.* Successful extension of investigations with co-operative links with other workers to include wider biotic coverage with papers in international journals and *Contributions to biodiversity exploration and research in Sri Lanka.*	

Outputs			
1. taxonomic revisions 2. descriptions of new species	1,2 publication of taxonomic revision papers and new species descriptions	Paper on taxonomy of *Ratnadvipia* including new species submitted to *Biodiversity & Systematics* July 2004. accepted for publication	Two additional papers with species descriptions in preparation: 1. New Sri Lankan species of Cyclophoridae (*Theobaldius, Japonia*) 2. New Sri Lankan species of *Glessula*. further papers planned
3. evaluation of entire recorded land snail fauna for IUCN red listing	3. submission of information on extinction threat categories for all of the recorded Sri Lankan snail fauna to IUCN	Fred Naggs was invited participant as molluscan specialist at IUCN Sampled Red List Index workshop. London, March 2005	*3)* We no longer consider that listing Sri Lankan land snails as part of a global assessment is currently an appropriate strategy. This topic will be addressed in an article *High diversity and high extinction rates: how can land snails play a role in assessing conservation priorities?*
4. publications on distribution and conservation	4. publication of analytical paper(s) on aspects of Sri Lankan land snail distributions	1. Naggs *et al.* The Darwin Initiative project on Sri Lankan land snails: patterns of diversity in Sri Lankan forests. Accepted for publication in the *Raffles Bulletin of Zoology.*	In preparation: 1. The value of village home gardens for the conservation of Sri Lankan rainforest land

		2. Naggs, F. and Raheem, D. Sri Lankan snail diversity: faunal origins and future prospects. Submitted October 2004. accepted for publication in *Records of the Western Australia Museum.* 3. Wade, C., Mordan, P.B., and Naggs, F. Submitted February 2004. Evolutionary relationships among the Pulmonate land snails and slugs (Pulmonata, Stylommatophora). Accepted for publication *Biological Journal of the Linnean Society subject to changes.* Resubmitted March 2005.	snails 2. Land snails in Sri Lankan fragmented rainforests: patterns, processes and implications. 3. The native and endemic land-snail fauna of the wet lowlands of south-western Sri Lanka.
5. major development of CD-ROM	5. addition of new species to CD-ROM, a summary of information for all species, including facsimilies of the primary literature, images of living specimens, habitat views and distribution maps	Hasantha Sanjeewa made progress on scanning primary literature. Additional progress is being made by two part-time volunteer workers	Facsimiles of primary literature to be added to CD-ROM
6. user friendly guide	6. preparation of a user-friendly, laminated folding guide giving common species of different types, including pest species	Structure of guide planned and taxa chosen for inclusion	Preparation of guide ready for publication.

Appendix I

Status of species level taxa

Species	Native Taxa	Described Taxa	New Species and Subspecies	Status unknown	Described Endemics
Acavus haemastoma	1	1	0	0	1
Acavus phoenix	1	1	0	0	1
Acavus superbus	1	1	0	0	1
Aulopoma grande	1	1	0	0	1
Aulopoma sp. A	1	0	0	1	0
Aulopoma sp. C	1	0	0	1	0
Aulopoma sp. D	1	0	0	1	0
Aulopoma sp. E	1	0	1	0	0
Aulopoma sp. F	1	0	1	0	0
Beddomea albizonata-aggregate	1	1	0	0	1
Beddomea ceylanica (?)	1	1	0	0	1
Beddomea trifasciatus-aggregate	1	1	0	0	1
Corilla adamsi	1	1	0	0	1
Corilla beddomeae	1	1	0	0	1
Corilla carabinata	1	1	0	0	1
Corilla colletti	1	1	0	0	1
Corilla erronea	1	1	0	0	1
Corilla humberti	1	1	0	0	1
Corilla odontophora	1	1	0	0	1
Cryptozona bistrialis	1	1	0	0	0
Cryptozona ceraria	1	1	0	0	1
Cryptozona chenui	1	1	0	0	1
Cryptozona semirugata	1	1	0	0	0
Cyathopoma mariae	1	1	0	0	1
Cyathopoma sp. (Uva)	1	0	1	0	0
Cyathopoma sp. (turritite)	1	0	1	0	0
Cyathopoma ceylanica	1	1	0	0	1
Cyathopoma sp. F	1	0	1	0	0
Cyclophorus involvulus	1	1	0	0	0
Cyclophorus menkeanus-aggregate	1	1	0	0	1
Eupecta colletti	1	1	0	0	1
Euplecta concavospira-aggregate	1	1	0	0	1
Euplecta emiliana	1	1	0	0	1
Euplecta gardeneri	1	1	0	0	1
Euplecta hyphasma	1	1	0	0	1
Euplecta indica-aggregate (LCDZ & IZ)	1	0	0	1	0
Euplecta indica-aggregate (LCWZ, flat and large))	1	0	1	0	0
Euplecta indica-aggregate (LCWZ, small	1	0	1	0	1

and turbinate)					
Euplecta isabellina	1	1	0	0	1
Euplecta layardi	1	1	0	0	1
Euplecta partita-aggregate	1	1	0	0	1
Euplecta prestoni	1	1	0	0	1
Euplecta semidecussata	1	1	0	0	0
Euplecta sp. (dwarf, like *verrucula*)	1	0	0	1	0
Euplecta sp. (Moneragala, arboreal)	1	0	0	1	0
Euplecta sp. (montane, turritite)	1	0	0	1	0
Euplecta sp. (like *phideas*)	1	0	1	0	0
Euplecta travancorica praeeminens	1	1	0	0	0
Satiella sp. A	1	0	1	0	0
Eurychlamys sp. B	1	0	1	0	0
Eurychlamys regulata	1	1	0	0	1
Glessula (?) *capillacea*	1	1	0	0	1
Glessula parabilis	1	1	0	0	1
Glessula sp. (montane, micro)	1	0	0	1	0
Glessula ceylanica	1	1	0	0	1
Glessula sp. A[1]	1	0	1	0	0
Glessula sp. A[2]	1	0	1	0	0
Glessula sp. A[3]	1	0	1	0	0
Glessula sp. A[4]	1	0	1	0	0
Glessula sp. C	1	0	1	0	0
Glessula sp. G	1	0	1	0	0
Glessula sp. H	1	0	1	0	0
Glessula sp. I	1	0	1	0	0
Glessula veruina	1	1	0	0	1
Indoartemon layardianaus	1	1	0	0	1
Indoartemon sp.	1	0	1	0	0
Japonia conulus	1	1	0	0	1
Japonia sp. (Viharekele)	1	0	1	0	0
Japonia sp. (like *binoyae*)	1	0	1	0	0
Japonia vesca	1	1	0	0	1
Japonia vesca subspecies A	1	0	1	0	0
Kaliella barrakporensis	0	0	0	0	0
Kaliella colletti (?)	1	0	0	0	1
Landouria radleyi	1	1	0	0	1
Leptopoma semiclausum	1	1	0	0	1
Leptopomoides halophilus	1	1	0	0	1
Leptopomoides taprobanensis	1	1	0	0	1
Macrochlamys vilipensa	1	1	0	0	0
Micraulax coeloconus	1	1	0	0	0
Microcystina lita	1	1	0	0	1
Mirus panos	1	1	0	0	1
Mirus stalix	1	1	0	0	1
Nicida delectabilis	1	1	0	0	1
Oligospira poleii	1	1	0	0	1
Oligospira skinneri	1	1	0	0	1
Oligospira waltoni	1	1	0	0	1

Phaedusa ceylanica	1	1	0	0	1
Philalanka circumsculpta-aggregate	1	1	0	0	1
Philalanka sinhila	1	1	0	0	1
Philalanka lamcabensis-aggregate	1	1	0	0	1
Philalanka thwaitesi	1	1	0	0	1
Pterocyclus cumingi-aggregate	1	1	0	0	0
Rhachistia pulcher	1	1	0	0	0
Ratnadvipia irradians	1	1	0	0	1
Ratnadvipia sp. A	1	0	1	0	0
Ravana politissima	1	1	0	0	1
Ruthvenia clathratula	1	1	0	0	1
Scabrina (?) *brounae*	1	1	0	0	1
Sivella sp.	1	0	0	1	0
Eutomopeas layardi-aggregate	1	1	0	0	1
Theobaldius annulatus-aggregate (LCDZ & IZ)	1	1	0	1	1
Theobaldius annulatus-aggregate (LCWZ)	1	1	0	1	0
Theobaldius bairdi	1	1	0	0	1
Theobaldius layardi	1	1	0	0	1
Theobaldius sp. F	1	0	1	0	0
Theobaldius sp. E	1	0	1	0	0
Theobaldius sp. A	1	0	1	0	0
Theobaldius sp. C	1	0	1	0	0
Theobaldius sp. D	1	0	1	0	0
Theobaldius sp. G	1	0	1	0	0
Thysanota bicillata	1	1	0	0	1
Thysanota eumita	1	1	0	0	1
Tortulosa aureus	1	1	0	0	1
Tortulosa austeniana	1	1	0	0	1
Tortulosa marginata	1	1	0	0	1
Tortulosa nevilli	1	1	0	0	1
Tortulosa pyramidata	1	1	0	0	1
Tortulosa sp. (Handapan Ella)	1	0	1	0	0
Tortulosa prestoni	1	1	0	0	1
Tortulosa sp. (templemani or ally)	1	0	1	0	0
Tortulosa cumingi-aggregate	1	1	0	0	1
Tortulosa blanfordi new sub species	1	1	0	0	1
Other New species	10	0	8	0	0
New sub-species	8	0	8	0	0
Other Described taxa	10	10	0	0	0
TOTAL	**149**	**90**	**47**	**11**	**72**

Exotic species	**15**
Described Native Species	**10**
Described Endemic Species	**72**
New Species and subspecies	**47**

Appendix II

Feature article in Sri Lankan national newspaper

NEWGEN milk CHOCOLATE MILK
Spirit of the New Generation
Ceylon Chocolates Ltd.
LIFE style
Sunday Island, October 24, 2004 – Page 1

Several new species discovered by gifted Lankan naturalist

Snails are a large Part of her life!

Photo: H. Lokugamage

by Namini Wijedasa in London

To most, a snail is something to gingerly pluck out from a plant pot and toss into the horizon. But to one young Sri Lankan scientist in England, these slimy, unassuming creatures offer the key to some of nature's most pressing questions.

Twenty -eight-year-old Dinazarde Raheem has spent the last 11 years of her life investigating Sri Lanka's land snails: Examining the animals in their home environments and making collections; studying and verifying available information; researching new species. Her work has helped reinforce what others have already, to an extent, established — that Sri Lanka has a high, even staggering, number of endemic snails.

The total number of species already known is approximately 250, with the greatest diversity found in the rainforests of south-western Sri Lanka. Of these, over 80 per cent are unique to Sri Lanka. And Dinazarde estimates that she may have discovered at least 50 more new species during the course of her fieldwork. These are soon to be formally described and catalogued. There may also be other new species in parts of the country that haven't yet been surveyed.

Together with Fred Naggs — biodiversity and conservation officer at the Natural History Museum (NHM) in London, where Dinazarde is currently based — she has produced glossy colour guides of Sri Lanka's snails in Sinhala, Tamil and English and is in the process of creating a CD-ROM of all described Sri Lankan species, complete with illustrations. They have also helped establish a reference collection of land snails at the Department of National Museums and another at the University of Peradeniya.

What drives her? "It's curiosity really," she grinned. "That's why I do it. I'm fascinated by natural history and curious to find out what's happening in Sri Lanka in terms of the land snail fauna."

Snails as an indicator

"Snails act as an indicator because they share their forest habitat with lots of other species," she enthused. ""They can tell us how animals in forests might be coping or not coping with changes in forest cover. They can provide clues about how communities of species are structured. I'm using snails as a model to answer fundamental questions about the ecosystem."

It sounds like a language only biologists can understand but Fred volunteered to explain. Land snails can offer us a view of the past, he said. Their shells often remain preserved for long periods of time and can yield clues about the earth's past climate. Land snails such as the large and beautiful tree snail Acavus have changed little since the world's southern continents were joined together as the supercontinent Gondwana over 100 million years ago. They can provide insight into the rate of evolutionary change.

Scientists may also find interest in why Sri Lanka has such a large number of endemic snails — species that are not even found in India. Although the island does share many species of mammal, bird and reptile with the neighbouring country, this does not extend to snails. "That's got to mean something," observed Fred.

Lack of interest

Fred and Dinazarde lament that, despite being fascinating and often beautiful creatures, snails are a neglected species in Sri Lanka. They are usually reviled for destroying plants, although Dinazarde pointed out that none of the major pest species are native to Sri Lanka — the introduction of exotic slugs and snails is a serious and growing problem.

"Next to being asked how to kill garden snails, the question we are most often asked is 'what use are they'?" Fred and Dinazarde write in one of their colour guides. "This implies that the existence of organisms needs to be justified in terms of human values and human exploitation; it is not a view we share."

Dinazarde's own interest in snails developed a few months after she left school, when she spen t a year rummaging in Sri Lankan forests with eminent naturalist the late P. B. Karunaratne — 'Karu', to his friends. A friend of the family, he was involved in a five-year survey of forest areas — studying various animal groups like mammals, birds, amphibians, reptiles and butterflies — and he had encouraged the young girl to become one of his field assistants. She moved fresh from her advanced level examination into Sri Lanka's wilderness.

An old girl of Bishop's College and Colombo International School, Dinazarde later shifted to Imperial College, London, for a degree in biology. Snails became an important focus of interest during her time as an undergraduate. She started visiting the neighbouring NHM because she knew it had Sri Lankan collections. "I wanted to identify the snails I had seen while working with Uncle Karu," she said.

The NHM collection

How had a museum in Britain acquired such a large collection of Sri Lankan snails? The answer lies with the Brits who roamed the country during colonial times, many of whom had strong naturalist inclinations. "We do have a massive collection of specimens, mostly put together during the 19th century," said Fred. "Britain was then a major influence in the world and Britons took their passionate interest in natural history wherever they went." Including 'Ceylon'. And their zeal was not confined to snails.

"If anybody wants to do any work involving animals in Sri Lanka, the chances are that they will have to refer to our collections here," Fred said. "This is especially true where it concerns groups like snails."

These amateur British naturalists gathered samples of flora and fauna, trying to identify species and glean whatever information they could about them. This led to the formation of private collections around the world; these later came to the United Kingdom when their owners retired and returned home. Many of them left their collections as private legacies and the museum has largely built up its own collections from these private individuals. The museum's haul often forms the basis of diverse study programmes.

Among those collectors who lived and worked in Sri Lanka were several members of the Layard family. The two Layard cousins, Edgar and Fredrick, made a particularly significant contribution to the study of Sri Lankan natural history and to our basic understanding of how many species there are in the country — not only of snails but of butterflies, birds, etc.

Continued on page 9

Snails...

From page 1

OA large number of the snails they gathered are now at NHM, Layard's Road in Colombo is named after another member of this family.

"It was fun"

In her first year and also immediately after her degree, Dinazarde and some friends conducted two field expeditions to Sri Lanka with funding from the university. Once again, she was trudging through forests, surveying distribution and collecting specimens. And it was quite enjoyable, she recalled.

"Sometimes we camped," she said. "Sometimes we climbed hills and often we walked quite deep into the forests. We saw birds, waterfalls, beautiful trees.... It was fun."

Following graduation, Dinazarde started working part-time at NHM. Soon afterwards, she became involved in a collaborative project on Sri Lankan land snails between the NHM, Department of National Museums Sri Lanka and the University of Peradeniya. The project was funded by the UK government's Darwin Initiative. It involved field research on land snails and their distribution; the establishment of land snail collections in Sri Lanka; and the publication of scientific and popular guides on the island's land-snail fauna.

Launched at the 1992 UN 'Earth Summit' in Rio de Janeiro, Brazil, the Darwin Initiative seeks to help safeguard the worlds' biodiversity by drawing on British strengths. It aims to assist countries that are rich in biodiversity but poor in financial resources by increasing their capacity for understanding and conserving their own biodiversity.

During the three-year Darwin project, Dinazarde studied land snails in different forests of Sri Lanka's wet, dry and intermediate zones. This was followed with more detailed research in threatened forest patches of the wet lowlands. The latter study, which forms the focus of her PhD, looks at how forest snails deal with forest loss and land use change. For this, she explored lowland rainforests in the Ratnapura, Kalutara, Galle and Matara districts.

Over the next few years, Fred and Dinarzarde hope to publish the results of these investigations as popular articles, guides and as research papers in scientific journals.

Local knowledge

Currently completing her doctoral studies at the University of Cambridge and NHM, Dinazarde has gained valuable insight during the past few years. She has discovered, for instance, that some of the people who knew most about forests were the villagers who lived around them. "There are still local people with an incredible knowledge of forest plants and the uses of forest plants," Dinazarde said. "They don't know them by scientific or botanical names.' But they have a sophisticated system of classification which is quite impressive."

"We have come across people who are quick in picking up even Latin names," she continued. "A lot of people are desperate for information."

Dinazarde now hopes that more can be done to provide updated and scientific information on Sri Lanka's plants and animals to people in rural areas.

"I think long-term conservation depends on empowering local people, people who actually live close to forests," she explained. "They are in the best position to protect those areas. I feel the solution lies in getting local people involved in managing their own resources."