

The Newsletter of the IUCN/SSC Mollusc Specialist Group
Species Survival Commission • IUCN - The World Conservation Union

TENTACLE

Editorial

According to the 10 May 1999 issue of the Pacific Daily News (a Guam newspaper), the case between the British Broadcasting Corporation (BBC) and Dr. R. Muniappan was settled out of court. Dr. Muniappan had taken the BBC to court over its documentary "Predator" that told the story of the extinction of native Pacific island tree snails as a result of the introduction of the predatory snail *Euglandina rosea* for putative control of the giant African snail, *Achatina fulica* (there is no good evidence that control is effected). Dr. Muniappan had taken exception to statements in the documentary that implicated him in causing such extinctions. The BBC paid all his expenses plus a "small cash settlement". The paper said "they also agreed to withdraw their documentary from their catalogue and just keep one copy under lock and key". The lesson to be learned from this fiasco is that we must all be extremely careful that whatever we write or say regarding conservation, the impacts of alien species, development, and so on, especially in a public forum, must be watertight. We all have gut feelings about many of these issues—gut feelings that are based on our experience and that may frequently be correct—but unless we can support those feelings with facts in a court of law it may often be better to resist the temptation to express them. Loss of a lawsuit does more harm to our cause than does presenting a somewhat less cut and dried case in the first place—it damages our entire credibility. That "Predator" is no longer available is a tragedy.

As always, I reiterate that the content of *Tentacle* depends largely on what is submitted to me. Molluscs continue to face many conservation problems and I consider *Tentacle* a means to publicise them. To this end I make every effort to distribute *Tentacle* as widely as possible, given limited resources. So I encourage anyone with a concern about molluscs to send me an article, however short. It doesn't take long to pen a paragraph or two.

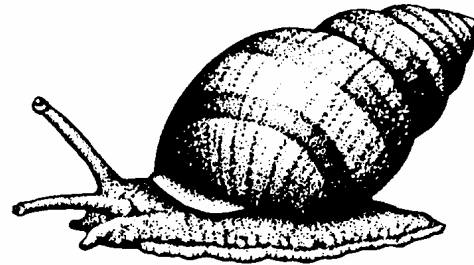
Don't wait until I put out a request for new material (usually via the MOLLUSCA listserver). Send me something now, and it will be included in the next issue. Line drawings (not photographs) are particularly welcome.

I make only very minor editorial changes to submitted articles and I accept almost everything submitted to me. Statements made in *Tentacle* therefore remain the authors' responsibilities and the balance of each issue reflects whatever I receive.

The interval between the appearance of this issue of *Tentacle* and issue 8 has been too long, for reasons beyond my control, but essentially financial. For this I apologise. Printing and mailing of this issue was supported by UNITAS Malacologica, for which the Mollusc Specialist Group is most grateful.

I am in the process of updating the mailing list for *Tentacle*. If you receive it but some of your details are incorrect, please let me know.

Robert H. Cowie, Editor, details in the list of Mollusc Specialist Group members at the end of this issue of *Tentacle*.



In this issue:

IUCN and Mollusc Specialist Group News

Internet resources: lists and websites

Meetings 2000/2001

New Society: Freshwater Mollusk Conservation Society

News

Freshwater bivalves in North America

Considering molluscs in rodent eradication projects

Rare species in Delaware?

South Iberian and North African land molluscs

Committee On Recently Extinct Organisms (CREO)

Molluscs in biodiversity conservation planning

Black carp threat to North American freshwater mollusks

East African snail projects

Indian snail project

Tourism threat to Madeiran land snails

Banff Springs snail recovery in Canada

Mollusks stall Japanese nuclear power plant construction

Pacific island land snail page: Snails in Vanuatu, Hawaiian succineids, Hawaiian Achatinellinae, Galapagos land snails, *Placostylus* in New Caledonia, Alien snails in the Pacific

Marine matters: Oysters in New York, North American bivalves, Pacific *Nautilus*, Australian news, Canadian winkles

New CD-ROMs

Recent publications relevant to mollusc conservation

Members of the Mollusc Specialist Group

IUCN AND MOLLUSC SPECIALIST GROUP NEWS

Resignation

Winston Ponder has resigned as co-chair of the Mollusc Specialist Group, effective October 2000. We thank him for his efforts on behalf of the group over the last few years and for his continuing efforts on behalf of mollusc conservation. He continues as a regular member of the group. Mary Seddon remains as chair, until at least 2003.

Species Information Service (SIS)

The IUCN Species Survival Commission (SSC) is developing the Species Information Service (SIS) software, which will bolster information management capacity throughout the network. It will be the first such wide-scale effort to link spatial and temporal data sets across a wide variety of species including vertebrates, invertebrates and plants. As a result, it will increase the efficiency with which existing products, such as the IUCN Red Lists of Threatened Species, are delivered.

The vision of SIS is to create a world-wide species information resource (inter-linked databases of species-related information) that is easily accessible to all members allowing efficient exchange of data and information across the internet, building to the most comprehensive global resource of species information in existence.

SIS will be implemented through a distributed data management model; SSC Specialist Groups will serve as "data custodians", thus retaining full control over the quality and management of the data contributed by their own members. It will integrate several aspects of information management, including the capacity to manage population data, a geo-referencing component, an expert system for applying the IUCN Red Listing system, the ability to track conservation actions, and documentation of information resources.

Ultimately, SIS will enable SSC to produce IUCN Red Lists, Action Plans, expert advice and services to international treaties with ease and efficiency. It will allow efficient integration of data and information with partner organisations, in particular those working now with SSC in the context of the BCIS consortium. Concurrently, it will enable SSC Specialist Groups to more effectively advance conservation of the animal and plant species to which they are committed.

The finalised version of SIS should be available to Mollusc Specialist Group members at the end of 2000 and will herald the movement of the data gathering process to a more streamlined standardised system.

Mary Seddon, details in the list of Mollusc Specialist Group members at the end of this issue of *Tentacle*.

IUCN Red List: criteria review

Many of the people involved in the Red Listing of molluscs in 1995-6 had comments about the applicability of the new criteria to molluscs. These were consolidated into a single document and presented to the SSC office in 1996. There were many other representations from different fauna and flora specialist groups and other interested parties and the at the World Conservation Congress in Montreal in 1996, SSC was mandated to review the categories and criteria in the light of these comments. Since 1997 this process has been ongoing and involved over 60 scientists and all of the workshop reports have been posted on the SSC web-site under Red Listing theme for comments (<http://www.iucn.org/themes/species>). Members of the Mollusc Specialist Group have been present at several of these workshops, ensuring that the invertebrates

viewpoint was considered during the discussions. Mary Seddon has attended three of the criteria review workshops (scoping, population data and thresholds, range thresholds and Winston Ponder attended workshops on range thresholds and uncertainty about data quality. The final review workshop was held in July 1999, and the recommendations from this process were presented to IUCN council for approval. The revised categories and criteria will come into effect from 1 January 2001. There is a change to Vulnerable D2 thresholds which will have an impact on Molluscs, and will hopefully reduce the likelihood of overlisting species that are abundant in a small range, but not at risk.

As with all of these processes, there have been compromises, and some suggestions made from an invertebrate perspective were recognised, but not adopted.

There are some additions and amendments to the 1996 list of molluscs, which will be placed on the SSC Red List database to be launched in October 2000, and we have improved the knowledge on some data deficient species listed in 1996. All changes to the list now require full documentation (see headings below), and hence only some listings have been reviewed in 2000. However, from 2000 the Red List will be up-dated annually. We intend to implement a process of reviewing all existing records for molluscs on the 1996 list by 30 April 2001, with the intention of having a completely revised and documented list using the new criteria by the time of the Unitas Malacologia meeting in Vienna (see below for information on this meeting). Mary Seddon has already initiated the process of reviewing the records, and all previous records are being annotated with documentation requirements for future transfer to SIS when it becomes available.

Additional data with statements that provide the data source and quality of information (i.e. known range, "guesstimates") includes:

Species Name (authority)
 Order/superfamily/family (state source of taxonomic hierarchy used)
 Habitat
 Range description (globally)
 Number of localities where the species is found
 Range size (total) in km²
 Area within range that is occupied by species (in km²)
 Knowledge of range decline (over period of time)
 Reason for range decline (deterioration in quality, destruction, predation, competition, etc.)
 Number of subpopulations (IUCN definition)
 Size of population/subpopulations
 Knowledge of population decline (over specified period of time)
 Reason for population decline (small population size, predation, competition, etc.)
 Age at first breeding
 Life Span
 Number of young
 Specified threat to species
 List of references with supporting documentation about the above headings

Please note these dates for your diaries, and we hope you will assist in the preparation of the next Molluscan Red List in 2001, in the same enthusiastic manner as with previous Red List exercises.

Mary Seddon, details in the list of Mollusc Specialist Group members at the end of this issue of *Tentacle*.

Molluscan Action Plan: progress report

[From discussions at a meeting held at IUCN Gland with Simon Stuart, Sue Mainka, Mariano Gimenez-Dixon (SSC staff); Philippe Bouchet, Olivier Gargimony, Mary Seddon (MSG)]

The current concept of the plan is far broader than many of the other IUCN specialist group action plans, hence Philippe Bouchet organised a meeting with the SSC staff office, to get their opinions on the progress on the project, and advice as to how to seek to publish the product given its current size. The SSC office staff

viewed the project as an ambitious but very worthy product that the contributors should be proud of, and one which will seek to inform decision-makers about molluscs in a context that includes the essential data and potential sources of further information. Although Olivier Gargimony has been employed on other projects since 1998, there has been progress on the Action Plan. Much of the support for the Land and Freshwater Mollusc Action plan since 1998 has come from the Muséum Nationale d'Histoire Naturelle (Paris) and the French Ministry of Environment, who supported the visiting scientist award to Cristina Mansur (Brazil) and a grant to Alexander Suvorov (Russia). These two have increased the action plan coverage of the lesser known regions in South America and much of the former Soviet Union region. The outstanding gaps remain in North America, countries in South and Meso America, Japan, Europe, parts of the Middle East, parts of Africa (including Madagascar) and some of the Pacific islands.

SSC is currently investigating the possibility of posting the agreed final reports for countries as an electronic document on their web-site prior to the final publication.

Philippe Bouchet, details in the list of Mollusc Specialist Group members at the end of this issue of *Tentacle*.

Molluscan Conservation Conference: November 1996

The proceedings volume from this conference are available for purchase. The entire volume was produced as a special publication of the *Journal of Conchology* (published by the Conchological Society of Great Britain & Ireland, one of the co-organisers) with additional sponsorship from Countryside Council for Wales and English Nature.

Molluscan Conservation: A Strategy for the 21st Century. Journal of Conchology Special Publication 2. Eds. Killeen, I.J., Seddon, M.B. & Holmes, A.M.

Contact Mary Seddon (details in the list of Mollusc Specialist Group members at the end of this issue of *Tentacle*) for more information.

IUCN and MSG information sources on molluscs

1996 Red List of Molluscs. The list is available from IUCN Publications Services Unit, 219c Huntingdon Road, Cambridge CB3 0DL, UK. Tel +44 1223 277894, fax +44 1223 277175, e-mail iucn-psu@wcmc.org.uk.

The computer database used to compile the 1996 Red List is also accessible through the web at the World Conservation Monitoring Centre: <http://www.wcmc.org.uk/species/animals/index.html>

If you need to check on which species were given what status in the previous Red List, the links from the WCMC site will be useful to you. For readers' convenience, the entire list of bivalves was reproduced as an appendix in issue 8 of *Tentacle*; the gastropods were listed in issue 7.

SSC List. Members of the SSC Mollusc Specialist Group are entitled to register with the SSC mailing list, which disseminates information to the SSC network. At present it is restricted to members, but may become more widely available in the future.

Contact Mary Seddon (details in the list of Mollusc Specialist Group members at the end of this issue of *Tentacle*) if you wish to get access to this mailing list.

ECOLEX

A new initiative to provide global access to Environmental Law Information. <http://www.ecolex.org/>

ECOLEX is designed to use IUCN's Environmental Law Information System (ELIS) as its core archival system and link these

data to full text information available with UNEP's Computerised Environmental Law Information Base (CELIB) and other authoritative sources.

The project was initiated in 1997. Users can search using subject area, keyword, country, or date. The list of subjects includes, for example: climate/atmosphere; fresh water; marine environment; soils; forests; biodiversity; energy; protected areas; hazardous substances; and wastes. ECOLEX includes information on multilateral treaties, national legislation, European Union instruments, international "soft law" and related documents, law and policy literature, and judicial decisions.

The service is designed to provide users - via two levels of Internet access (general and specialised) - with access to: a locator mechanism, a distributed system of specialised environmental law information databases, products such as CD-ROMs, disk-based information and paper publications, and links to other databases, expertise and more information.

Buying books from Amazon.com? Then read on....

As a member of the Amazon.com Associates Program, SSC receives proceeds from purchases made from the Amazon.com web site. For SSC to receive these funds, you MUST enter the Amazon.com web site through the link on their web site. More information on SSC's affiliation with Amazon.com is available here. Contact ssc@hq.iucn.org with any additional questions.

Invasive Species Specialist Group

Alien invasive species - a global threat to biodiversity
<http://www.iucn.org/themes/ssc/news/invasives.htm>

The global conservation community is battling to find solutions to one of the major threats to biological diversity that continues unabated with devastating consequences for the planet. Biological invasion by alien species is now recognised as one of the major threats to native species and ecosystems, yet awareness of the problem is alarmingly low. The effects on biodiversity are immense and often irreversible.

Alien species are those that occur outside their natural range. Those alien species that threaten the existence of native plants and animals or other aspects of biodiversity are termed alien invasive species. Alien invasive species occur in all groups of plants and animals. As competitors, predators, pathogens and parasites, they have invaded almost every type of native ecosystem, and caused hundreds of extinctions.

Through increased volume of trade and international transport over the past few centuries, natural barriers such as oceans and mountains that once prevented the movement of species have now become ineffective, ending millions of years of biological isolation. Introductions of alien species can happen deliberately or unintentionally, for example, by organisms "hitch-hiking" in containers, ships, cars or soil.

The water hyacinth in African freshwater ecosystems, the rabbit and fox in Australia, the macaque monkey in Mauritius, or the zebra mussel in North America are among the better known examples of invasive species that damage native ecosystems. Tourists and homeowners often unwittingly introduce alien plants into wilderness areas, for example, by planting imported ornamental species in their gardens, which then flourish and out-compete native species.

The scope and cost of biological alien invasions are enormous in both ecological and economic terms. Economic costs of alien invasive species run into billions of dollars each year. Introduced pests and pathogens reduce crop and stock yields, and weeds degrade marine and freshwater ecosystems.

Improved education and dissemination of information to all sections of the international community is critical to stopping the spread of alien species. Yet useful information that could help reverse or at least halt the problems is not being shared sufficiently. That is why IUCN has identified the problem of alien invasive species as one of its major global initiatives and recently finalised the IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species.

These Guidelines, developed by the SSC's Invasive Species Specialist Group (ISSG), aim to help governments and management agencies around the world prevent the introduction of alien invasive species, or control and eradicate species that threaten their native species, habitats and ecosystems. Full text is available from: <http://www.iucn.org/themes/ssc/pubs/policy/invasivesEng.htm>

Aliens, the newsletter of the ISSG often contains items of interest to mollusc conservationists. It is available from its editor: Maj De Poorter, ISSG, School of Environmental and Marine Sciences, University of Auckland (Tamaki Campus), Private Bag 92019, Auckland, New Zealand; e-mail m.depoorter@auckland.ac.nz

ALIENS-L is the listserver of the ISSG. This listserver is not limited to members of ISSG but is available to all who might be interested in invasive species. From time to time there may be issues of interest in relation to mollusc conservation.

To subscribe to the list send an e-mail message to:
ssc-mgr@indaba.iucn.org

Leave the subject line blank and turn off any automatic signatures. In the body of the message type:
subscribe Aliens-l

This listserver is managed for the ISSG by Dick Veitch, 48 Manse Road, Papakura, New Zealand. dveitch@ns.planet.gen.nz. Daytime tel +64 9 307 9279, fax 64 9 377 2919, after hours tel/fax +64 9 298 5775. Co-manager is Wendy Strahm at IUCN Headquarters: was@hq.iucn.org

Additional IUCN/SSC information

The SSC web site is available at
<http://www.iucn.org/themes/ssc/siteindx.htm>

Red List Index Page
<http://www.iucn.org/themes/ssc/redlists/rlindex.htm>

IUCN Red List Criteria Review Provisional Report
Draft of the proposed changes and recommendations July 1999
<http://www.iucn.org/themes/ssc/SpeciesReportFinal.htm>

The IUCN Criteria Review: Report of the Marine Workshop
<http://www.iucn.org/themes/ssc/redlists/marine/marine.htm>

INTERNET RESOURCES: LISTS AND WEBSITES

These are just a few of the many websites dealing with molluscan conservation, and with molluscs and conservation in general.

Mollusca

The MOLLUSCA listserver is intended as an informal forum for discussions of molluscan evolution, palaeontology, taxonomy and natural history. There are over 700 subscribers. From time to time it has something of interest related to conservation. To subscribe to the list send e-mail to:

listproc@ucmp1.berkeley.edu

Then on the first line of the body of the message:

sub mollusca <your_name>

You will get a reply soon after saying that your name has been added. You will then receive anything that is posted to the list. MOLLUSCA is maintained and managed by D.R. Lindberg of the University of California Museum of Paleontology, Berkeley, USA.

Mollia

The MOLLIA web site makes available the UNITAS Malacologica newsletters, which have a lot of information complementing information in *Tentacle*. The site also includes instructions to authors, subscription information and links to various malacological journals. It also allows you to subscribe to the MOLLUSCA listserver (above) and to access the MOLLUSCA archives. MOLLIA, like MOLLUSCA, is maintained and managed at the University of California Museum of Paleontology, Berkeley, USA. The address is: <http://www.ucmp.berkeley.edu/mologis/mollia.html>

Unionids

UNIO is an unmoderated listserver focusing on the biology, ecology and evolution of freshwater unionid mussels. Details are given at the UNIO website:

<http://research.umbc.edu/~tankersl/unio.html>

The primary objectives of the list are (1) to foster communication and collaboration among scientists, researchers, and students engaged in mussel-related activities and (2) to facilitate the informal discussion of regional and federal research priorities. Postings related to mussel conservation issues, including the artificial propagation and captive rearing of threatened and endangered species, are especially welcomed. Subscribers are also encouraged to use the list for posting information on mussel-related meetings, symposia, workshops, and funding opportunities. The list is sponsored by the University of Maryland Baltimore County (UMBC) and administered and managed by Rick Tankersley (tankersl@umbc.edu) to whom any questions regarding the list, including problems while attempting to subscribe or post messages, should be addressed. There are no limitations on who may subscribe to the list and the subscription is free.

CITES

CITES-L is a Bulletin board restricted to trade issues for endangered species, which is managed from the World Conservation Monitoring Centre in Cambridge. The majority of information relates to mammal and bird trade, but updates to the CITES lists are posted there. To subscribe send a one line message to MAJORDOMO@WCMC.ORG.UK with the command line (in message body):

SUBSCRIBE CITES-L

World Conservation Monitoring Centre

Much information on the organizations' activities, and the entire Red List of Threatened Animals, which can be searched.
<http://www.wcmc.org.uk:80/>

Illinois Natural History Survey

This site has much information on the mussels of North America, with links to other mussel sites.
<http://www.inhs.uiuc.edu/cbd/collections/mollusk.html>

North American mussels

The US National Park Service has added a considerable amount of information on unionids to their web site.
<http://www.nature.nps.gov/wrd/mussels/TOC.htm>

Malacological Society of Australasia

The site has details of the "Molluscs 2000" meeting (see note below). <http://www.austmus.gov.au/malsoc>

American Malacological Society

The homepage of the AMS carries a link to the Society's conservation policy. <http://erato.acnatsci.org:80/ams/>

Hawaii Biological Survey

The Hawaii Biological Survey (based at the Bishop Museum, Honolulu) web site has searchable databases and much additional information on most Hawaiian organisms, including both indigenous (99% endemic) and non-indigenous land and freshwater snails, endangered species, and so on. <http://hbs.bishopmuseum.org/>

Samoan Snail Project

The Samoan Snail Project, part of the Bishop Museum's Pacific Biological Survey, has as its goals assessing the diversity and historical decline of the native Samoan non-marine snail fauna, as a first step in its conservation. <http://www.bishopmuseum.org/bishop/PBS/samoasnail/>

Links

Useful sites with links to many of the major malacological websites: <http://www.geocities.com/Paris/LeftBank/6559/scc28.html>
<http://manandmollusc.net/MolluscaLinks.html>

MEETINGS 2000/2001

International Congress on Basic and Applied Malacology

The International Society for Medical and Applied Malacology will sponsor, in cooperation with the Instituto Pedro Kouri, the Sixth International Congress on Medical and Applied Malacology in Havana, Cuba, September 4-8, 2000.

The Congress will include papers not only on medical and applied malacology, but also basic (non-applied) malacology.

For further information contact Dra. Gloria Perera, fax 537 246051, e-mail alfredo@ipk.sld.cu; or Mr. Fritz Paper, tel +1 734 764 0470, fax +1 734 763 4080, e-mail fpaper@umich.edu

Molluscs 2000

"Understanding Molluscan Biodiversity in our Region into the 21st Century. 4-8 December, 2000. The University of Sydney, Sydney, NSW, Australia.

This is the second of the Malacological Society of Australasia's 3-yearly meetings aimed at bringing together people working on molluscs in the Australasian and Indo-west Pacific regions.

As well as general papers, there will be three main symposia:

1. Describing Molluscan Biodiversity - taxonomy and phylogeny and their role in biodiversity studies.
2. Assessing Molluscan Biodiversity - ecology, life history and genetics.
3. Humans and Molluscan Biodiversity - impacts, commercial utilization, pests and diseases.

Registrations by 15th October, 2000. Registrations after that date will have a \$20 late fee imposed. Deadline for abstracts 30th October, 2000. Registration costs: \$160 students (+ \$50 for final dinner + drinks - optional); \$250 non-student participants (+ \$70 for

final dinner + drinks - optional). There is a \$20 discount for MSA members.

For further details, check the MSA website:

<http://www.austmus.gov.au/malsoc>

or contact:

Dr Winston Ponder, Australian Museum, 6 College St, Sydney, NSW 2010, Australia. Tel +61 2 9320 6120, fax +61 2 9320 6050, e-mail winstonp@austmus.gov.au, or wponder@mail.usyd.edu.au

World Congress of Malacology and American Malacological Society 2001 meeting

The 2001 Unitas Malacologica World Congress of Malacology and the 2001 annual meeting of the American Malacological Society will be held jointly 19-25 August 2001, in Vienna, Austria. The Institute of Zoology, University of Vienna, will host the meeting.

For details contact (Unitas):

Prof. Luitfried Salvini-Plawen, Institute of Zoology, University of Vienna, Althanstr. 14, A-1090 Vienna, Austria; tel +43 1 31336 1264; fax +43 1 31336 778; e-mail Luitfried.Salvini-Plawen@univie.ac.at or Gerhard.Steiner@univie.ac.at; or on the web at <http://www.univie.ac.at/WCM2001/>

or (AMS):

Janice Voltzow, Department of Biology, University of Scranton, Scranton, Pennsylvania 18510-4625, USA; tel +1 570 941 4378; fax +1 570 941 7572; e-mail voltzowj2@uofs.edu

NEW SOCIETY

Freshwater Mollusk Conservation Society

by Paul Johnson, President

The Freshwater Mollusk Conservation Society (FMCS) was formally created in late 1998 to address the conservation issues associated with freshwater mollusks, North America's most imperiled animals. Membership in the FMCS is open to anyone interested in freshwater mollusks who supports the purposes of the Society. In brief, these purposes are: 1) advocate conservation of freshwater molluscan resources, 2) serve as a conduit for information about freshwater mollusks, 3) promote science-based management of freshwater mollusks, 4) promote education and awareness about freshwater mollusks and their function in freshwater ecosystems, 5) facilitate the *National strategy for the conservation of native freshwater mussels* (*Journal of Shellfish Research*, 1999, Volume 17, Number 5; and see article elsewhere in this issue of *Tentacle*), and a similar strategy currently under development for freshwater gastropods.

The FMCS traces its origins to 1992 when a symposium sponsored by the Upper Mississippi River Conservation Committee, US Fish and Wildlife Service, Mussel Mitigation Trust, and Tennessee Shell Company brought concerned people to St. Louis, Missouri, to discuss the status, conservation, and management of freshwater mussels. This meeting resulted in the formation of a working group to develop the *National strategy for the conservation of native freshwater mussels* and set the groundwork for another freshwater mussel symposium in 1995. In March 1996, the Mississippi Interstate Cooperative Research Association (MICRA) formed a mussel committee. This committee, which became the National Native Mussel Conservation Committee (NNMCC), was a group of state, federal, and academic biologists together with individuals from the commercial mussel industry who agreed to the *National strategy for the conservation of native freshwater mussels*. In March 1998, the NNMCC and attendees at the Conservation, Captive Care

and Propagation of Freshwater Mussels Symposium held in Columbus, Ohio, voted to form the Freshwater Mollusk Conservation Society.

The present FMCS Executive Board is composed of its officers and the chairs of nine standing committees (below). Participation in any of the standing committees is open to any FMCS member. In November 1998, the Executive Board drafted a society constitution and voted to incorporate the FMCS as a not-for-profit organization. The founding legal work was completed in 1999, so we are now celebrating our first year as an official society. Copies of the FMCS constitution are available from the FMCS Secretary.

Our first symposium held in March 1998 in Chattanooga, Tennessee, attracted over 280 attendees, and our next symposium will be held in Pittsburgh, Pennsylvania, in March 2001 (information about the symposium can be obtained by contacting the symposium committee chair given below). In less than 2 years the FMCS has: drafted a constitution and made our not-for-profit status official, attracted over 180 members, developed a society newsletter (*Ellipsaria*; see article elsewhere in this issue of *Tentacle*), held a full symposium, published the national strategy dealing with the conservation of freshwater mussels, held a workshop focused on outreach efforts, is developing a society web-page, and held formal elections for the change of officers. More information about the FMCS is available from the officers or one of the nine committee chairs.

The 2000 FMCS officers are:

President

Paul Johnson, Southeast Aquatic Research Institute, 5385 Red Clay Road, Cohutta, Georgia 30710, USA. Tel +1 706 694 4419, e-mail pdj@sari.org

Secretary

Rita Villella, USGS-BRD, Leetown Science Center, Kearneysville, West Virginia 25430, USA. Tel +1 304 724 4472, e-mail Rita_Villella@usgs.gov

Treasurer

Heidi Dunn, Ecological Specialists, Inc., 114 Algana Ct., St. Peters, Missouri 63376, USA. Phone +1 636 447 5355, e-mail Ecologists@aol.com

President - elect

Kevin S. Cummings, Illinois Natural History Survey, 607 E. Peabody Dr., Champaign, Illinois 61820, USA. Tel +1 217 333 1623, e-mail ksc@inhs.uiuc.edu

Past - president

Al Buchanan, Missouri Dept. of Conservation, 1110 S. College Ave., Columbia, Missouri 65201, USA. Tel +1 573 882 9880, ext 3257, E-mail Buchaa@mail.conservaation.state.mo.us

Executive Assistant

Steven A. Ahlstedt, USGS-WRD, 1820 Midpark Dr., Knoxville, Tennessee 37828, USA. Tel +1 423 545 4140, e-mail ahlstedt@usgs.gov

The 2000 FMCS committees and chairs are:

Mussel Status and Distribution Atlas

Kevin Cummings, details above.

Gastropod Status and Distribution Atlas

Robert T. Dillon, College of Charleston, Dept. of Biology, 66 George Street, Charleston, South Carolina 29424, USA. Tel +1 843 9538087, e-mail dillonr@cofc.edu

Symposium Committee

Tom Proch, Pennsylvania Dept. of Envir. Quality, 2721 Cedric Avenue, Pittsburgh, Pennsylvania 15226, USA. Tel +1 412 442 4051, e-mail tproch@stargate.net

Information Exchange

Mark Hove, University of Minnesota, Dept. of Fisheries, 1980 Folwell Ave., St. Paul, Minnesota 55108, USA. Tel +1 612 624 3019, e-mail mark.hove@fw.umn.edu

Water Quality/Habitat/Exotic Species

Bob Anderson, USGS-WRD, 1000 Church Hill Road, Suite 200, Pittsburgh, Pennsylvania 15205, USA. Tel +1 412 490 3810, e-mail rmanders@usgs.gov

Outreach

Janet Butler, USFWS, PO Box 1811, Parkersburg, West Virginia 26102, USA. Tel +1 304 422 0752, e-mail janet_butler@fws.gov

Guidelines and Techniques

Heidi Dunn, details above.

Propagation/Restoration and Introduction

Chris Barnhardt, Southwest Missouri State University, Dept. of Biology, 901 South National Ave., Springfield, Missouri 65804, USA. Tel +1 417 836 5166, e-mail mcb095@mail.smsu.edu

Commercial

Steven A. Ahlstedt, details above.

Paul Johnson, Southeast Aquatic Research Institute, 5385 Red Clay Road, Cohutta, Georgia 30710, USA. Tel +1 706 694 4419, e-mail pdj@sari.org

NEWS

Snails win battle over golf resort

From *Excite News*

<http://news.excite.com/news/>

Dublin (Reuters)—Some 10 million snails have won legal protection in a court case which had threatened to cancel a planned holiday complex in Ireland, including a golf course designed by Australian golf star Greg Norman.

The holiday complex in Doonbeg in the western county of Clare was put on hold after environmentalists, concerned at the plight of the endangered species *Vertigo angustior*, took high court action against developers.

"We're very pleased at the outcome," Peter Lowes, leader of the environmentalist group told Reuters Thursday. "This snail was one of the few creatures in Ireland to survive the Ice Age, and this site is one of the most important for them in the country. Essentially the snail has become a ward of court," he said.

The court settlement requires the developers to carry out annual reviews of the snail population on the golf course and to close fairways if there are signs of depletion. "Cut the grass too short and there's not enough moisture and the snail dies," Lowes explained. "Weedkillers and chemical sprays must also be closely monitored."

Following the settlement—which also requires assurances from an expert that measures to protect the snails are adequate—the development of a hotel, chalets, and golf links is expected to be completed by mid-2002.

San Xavier talussnail

Modified from: *Endangered Species Bulletin*, September/October 1999 24(5): 12.

The San Xavier talussnail (*Sonorella eremita*) is a small desert mollusc with an extremely restricted range: a single hill near the town of San Xavier in southern Arizona, USA. The snail's shell is round, approximately 19 mm in diameter with up to four and a half whorls, and has a white to pinkish tint with a chestnut-brown shoulder band. After rain, this hermaphroditic snail feeds, mates, and lays eggs. Fertilization and egg production take several days, and if the rains are short-lived, the eggs are held until the following rain. maturity takes 3-4 yr, depending on rainfall frequency. The San Xavier talussnail has a reproductive span of 4-6 yr, depending on the number of days each year that it remains active.

Desert snails in general survive by crawling into deep, cool rockslides that are not filled with soil. Limestone or other rock containing calcium carbonate provides minerals for shell formation and neutralizes the carbonic acid produced during the snail's dormancy. San Xavier talussnails are dormant for up to 3 yr and in most years are active for only 3 or 4 days a year. However, little is known of the talussnail's biology, such as its population dynamics, so more information is needed to ensure its long-term viability.

Because its range is so limited, the San Xavier talussnail is vulnerable to relatively small-scale human actions or even a single catastrophic event. The snail lives within a single limestone rockslide on a hillside that is owned by the El Paso Natural Gas Company and managed by the Arizona Electric Power Cooperative. Protecting the species and its limited habitat from threats posed by vandalism, illegal collection, and road construction or maintenance is the primary purpose of the talussnail "Candidate Conservation Agreement". One of the conservation measures the agreement identifies includes recognizing an "Area of Concern" for the snail where rock or soil removal, construction, and herbicide use are restricted. This conservation program by the El Paso Natural Gas Company and the Arizona Electric Power Cooperative is assisted by the US Fish and Wildlife Service and the Arizona Game and Fish Department.

'Extinct' mollusc rediscovered

From *Oryx* 34(1): 10 [see also *Journal of Molluscan Studies* 65: 273]

A mollusc *Discus guerinianus*, which was considered to be one of Madeira's most elegant land shells when it was described in 1878, and said to be rare and confined to damp wooded areas of Madeira at medium to high altitudes in the interior of the island, has been rediscovered.

FRESHWATER BIVALVES IN NORTH AMERICA

National strategy for the conservation of native freshwater mussels

The strategy was published in 1998 in the *Journal of Shellfish Research* 17(5): 1419-1428.

It outlines problems, goals, and strategies for managing freshwater mussels in North America. It was compiled by mussel experts from state, federal, and private entities in the USA. See also the article about the Freshwater Mollusk Conservation Society elsewhere in this issue of *Tentacle*.

Triannual Unionid Report superseded by *Ellipsaria*

The *Triannual Unionid Report* series was intended to expedite the exchange of information in an informal format. The final issue, report no. 19, appeared in March 2000.

Production of the report will from now on be done by *Ellipsaria*, the Official Newsletter of the Freshwater Mollusk Conservation Society (FMCS) (see article elsewhere in this issue of *Tentacle*). In order to receive *Ellipsaria* you must be a member of the FMCS. For membership details contact the FMCS secretary, Rita Villela, USGS-BRD Leetown Science Center, Kearneysville, West Virginia 25430, USA; tel +1 304 724 4472, e-mail Rita_Villela@usgs.gov

Algal blooms follow mussel invasion

From *Oryx* 33(2): 103 [see also *Marine Pollution Bulletin* 36(11): 867].

Blooms of the blue-green algae *Microcystis* spp. seem to follow an invasion of lakes in inland North America by zebra mussels *Dreissena polymorpha*, which first invaded the Great Lakes in 1980 after arriving on the hulls of ships from the Black Sea. In high numbers, the algae produce toxins that have the potential to harm wildlife as well as people. Observations of zebra mussels feeding have shown them to take up most microorganisms but to expel *Microcystis* untouched, which could result in reduction of the populations of species that normally compete with *Microcystis* for

resources. Over 75 inland lakes in Michigan alone are known to be contaminated with zebra mussels.

Mussel trader fined

From *Oryx* 33(2): 105 [see also *TRAFFIC North America*, September 1998, 12-13]

In 1998 the Tennessee Shell Company pleaded guilty to purchasing thousands of kilogrammes of illegally taken freshwater mussels from rivers in Michigan, Ohio, Kentucky and West Virginia. Tennessee Shell was ordered to pay \$1 million in restitution to the National Fish and Wildlife Foundation for the establishment of the Freshwater Mussels Conservation Fund for mussel research and recovery. Tennessee Shell is the largest shell-buying and shell-exporting company in the USA and a subsidiary of Kogen Trading Company Ltd of Tokyo, Japan. The freshwater mussel family Unionidae is one of the most endangered animal families in the USA and the shells of species in the family are in demand in China and Japan, where they are cut, rounded into beads and implanted into live oysters to form the core of cultivated pearls.

Mussels suffer sponge setback

From *Oryx* 33(4): 290 [see also *Environmental Science and Technology* 33: 1957]

Introduced zebra mussels *Dreissena polymorpha* in the North American Great Lakes are declining because a native sponge *Eunapius fragilis* is growing on the mussels, preventing them opening their shells to feed or breathe. The sponge has become abundant while the zebra mussel population has fallen by 20-40 per cent in some areas but it is not known if the sponge can control the invaders in the long term.

Black carp introductions

See the article by Kevin Cummings elsewhere in this issue of *Tentacle*.

CONSIDERING MOLLUSCS IN RODENT ERADICATION PROJECTS

by Justin Gerlach and Vincent Florens

Alien predators are known to have had devastating impacts on some island snail populations, most obviously in the introductions of *Euglandina rosea*. Predation by rodents has been blamed for declines in many island animal populations, including snails. The most serious impacts have been described from New Zealand and there considerable expertise has been developed in rodent eradication techniques using anti-coagulant baits, the currently favoured poison being Brodifacoum. There have been few published studies of the impacts of rodent control on invertebrate faunas but there are reports, at least anecdotally, of increases in mollusc populations following poisoning campaigns.

In 1999 proposals were made for the eradication of rats from five of the Seychelles Islands using Brodifacoum. Most of these islands are small and are not believed to retain significant endemic faunas (although this has not been investigated). The exception is Fregate Island which supports several endemic species including the Fregate enid snail *Pachnodus fregatensis*. The proposals included measures to protect non-target vertebrates, principally birds, but not invertebrates. The apparently unknown risks to invertebrates prompted an investigation of the effects of Brodifacoum on snails, insects and millipedes. As was expected, all species would consume the bait and no adverse effects were apparent in any of the

arthropods. The snails were a different matter, with 100 % mortality in *Achatina fulica* and *Pachnodus silhouettanus* (a common species used as a model for the threatened *P. fregatensis*). The fatal dosages varied according to the size of the snail, for the 15-20 mm *P. silhouettanus* doses of only 0.01-0.2 mg were sufficient to cause death within 72 hr.

Field data from Mauritius support these observations. In the Brise Fer forest an area of some 24 ha has been subject to rodent control by poisoning. Various snail species have been seen feeding on poison baits and in treatment areas statistically significantly higher numbers of recently dead *Pachystyla bicolor* and lower numbers of live adults have been found. Whether or not poisoning represents a significant threat to the affected populations depends on how this mortality compares with predation levels from mammals targeted by the poisoning. For the *P. bicolor* populations poisoning is a significantly greater mortality factor than predation; this site has the largest remaining *P. bicolor* population and is the only site for the critically endangered *Erepta stylodon*, shells of which have also been found at the poisoning site.

These studies demonstrate that molluscs can be affected by Brodifacoum poisoning. We believe that such rodent control programmes should evaluate probable impacts on molluscs and other invertebrates before implementation. Whether such poisoning is a serious novel threat to the mollusc populations will depend upon the precise levels of predation by the targeted rodents and the level of poisoning risk. In the Fregate Island case, *Pachnodus fregatensis* has not been affected by the high population of brown rats but will readily consume poison bait and poisoning mortalities are expected to be high. Far more serious is the threat to an undescribed streptaxid discovered in 1999. This is a radula-less carrion feeder which is likely to be attracted to the poisoned snails and to be killed by secondary poisoning. It is a sad irony that this remarkable endemic streptaxid genus will probably be extinct on the island by the end of June 2000; prior to the publication of its description and to the publication of this note. Following extensive discussions, the rodent eradication project organisers have been persuaded to establish captive populations of the vulnerable endemic snails. It is hoped that viable populations can be secured before the poisoning starts in June.

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FEW OCCURRENCES IN DELAWARE, USA: RARE SPECIES OR NOT?

by Tim Pearce

A colleague in the Delaware (USA) Natural Heritage program recently asked if I know some land snails that should be added to the State list of rare species. I am pleased that the Heritage Program is recognizing that snails, members of the second largest animal phylum, are worthy of protecting. I am conducting a survey of the land snails of the Delmarva Peninsula, USA (Delaware and parts of Maryland and Virginia), so I do have distribution and abundance information for land snail species. However, defining rare species is not as simple as I thought. Finding a species with few occurrences might not always mean scarcity in a larger context.

Of about 80 species of land snails found so far in Delaware, about 25 have been found in fewer than three of the 225 5 x 5 km UTM grid squares in the state. Are they rare? I considered four reasons that a species might appear to be rare in an area. 1) Species might be rare on the edges of their ranges although they might be common in

other parts of their ranges. 2) Species that are abundant in specific habitats might be rare in an area lacking those habitats. 3) Species that have been recently introduced from elsewhere might appear rare in an area if they have not yet had a chance to disperse. And 4), species might be genuinely uncommon.

About five species in Delaware appear to be in the latter category. If a bit more surveying does not turn up more occurrences, I will consider proposing to add them to the State list of rare species.

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SOUTH IBERIAN AND NORTH AFRICAN LAND MOLLUSCS

by Alex Menez

I am working on a PhD on the distribution and abundance of land molluscs in South Iberia and North Africa. I focus mostly on abiotic-biotic patterns at different scales but am also interested in the fossil element. Some of the areas I am working in are considered threatened because of development, land use etc. so the results may have a bearing on conservation issues as well as elucidating ecological and biogeographical relationships.

I am keen to establish contact with anyone who is working in this area and who may want to discuss my project further. Unfortunately, I have limited access to resource libraries and would be grateful to anyone who can suggest any literature references for my study area, specifically Morocco.

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COMMITTEE ON RECENTLY EXTINCT ORGANISMS (CREO)

by Paula Mikkelsen

The Committee on Recently Extinct Organisms (CREO) was established in 1998 at the American Museum of Natural History's (AMNH, New York City) Center for Biodiversity and Conservation. Its goal, to foster an improved understanding of species extinctions that have occurred in Recent times (post-1500 BCE), employs a standardized set of criteria to evaluate the quality of evidence in support of each reported case. Already published work on mammals and fishes (MacPhee & Flemming, 1999; Harrison & Stiansny, 1999, respectively) has revealed significant differences over existing extinction lists. In mammals for example, 90 species were fully resolved as extinct by CREO standards, compared to 88 species on the 1996 IUCN Red List, but with only 44 % overlap with the latter. Of 245 presumably extinct freshwater fish, only 109 species were confirmed and of these, only 3 species were fully resolved. These kinds of results have implications for endangered species conservation and for our interpretation of the present biodiversity crisis.

Advisory Panels now include over 70 international scientists covering 17 major groups of animals and plants. Despite a successful organizational workshop and endorsement by Diversitas 2001, the World Conservation Monitoring Centre, the IUCN Species Survival Commission, and The Nature Conservancy, CREO has been unsuccessful to date in raising funds for its continuance or publications. Efforts are nevertheless proceeding to maintain and expand the existing CREO website (<http://creo.amnh.org>) with searchable taxonomic databases on CREO-researched organisms. Data on mammals and birds are expected to be available first.

A preliminary list of Recently extinct mollusks has been compiled from the literature by the Mollusk Advisory Panel [W.F. Ponder (Australian Museum), A.E. Bogan (North Carolina State Museum of Natural Sciences), P.M. Mikkelsen (AMNH)]. This will be posted on the website in the near future, not as a finished CREO product but as a starting point to stimulate interest in the CREO program as well as collection- or field-based research on reportedly extinct mollusks. Questions or comments can be directed through the website, or via e-mail to Dr. Paula Mikkelsen.

Harrison, I. J., and M. L. J. Stiassny. 1999. The Quiet Crisis: a preliminary listing of the freshwater fishes of the world that are extinct or "missing in action." pp. 271-331, in *Extinctions in Near Time: Causes, Contexts, and Consequences*, R. D. E. MacPhee (ed.), Kluwer Academic/Plenum Publishers, New York.

MacPhee, R. D. E., and C. Flemming. 1999. Requiem Aeternam: the last five hundred years of mammalian species extinctions. pp. 333-371, in *Extinctions in Near Time: Causes, Contexts, and Consequences*, R. D. E. MacPhee (ed.), Kluwer Academic/Plenum Publishers, New York.

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PLUGGING MOLLUSCS INTO BIODIVERSITY CONSERVATION PLANNING

by Dai Herbert

Those of us concerned with invertebrate conservation often complain about the bias afforded to the big and hairy, and the fluffy and feathery. Sure, they do get a lot of attention, but maybe things are changing and, if we play our cards right, the future may see invertebrates being considered more routinely in conservation decision making.

Now that the terrestrial mollusc collection at the Natal Museum is fully computerised, we have provided the KwaZulu-Natal Nature Conservation Service (NCS) with a copy of the data relating to the molluscs of the province. Dr Adrian Armstrong and colleagues in the NCS Biodiversity Division have now integrated these data into a project designed to assess the conservation value of land units in the province.

The project was financed by the national Department of Water Affairs and Forestry (DWAF), its primary purpose being to inform decision making with regard to the granting of permits for water extracting activities which threaten minimum stream flow requirements of rivers, e.g. commercial afforestation. Such enterprises have recently come under increasing scrutiny in South Africa, a region where water is a valuable and scarce resource. Spatial data regarding distributions of plants and animals (now including molluscs and several other invertebrate groups) have been analysed and provide critical supplementary information which can be assessed together with hydrological data when evaluating afforestation applications. Since museum records alone are largely only indicative of species distributions, the data have been modelled so as to make predictive estimates of actual distributions, using GIS technology and data sets relating to climate, topography, geology and vegetation type, amongst others. This is obviously a time consuming process and, in the first iteration, only species endemic to the province have been evaluated.

Although initially undertaken with DAWF's specific needs as the focus, the project will have application across the board in conservation planning and environmental impact assessment. For example, it will allow the NCS to establish whether or not the province's biota is being adequately conserved by the existing,

rather *ad hoc*, network of protected areas and whether perhaps there may be hotspots of invertebrate diversity in which there are currently no protected areas.

Utilisation of museum collection data in this way highlights the opportunities offered by recent advances in computer technology, providing us not only with a means of promoting the conservation of molluscs, but also of demonstrating the value and relevance of the natural history collections housed in the World's museums – and goodness me, in our myopic, money-driven age, both need all the help they can get.

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BLACK CARP—A POTENTIAL CATASTROPHE FOR NORTH AMERICAN FRESHWATER MOLLUSKS

by Kevin Cummings

The black carp (*Mylopharyngodon piceus*) is a large (up to a meter in length) molluscivorous fish that has been imported from Asia into North America by the aquaculture industry. Black carp were first introduced into the US in the early 1970s as a "contaminant" in imported grass carp stocks. The second introduction came in the 1980s when the species was imported as a food fish, and as a biological control agent to combat the spread of yellow grubs in aquaculture ponds. Nico & Williams (1996) reported that Arkansas, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma and Texas were known to have black carp in aquaculture farms and research facilities. Four other Asian carp species (common, grass, bighead, and silver carps) have been introduced into US waters, and all have been able to establish themselves in the wild, producing large populations. The large numbers of Asian carp that presently occur in certain parts of the Mississippi River Basin undoubtedly are producing significant negative impacts on native fish species. However, the black carp poses an even greater threat to native invertebrate populations because it feeds almost exclusively on mollusks which are the most endangered group of animals in North America, with over 70 % of our the native freshwater species in need of conservation.

In the fall of 1999 the State of Mississippi decided to allow fish farmers to import reproductively viable (diploid) black carp from Arkansas to control snail populations (*Planorbella trivolvis* and *P. subcrenata*) which serve as intermediate hosts to the digenetic trematode *Bolbophorus confusus* (often called "grubs" or "flukes") in their catfish ponds. This raised a significant "red flag" with other states in the Mississippi River Basin and throughout eastern North America. Of great concern is the fact that 90 % (191 species) of the native mussel species designated as endangered, threatened, or of special concern by the American Fisheries Society (Williams *et al.*, 1993) are found in the southeastern states - not far from where the black carp are being stocked. Forty-eight percent or 102 of these species are endemic to that region of the US, and the black carp have the potential of driving some of these species to extinction. Black carp also could have a profound negative effect on native fingernail clam populations which serve as a primary food source for many migratory waterfowl species in the Mississippi flyway and elsewhere.

On 24 February 2000 the Mississippi Interstate Cooperative Resource Association (MICRA) petitioned Jamie Rappaport Clark, Director of the US Fish & Wildlife Service (USFWS), to list the black carp as an "injurious species of wildlife" coming under jurisdiction of the Federal Lacey Act. The USFWS published a

notice regarding the black carp in the Federal Register on June 2, 2000 (Proposed Rules Vol. 65(107):35314-35315. Federal Register Online: http://www.access.gpo.gov/su_docs/aces/aces140.html). The USFWS is reviewing available economic and biological information on the black carp for possible addition to the list of injurious wildlife under the Lacey Act. The importation and introduction of *M. piceus* into the natural ecosystem of the United States may pose a threat to native mollusk and fish populations. Listing *M. piceus* as injurious would prohibit its importation into, or transportation between, the continental United States, the District of Columbia, Hawaii, the Commonwealth of Puerto Rico, or any territory or possession of the United States, with limited exceptions. The Federal Register notice seeks comments from the public to aid in determining if a proposed rule is warranted.

The Federal Register notice also solicited economic, biologic, or other information concerning *M. piceus*. The information will be used to determine if the species is a threat, or potential threat, to those interests of the United States delineated above, and thus warrants addition to the list of injurious wildlife (Federal Register 50 CFR 16.13). The information will also assist USFWS in preparing impact analyses and examining alternative protective measures under the Regulatory Flexibility Act (5 U.S.C. 601).

The Lacey Act (18 U.S.C. 42) and implementing regulation in 50 CFR 16 restrict the importation into or the transportation of live wildlife or eggs thereof between the continental United States, the District of Columbia, Hawaii, the Commonwealth of Puerto Rico, or any territory or possession of the United States of any nonindigenous species of wildlife determined to be injurious or potentially injurious to certain interests, including those of agriculture, horticulture, forestry, the health and welfare of human beings, and the welfare and survival of wildlife and wildlife resources in the United States. However, injurious wildlife may be imported by permit for zoological, educational, medical, or scientific purposes in accordance with permit regulations at 50 CFR 16.22, or by Federal agencies without a permit solely for their own use. If the process initiated by this notice results in the addition of *M. piceus* to the list of injurious wildlife contained in 50 CFR 16, their importation into the United States would be prohibited except under the conditions, and for the purposes, described above.

The American Malacological Society, Freshwater Mollusk Conservation Society, American Fisheries Society and other organizations have called for the elimination of all black carp stocks in North America. A risk assessment conducted by the US Geological Survey, Biological Resources Division concluded that the risk to native mollusks posed by the black carp was high (Nico & Williams, 1996). There is ample biological evidence to justify preventing black carp from being used anywhere in the US for any purpose. However, the final decision on this matter, and therefore on the ultimate fate of the North American native mollusk fauna will be made by the USFWS. Those who support the use of black carp are busy lobbying their Congressmen and USFWS to protect their perceived right to continue that use. Those who oppose the use of black carp will have to do the same.

Those interested in writing a letter to state their concerns about this issue and ask them to exercise their power to list the black carp as an "injurious species of wildlife" under the jurisdiction of the Federal Lacey Act should send it to: Susan_Mangin@fws.gov, Jamie_Clark@fws.gov, Nancy_Gloman@fws.gov, a_gordon_brown@ios.doi.gov, Hannibal_Bolton@fws.gov, Kari_Duncan@fws.gov

For further information contact: Susan Mangin, Division of Fish and Wildlife Management Assistance at +1 703 358 1718 or Kevin Cummings (details below).

Williams, J.D., Warren, M.L., Jr., Cummings, K.S., Harris, J.L. & Neves, R.J. 1993. Conservation status of freshwater mussels of the United States and Canada. *Fisheries* 18(9):6-22.
Nico, L.G. & Williams, J.D. 1996. Risk assessment on black carp (Pisces Cyprinidae). Final Report to the Risk Assessment and Management Committee of the Aquatic Nuisance Species Task Force. US Geological Survey, Biological Resources Division, Gainesville, Florida.

Kevin S. Cummings, Illinois Natural History Survey, 607 E. Peabody Drive, Champaign, Illinois 61820, USA; e-mail ksc@inhs.uiuc.edu, web <http://www.inhs.uiuc.edu/cbd/collections/mollusk.html>

NEWS FROM EAST AFRICA—UK DARWIN INITIATIVE SPONSORED PROJECT

by Mary Seddon

The tripartite programme between National Museum of Wales, National Museums of Kenya and the National Museums of Tanzania is still ongoing.

Tanzania

Christine Meena, Curator of Invertebrates at National Museums of Tanzania has been undertaking small surveys in the coastal forest zones, which are identified as some of the highest risk regions for endemic molluscs in Tanzania. She has also been working up the materials collected in the 1998 surveys in northern Tanzania. These surveys have produced new distributional records, as well as undescribed species.

Kenya

Charles Lange is now on staff at National Museums of Kenya, and is finishing his M.Sc. project on the molluscan biodiversity of the coastal forest zone in Kenya specifically focussing on Araboko-Sokoke forest, a site well known for bird and butterfly species. He is also completing work on the Taita Hills molluscs, where he has been participating in a Belgian government sponsored survey on the impact of forest fragmentation on the vertebrate and invertebrate faunas in this highly endangered forest area. Charles Warui has also been taken onto staff at the National Museums of Kenya with special responsibility for invertebrate spirit collections. He is currently starting a new project on the molluscs of the Aberdares National Park, having completed a project on Mount Kenya for his M.Sc. This latter work is currently being prepared as two papers for publication: an annotated checklist of the molluscs found on Mount Kenya, reviewing the past literature records and present survey results and a second paper looking at altitudinal variation in the molluscan assemblages. E-mail: nmk@africaonline.co.uk

Paper in press:

Tattersfield, P., Seddon, M.B., Meena, C., Kayumbo N. & Kasiwega, P. in press. Ecology and Conservation of the land-snails of the Eastern Arc mountains. *Journal of East African Natural History*.

This paper provides an updated checklist of the species present in the Eastern Arc Mountains, with some new records from the surveys undertaken early in this project, although there are now more new records, which will eventually be published as part of the Darwin programme.

Mary Seddon, details in the list of Mollusc Specialist Group members, below.

LAND AND FRESHWATER MOLLUSCS OF THE WESTERN GHATS

Mary Seddon writes—

Professor Madhyastha is working on an Indian Government project to survey the land and freshwater molluscs of Western Ghats. It is intended to both build the local capacity for taxonomy as well as gain a better understanding of the fauna of the region. Professor

Madhyastha has just started looking at land snails after spending a five year period surveying the freshwater fauna.

Amongst the interesting findings of the first part of the project is the Gondwana relict *Acostea dalyi*, the only cemented bivalve found in fresh waters in India. It has a very restricted distribution and Professor Madhyastha was able to find the species only in two places. In one place, the type locality, there were about 300 individuals and at the other site, about 50 km north of the type locality hardly 100 individuals are left. The real threats to the species are damming on these river systems and the continued decline in quality of the habitat; hence it has been proposed for listing on the 2000 red list.

If you can kindly spare the reprints of your articles on fresh water and land molluscs please help build the library at Poornaprajna. For more information, or to send reprints: Professor N. A. Madhyastha, Co-ordinator of the Malacology Centre, Poornaprajna College, Udipi 576 101, India; e-mail madhyastha@mcdecom.net

A POTENTIAL THREAT TO THE MADEIRAN LAND MOLLUSC FAUNA FROM TOURISM RELATED DEVELOPMENT

by Paul Craze

The land mollusc fauna of the Madeiran Islands is well known as one of the richest in the world. Compared to many other island land snail radiations it does not seem to have suffered greatly from human interference and is still relatively intact.

Porto Santo, the second largest island of the group, is the most species rich. This small island, just 11 km by 6 km, also has the only large beach in the Madeiran archipelago and this makes it a popular tourist destination. Until recently tourism has not been particularly intensive and developments have been restricted to land close to the beach.

However, over the last few years there has been an apparent dramatic increase in tourism related development on the island. Where this has remained in the strip of degraded land bordering the beach it should probably cause little concern for invertebrate conservationists. A far more worrying sign is the beginning of a move away from the beach to other areas of the island where large scale development of any kind has not taken place. On the undeveloped east coast the area known as Porto dos Frades has been earmarked for construction of a tourist village. This is a sensitive area ecologically and geologically. It also contains part of the range of the geographically restricted endemic land snail currently classified as *Steenbergia duplex*.

The potential environmental implications of this development do not seem to have been investigated by the developers. Local conservation organisations have been highly successful in monitoring and managing other sites in the archipelago but, out of necessity, have had to be selective. They have chosen, justifiably, to concentrate their efforts on the small, uninhabited islands surrounding Porto Santo. This means there is currently little environmental monitoring of developments on Porto Santo itself. There is clearly a will amongst local conservation organisations to be more active on Porto Santo but resources are limited. This is something to which malacologists should be alerted.

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RESOURCE MANAGEMENT PLAN FOR THE RECOVERY OF THE THREATENED BANFF SPRINGS SNAIL IN BANFF NATIONAL PARK, ALBERTA, CANADA

by Dwayne A.W. Lepitzki

Since January 1996 we have been studying the ecology of the Banff springs snail, *Physella johnsoni* (Clench, 1926), an endemic found in only a handful of thermal springs in Banff National Park, Alberta, Canada (see *Tentacle* No. 7, July 1997). Prior to our research program little was known about this unique species besides its original collection and description in the 1920s and collection once again in 1965. Our initial research questions included what was the status and distribution of the species. Using tri-weekly population surveys, we soon discovered that the snail was extirpated from four of its historic locations and currently occupied only five others. Based on these results, dramatic seasonal population fluctuations, and because four of the five populations are in a high human-use area, the species was classified as threatened by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) in 1997. It was the first extant mollusc to be listed by COSEWIC in Canada. COSEWIC has recently adopted new, IUCN-style criteria for listing species at risk. As a result, *Physella johnsoni* was uplisted to "endangered" in May 2000. We have continued to document seasonal population fluctuations and microdistribution patterns, and have confirmed the uniqueness of the species by allozyme and mitochondrial DNA analyses. Continuing questions include what causes the population fluctuations and microdistribution patterns; a major avenue of investigation is determining their relationships with the physico-chemical properties of the thermal spring water. We also continue to gather information on the biology and ecology of the species in the thermal springs and in flow-through aquaria. Most recently a draft resource management plan (August 1998) was modified and updated. It outlines the steps required to ensure the species' continued survival. It is anticipated that copies of the plan, the first recovery plan for a mollusc in Canada, will be made available via the internet. In the interim, we are also seeking the assistance of a field microbiologist who could begin identifying and assessing the spatio-temporal distribution of the thermal spring microbial communities.

Funding for the Banff Springs snail research and recovery program is provided by Parks Canada, the Endangered Species Recovery Fund (co-sponsored by the World Wildlife Fund Canada, the Canadian Wildlife Service, and the Canadian Millennium Partnership Program), and the Bow Valley Naturalists.

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MOLLUSKS STALL JAPANESE NUCLEAR POWER PLANT CONSTRUCTION

by Robert H. Cowie

The proposed construction of the Kaminoseki nuclear power plant on the shores of the Seto Inland Sea in Yamaguchi Prefecture, Japan, has been stalled as a result of protests by environmentalists and others concerned about its impact on biodiversity. Construction would in particular seriously impact the diverse intertidal marine mollusk fauna. Hiroshi Fukuda, Takahiro Asami and others have been especially involved in the documentation of the malacological diversity of the proposed site (e.g., Fukuda *et al.*, 2000) and have helped coordinate the protests against construction.

In January/February 2000, Winston Ponder (Australian Museum, Sydney), Rüdiger Bieler (Field Museum, Chicago), Paula

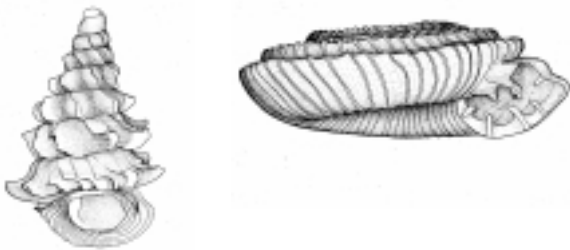
Mikkelsen (American Museum of Natural History, New York), and Robert Cowie (Bishop Museum, Honolulu) participated in a workshop in Japan discussing the potential impacts of construction. They visited the site, held discussions with government officials, appeared a number of times on Japanese national and local television, and were interviewed by reporters from both national and local newspapers.

As a result of this coordinated and scientifically supported protest, construction has now been put on hold pending additional environmental study. It is hoped that a more complete report on this issue will be possible in the next issue of *Tentacle*.

Fukuda, H., Asami, T., Yamashita, H., Sato, M., Hori, S. & Nakamura, Y. 2000. Marine molluscan and brachiopod fauna of Tanoura, Nagashima Island, Kaminoseki-chô, Yamaguchi Prefecture, Japan. *The Yuriryagai: Journal of the Malacozoological Association of Yamaguchi* 7(2): 115-196.

Robert H. Cowie, details in the list of Mollusc Specialist Group members, below.

PACIFIC ISLAND LAND SNAIL PAGE



A diplommatinid (left) from Palau and an endodontid (right) from Hawaii (Kauai), the latter almost certainly extinct, drawn by the late Yoshio Kondo. Both about 4 mm maximum dimension.

Snails in Vanuatu

by Jenny Bowen

The archipelago of Vanuatu is situated in the south-west Pacific, between 13 °S and 22 °S, and stretches for about 1,100 km. There are over 200 islands that include coral atolls and islands with active volcanoes. The climate of Vanuatu varies from tropical to sub-tropical and is hot and humid with annual temperatures of 21-28 °C and rainfall 1500-4200 mm. The vegetation is varied and includes montane forest and mangroves, although it is mostly tropical rainforest.

Partula spp. are considered to be found all over the archipelago. Snail collections have been made from Espiritu Santo, the largest island in the country. The collections were made from Loru Protected Area, an area of lowland tropical rainforest on the east coast, covering c. 220 ha. Loru is the first terrestrial protected area in the country and was officially opened on 26 April 1995. Forests found in the accessible lowland areas are under threat from logging companies for their highly valued hardwoods. Protected areas are important as encroaching logging companies, agriculture and the invasion of exotic fauna threaten Vanuatu's native wildlife, including snails.

Snail collections were made immediately after heavy rainfall. The snails were usually found on the leaves of understory shrubs, but also on trees and epiphytes. On *Pandanus* the snails were mostly found near the base of the leaves among detritus that had fallen from overhead trees. No snails were found on *Hibiscus tiliaceus*, where it had been suggested partulids could be found.

In Loru, many shells were found on the ground inside and outside the protected area. It is not known why there are so many shells but one of the problems facing the endemic snails is the predator snail

Euglandina rosea. *Euglandina rosea* was sighted in 1995 outside Loru, about 1 km away, but in 1998, *E. rosea* was seen inside Loru, suggesting an expanded distribution. *Euglandina rosea* was seen on many occasions very close to partulid populations, although it was never seen preying on the partulids. The predator snail was also seen on the volcanic island of Ambrym, part of the central group of islands in Vanuatu. They were seen on the beach as well as in dry river beds coming down from the volcano. It is still not known when the predator snail was first introduced to Vanuatu and how it managed to colonise so many of the islands. It has been suggested that it was distributed by cargo ships when provisions were delivered to the various islands.

The giant African land snail, *Achatina fulica*, is abundant in Vanuatu, so much so that it is affecting the subsistent lifestyle of the ni-Vanuatu. It is partial to island cabbage, a staple food for island communities, and other food sources such as taro. People will crush any *A. fulica* found in their gardens but this has not prevented the spread of the snails throughout the archipelago. There are particular problems in south-east Ambrym and on the island of Maewo. On Maewo a competition has been suggested by the agricultural extension officer to see who can collect the most snails.

The snails collected from Loru Protected Area are at the London Invertebrate Conservation Centre (London Zoo) and are under careful observation. Their specific identity has not been confirmed. Before any snails are released back into the wild, the status of the populations of *Euglandina rosea* and *Achatina fulica* needs to be assessed.

Jenny Bowen, Fir Close, Tubney, nr. Abingdon, Oxon. OX13 5QQ, UK

Hawaiian Succineidae: still around, but for how long?

by Rebecca Rundell

The Hawaiian Islands are home to over 750 land snail species, and all but two to four of these are endemic to this island chain. Many are single-island endemics. They represent an extraordinary opportunity to address both evolutionary and ecological questions. Unfortunately, however, as many as 90 % of Hawaiian land snail species may now be extinct. Continuing extinction pressures include habitat destruction and introduction of alien species. The most widely publicized alien threats are predators, like *Euglandina rosea* and rats. However, alien plants may alter ecosystems even more profoundly and non-predatory alien snails may compete with native snails. Mice, as well as rats, have been introduced to most Pacific Islands, including the Hawaiian Islands, and may severely impact populations of small-sized snail species and juveniles.

In spite of these pressures, faced by all native Hawaiian species, some native species persist in good numbers. Among these are some of the Hawaiian succineids. All 42 described species are endemic to the Hawaiian archipelago, and unlike most other succineids around the world, which are often almost amphibious in habit, the Hawaiian species live in a diverse range of habitats, from montane rainforest to xeric duneland and dry forest. Some species even appear to remain relatively common in native forest, making them especially amenable to scientific study. However, very little is known about the Hawaiian succineids. The only major work on these species was done in the early 1900s, and focused on taxonomy.

I am undertaking an evolutionary study of the Hawaiian Succineidae, and as anyone who is familiar with Pacific Island species knows, conservation is an essential component of this research. I plan to use the range size data I accumulate from Bishop Museum (Honolulu) specimens to help locate species that have not been searched for in a century, and eventually hope to compare historical data with current survey data to assess whether range sizes have contracted significantly. Some species may now be extinct.

Currently no Hawaiian succineid is listed as endangered under the Endangered Species Act of the USA, but all are listed as “species of concern.” None is listed in the IUCN Red List.

I hope to draw attention not only to the extraordinarily diverse and unique Hawaiian land snail fauna, but also to succineid species worldwide. Succineids are often closely associated with freshwater, and as humans alter natural waterways, these snails’ populations may be adversely affected. Although Hawaiian succineids may be more severely impacted by habitat destruction in general (the water source for many of these species is the rainforest, not necessarily a particular stream), other succineid species like *Oxyloma haydeni* from the southwestern United States have indeed been profoundly impacted by human-mediated diversion of water drying up original habitat (Meretsky & Stevens, *Tentacle* No. 8). The same is also probably true for *Succinea chittenangoensis* of New York State, USA, which is listed as “Data Deficient” in the 1996 IUCN Red List (*Tentacle* No. 7). Still other succineid species are listed as vulnerable, endangered and extinct. Many more have surely gone unreported, and those that survive await study.

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Hawaiian *Achatinella*/*Partulina* tree snail update

by Kevin J. Olival and Michael G. Hadfield

Ex situ conservation of endemic Hawaiian tree snails has continued in our University of Hawaii laboratory for nine years. As predators continue to decimate extant field populations and many species teeter on the brink of extinction, our captive breeding program has become more critical than ever to the survival of many species. At the time of publication of the last issue of *Tentacle* (No. 8, July 1998) our facility housed 200 snails representing seven species of the endangered genus *Achatinella* and four species of the closely related (and also imperiled) genus *Partulina*. Two years later, we have 488 snails (a 144 % increase)! Only 21 snails (or 7 %) of these 288 new snails were individuals brought in from the field, the rest arising from an increase in birth rate and survivorship of young snails. Three new populations of *Partulina* have been started in the laboratory, two species from the island of Lanai and one from Maui.

The recent population boom of captive snails has necessitated expansion of the facility; in the past year we have taken several steps to deal with this. In an attempt to better simulate the climatic conditions of some snail populations from lower elevations, we have just completed the installation of a third environmental chamber. We are also in the process of upgrading the air-conditioning units for our two climate-controlled greenhouses. Once temperature and humidity conditions are proven to be stable, we will be able to keep snails on a number of native host trees, which are currently thriving in the greenhouses. This should greatly increase our capacity as well as minimize the amount of daily maintenance required by keeping snails in terraria. Lastly, as both an effort of public outreach and a means to expand achatinelline captive rearing in Hawaii, we have been collaborating with the Honolulu Zoo to establish a public snail exhibit/captive breeding facility there.

On April 24, 2000 we were excited to successfully release 42 *Partulina redfieldi* at a long-term study site on the island of Molokai. These snails included only eight adults, brought to the lab in September 1999 and their 34 captive-born offspring. We anticipate returning to Molokai at the end of this year to monitor this population.

In addition to *ex situ* conservation work, we continue to collect demographic data, monitor the presence and effects of predators, and do occasional surveys at various study sites in the field. In the

Waianae Mountains of Oahu, a predator enclosure has been built to protect the population of *Achatinella mustelina* that we have followed since 1983 from rats and the predatory snail *Euglandina rosea*. We collect data at this site four times a year. In the absence of predators, this population is beginning to show signs of recovery.

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Galapagos land snails

by Mary Seddon

The National Museum of Wales (NMGW) was fortunate to get funding from the UK Darwin Initiative for a collection development and training programme for the Charles Darwin Research Station in the Galapagos Islands. This grant will support the creation of a small museum to hold voucher collections for all invertebrates, including molluscs, allowing resident researchers and visitors to work with the Charles Darwin Station and the National Parks Authority on specific invertebrate conservation problems. There will also be two or three training courses run by NMGW and Cardiff University staff to improve field survey, taxonomy and identification skills for the local scientists, students and park rangers. One training course will include field survey methods for land-snails and molluscan collection management. The local technicians and park rangers will be undertaking a variety of projects in the Galapagos, including evaluation of the distribution and status of their endemic land-snails. The main potential threats that may be investigated include impact of insect pest species on native vegetation, implementation of biocontrol for alien plant species and impact of fire ants on the native fauna. The latter is believed to have led to the reduction of populations of the native bulimulid land snails, and this is one project that will be undertaken at the Darwin station.

The programme is starting in May 2000 and runs to May 2003. Contact Mike.Wilson@nmgw.ac.uk for further information. A website detailing progress on this project will be set up in the near future.

Mary Seddon, details in the list of Mollusc Specialist Group members, below.

The snail of the Isle of Pines, *Placostylus fibratus*, an endemic endangered species from New Caledonia

by Fabrice Brescia

Land snails of the genus *Placostylus* belong to the family Bulimulidae and are found only in the Western Pacific (islands of the Melanesian Plateau), mainly in New-Guinea, Vanuatu, Fiji, Solomon Islands, Lord Howe Islands, the Northland Peninsula of New Zealand and New-Caledonia.

The four species found in New-Caledonia – *P. fibratus*, *P. porphyrostomus*, *P. caledonicus*, and *P. eddytonensis* – are all endemic and more or less endangered (Chèrel-Mora, 1983). *P. fibratus* is a large snail (60–100 g when adult with a shell 9–11 cm long) characterised by slow growth (sexual maturity reached in about 4 years) and very low activity (essentially nocturnal). It lives on the ground in native forest, most of the time hidden under dead leaves. *P. fibratus* is found throughout New Caledonia, including the Loyalty Islands, and is favoured as food. However, the only locality where the snails are sufficiently abundant to be marketed and consumed is the Isle of Pines, one of the many coral islands around the New Caledonian mainland.

The amount of snails harvested for consumption from the natural populations on the Isles of Pines has increased over the years to reach 48 tonnes (about 700,000 snails) in 1993 (Pöllabauer, 1994).

The harvest generates a traditional economic activity assessed at F CFP 22.5 millions (US \$ 180,000) annually. A recent survey showed a 30 % decrease in snail numbers in the field between 1993 and 1999 mostly explained by over-exploitation. Local authorities therefore imposed measures designed to limit the harvest, by forbidding gathering during the reproductive season. In parallel to these control measures, the Institut Agronomique néo-Calédonien (I.A.C.) is exploring conservation strategies (off-site preservation). Also, the I.A.C. is trying to develop farming methods. Mastery of farming and production of farm snails would allow exploitation of this natural resource to continue (of great concern to the local people) while preserving the natural populations of the snails. In addition, successful farming would enable the production and restocking of small populations of *P. fibratus* in areas where they have almost disappeared, a situation often related to predation (pigs, rats) or habitat modifications.

Chèrel-Mora, C. 1983: Variation géographique et taxonomie des Placostylus (Gastéropodes Pulmonés Stylommatophores) en Nouvelle-Calédonie. Doctorat 3ème cycle, Université Pierre et Marie Curie, Paris VII. 103 p.
Pöllabauer, C. 1994: Etude préliminaire du bulime de l'île des Pins. Rapport d'Activité. Agence Concept, Nouméa, Nouvelle-Calédonie. 14 p.

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Alien snails on the increase throughout the Pacific

by Robert H. Cowie

A major conservation concern throughout the world is the increasing spread of alien species. Many of these species cause serious harm to native ecosystems through predation and/or competition with native species, and through destruction or modification of native habitat. We have all heard the horror stories of the impacts of *Euglandina rosea*. This predatory land snail was introduced to many islands of the Pacific and Indian oceans, and elsewhere, in ill-conceived attempts to control the introduced giant African snail, *Achatina fulica*. *Euglandina rosea* has not controlled *A. fulica* but has caused the decline and extinction of native species. The message was reinforced recently when a spectacular photograph of *E. rosea* (taken in Hawaii by Jack Jeffrey) adorned the front cover of the journal *Science* (vol. 285, no. 5435, p. 1809-2020; 17 September 1999). A major section in this issue was devoted to alien species, with particular mention of Hawaiian land snails.

But *Achatina fulica* and *Euglandina rosea* are only part of the story. Throughout the Pacific a whole suite of other alien snails continue to spread. Their impacts may not be as obvious or dramatic as those of *Euglandina rosea*, but they may nevertheless be important. Recent documentation of species newly recorded in the Hawaiian Islands shows that at least one new species is introduced each year (see references below), with the horticultural trade appearing particularly responsible for accidental introductions.

The islands of the tropical and subtropical Pacific are home to probably around 5000 species of land snails, many of which are single island, or at least single archipelago, endemics. Most of these are disappearing rapidly, if they are not extinct already. In contrast, there are perhaps less than 200 alien land snail species in the region. Many of these are widespread across numerous islands, with a small number probably on virtually all islands. These are the "tropical tramps". The particularly ubiquitous species include especially the subulinids *Subulina octona* and *Paropeas achatinaceum* and the veronicellid slug *Vaginulus plebeius*.

In the past, little attention has been paid to these alien snails, research interest being understandably more focused on the unique and diverse native species. Hence, the records of alien species in the literature of Pacific islands, which I am currently in the process of

compiling, are probably far from comprehensive. While our knowledge of the distributions of these aliens could be increased by thorough study of museum collections, the greater need is for modern survey work, such as I have recently undertaken in American Samoa, which would allow us to gain a far clearer picture of the real extent of the homogenization of the Pacific island land snail faunas.

Recent publications dealing with alien snails in the Pacific

- Cowie, R.H. 1995. Identity, distribution and impacts of introduced Ampullariidae and Viviparidae in the Hawaiian Islands. *Journal of Medical and Applied Malacology* 5[for 1993]: 61-67.
- Cowie, R.H. 1995. Identity, distribution and impacts of introduced Ampullariidae and Viviparidae in the Hawaiian Islands. *Journal of Medical and Applied Malacology* 5[for 1993]: 61-67.
- Cowie, R.H. 1996. New records of introduced land and freshwater snails in the Hawaiian Islands. *Bishop Museum Occasional Papers* 46: 25-27.
- Cowie, R.H. 1997. Catalog and bibliography of the nonindigenous nonmarine snails and slugs of the Hawaiian Islands. *Bishop Museum Occasional Papers* 50: 1-66.
- Cowie, R.H. 1998. *Catalog of the nonmarine snails and slugs of the Samoan Islands*. *Bishop Museum Bulletin in Zoology* 3. Bishop Museum Press, Honolulu. viii + 122 p.
- Cowie, R.H. 1998. Patterns of introduction of non-indigenous non-marine snails and slugs in the Hawaiian Islands. *Biodiversity and Conservation* 7(3): 349-368.
- Cowie, R.H. 1998. New records of nonindigenous land snails and slugs in the Hawaiian Islands. *Bishop Museum Occasional Papers* 56: 60.
- Cowie, R.H. 1999. New records of alien nonmarine mollusks in the Hawaiian Islands. *Bishop Museum Occasional Papers* 59: 48-50.
- Cowie, R.H. in press. Non-indigenous land and freshwater molluscs in the islands of the Pacific: conservation impacts and threats. In: *Invasive species in the Pacific: a technical review and regional strategy* (ed. G. Sherley), p. 143-172. South Pacific Regional Environment Programme, Apia.
- Cowie, R.H. in press. New records of alien land snails and slugs in the Hawaiian Islands. *Bishop Museum Occasional Papers*.
- Cowie, R.H. & Cook, R.P. 1999. The distribution and abundance of land snails in the National Park of American Samoa, with particular focus on Partulidae. *Cooperative National Park Resources Studies Unit, University of Hawaii at Manoa, Technical Report* 125, iii + 143 p.
- Lach, L. & Cowie, R.H. 1999. The spread of the introduced freshwater apple snail *Pomacea canaliculata* (Lamarck) (Gastropoda: Ampullariidae) on O'ahu, Hawai'i. *Bishop Museum Occasional Papers* 58: 66-71.

Robert H. Cowie, details in the list of Mollusc Specialist Group members, below.

MARINE MATTERS

Oysters return to the Hudson River

From *Oryx* 33(4): 290 [see also *Audubon* 101(3): 16]

Eastern oysters *Crassostrea virginica* are back in the Hudson River, within 16 km of New York City. The once extensive oyster beds were wiped out by overharvesting by the early 1800s and by the 1950s the Hudson was too polluted for their survival. In the late 1960s, a river clean-up started and the oyster's return indicates the success of the programme.

Bivalve seashells of western North America

Just released!

The Santa Barbara Museum of Natural History's latest scientific publication, *Bivalve seashells of western North America*, is finally a reality. Eleven years in the making, the monograph documents and describes all bivalve mollusks from Baja California (Mexico) to northern Alaska, from the intertidal zone to depths of more than 4,500 m. It includes photographs of each species, along with a description of its shell, habitat, and ecology, and cites over 4,700 bibliographic references. The publication will be available directly from the Museum, and the museum website at

<http://www.sbnature.org/atlas/bivbook.htm>. The cost of the hardbound book is US\$99, plus postage and handling. It will begin shipping in June 2000.

This tremendous effort was led by Dr. Eugene V. Coan and Paul Valentich Scott of the Santa Barbara Museum of Natural History, and the late Frank R. Bernard of the Pacific Biological Station in British Columbia, Canada. The authors examined bivalve specimens located in museums around the world and documented 472 species living along the Pacific coast. Most of the species are well represented in the Santa Barbara Museum's vast collection of some 2.5 million shells.

Bivalve seashells of western North America follows another multi-year effort published by the Museum. The recently-completed 14-volume series, *Taxonomic atlas of the Santa Barbara Channel*, includes descriptions of more than 150 new species of invertebrates, and over 1,400 species accounts. This monumental work, which details the life and habits of benthic invertebrates of the Santa Barbara Channel, has been an international scientific best-seller, with editions distributed to more than 30 different countries. For more information on this series see the museum website at <http://www.sbnature.org/atlas/publicationindex.htm>

For more information, contact Paul V. Scott, Department of Invertebrate Zoology, Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road, Santa Barbara, CA 93105 USA; tel +1 805 682 4711, ext. 319, fax +1 805 569 3170, e-mail pvscott@sbnature2.org, web <http://www.sbnature.org>

***Nautilus* in the Pacific**

by John Aguiar

A recent report from New Caledonia suggests that *Nautilus macromphalus*, a species endemic to this island group, has been severely overfished in the past 2 years following a long history of exploitation. This, in combination with the longstanding depletion of *Nautilus pompilius* in the Philippines, and possible declines in other *Nautilus* across the Pacific, argues for the protection of at least some populations or isolated species under CITES. But without reliable data on the numbers affected, listing may be impossible to achieve.

Although some populations may be stressed from coral bleaching or other impacts, such as incidental take from shrimp trawlers, by far the greatest pressure on *Nautilus* is from the international shell trade, mediated by wholesale distributors and fueled by First World appetites. The most serious long-term effects have been on populations of *N. pompilius* in the Philippines, especially around the Tañon Strait near the south-central island of Cebu. Considerable declines were noted as long ago as 1979, when local *Nautilus* were the scarcest of any then known, and the Philippine populations have remained under tremendous commercial pressure ever since. Combined with the effects of aquatic pollution, this has virtually eliminated *Nautilus* in the region.

The situation in New Caledonia is less straightforward, but equally disturbing. The resident *Nautilus* were intensively harvested between 1978-1980, and after nearly twenty years they have shown scant signs of recovery. Now one researcher who recently visited the islands has estimated that perhaps 10,000 *N. macromphalus* have been harvested within the past two years alone, which may represent a significant fraction of the species as a whole. Others, finding *Nautilus* plentiful on-site, believe the actual numbers taken are considerably less, perhaps on the order of 1000 individuals—a matter of concern, but not calamity.

In areas where *Nautilus* is afforded protection, it appears to be surviving comfortably. Indonesia has banned the *Nautilus* fishery in its waters, and populations there are considered to be healthy. (The

Philippines have tight restrictions as well, entirely ignored.) In Australia, where *Nautilus* occurs on three coasts, it is officially recognized as a species of concern, and no commercial fishery exists. In Papua New Guinea, the general consensus is that *Nautilus* there are doing splendidly, though as with all such estimates it owes more to educated intuition than a systematic survey. And in other island groups without intensive fisheries, such as Fiji, Samoa and the Solomon Islands, the local *Nautilus* appear to be stable if not thriving—with the necessary caveat that, as with all deep-sea animals, their population dynamics and ecology are barely understood.

What little is known only heightens concern: the singular life history of *Nautilus* puts it at particular risk from the relentless trapping that supplies the global trade. Unlike other cephalopods, which typically live one or two years before spending themselves in a reproductive blaze, *Nautilus* are slow-growing and slow-breeding, producing only a handful of comparatively giant eggs each year after a long and delayed maturity. Much of the reason for this longevity, which may extend to twenty years, stems from the need to lay down the exquisite (and large) external shell. Even if an individual attains adult size, it may not be developmentally mature: hence its sudden removal from the population, before it could begin its own slow breeding, would be a proportionately greater loss than for any other cephalopod. Additionally, molecular research indicates that gene flow between populations is minimal at best—so if a population is extinguished from uncontrolled harvesting, a unique array of genetic information disappears as well, unpreserved in any other portion of the species' range. Some researchers consider *Nautilus* exploitation to be only a regional issue; but in a species complex that may be rapidly evolving, with taxonomic distinctions still unresolved, regional impacts may have far wider repercussions.

Further complicating the issue is the notoriously sporadic distribution of *Nautilus* overall—present on some reefs, absent on many others, with no clear reason why their appearance should be so completely unpredictable. Simply locating *Nautilus* can become a major challenge, and each population may well have its own idiosyncrasies. In New Caledonia, for instance, both the common sightings and heavy harvest may be due in part to a peculiarity of the local *Nautilus*: only here do they rise, of their own accord, to less than 30 meters beneath the surface, a uniquely shallow approach that puts them within easy range of divers. *Nautilus* elsewhere in the Pacific prefer to remain at depths between 100-500 meters: living dim, vertical lives along the steep faces of coral reefs, where they scavenge and take what prey they can.

It is this great depth that formerly limited collection to the gathering of wave-tossed shells, which are prized in the Solomons, New Guinea and elsewhere in the Philippines for their value towards brideprice and traditional trade. But researchers themselves began the practice of baiting live animals in cages at depth, a technique quickly seized upon (sometimes literally) by locals alert to new opportunity. Not all subsistence fishermen are able to harvest *Nautilus*—the cages must be raised by winch on hundreds of feet of rope, and frequently this basic equipment is far out of their economic reach. Yet those fishermen who do manage to make money from *Nautilus* shells rely on it for their families. Wherever a *Nautilus* fishery appears, declines are reported or suspected; but if the *Nautilus* catch is proscribed, those fishermen will require something else in its place.

The most complex situation appears to exist in Palau, where the endemic *Nautilus belauensis* has apparently recovered from heavy fishing in the past decade. The species is now considered to be abundant by many researchers as well as a third interested party, the dive-tour operators, who bring up live *Nautilus* for paying customers to pose with and photograph. According to one tour

operator, trapping is infrequent, barely a weekly occurrence; but even if the divers do release all *Nautilus* afterwards (not always guaranteed) the animals may still overheat, held at the warm surface for too many hours, dying before they can return to the deep. Compared to an exhaustive fishery, the impact is minor, but its long-term effects are completely unknown.

In other parts of the Pacific, the overharvesting apparently continues, and there are implications of general decline; yet despite even the well-known impacts, there are few reliable statistics for the *Nautilus* trade at large. In 1980 one estimate suggested 25,000 *Nautilus* shells had been imported into the United States in the previous year alone—but although the volume has surely expanded, no newer estimates have been made, and solid data are entirely lacking. The best way to discover the exact numbers would be to query the handful of commercial dealers who funnel the flow of shells into the United States; but naturally they would be unwilling to share information that might contribute to their own demise. It is this paucity of fact that prevents further action through CITES. Several researchers have suggested that a fellowship be established to support one or more graduate students, who could devote themselves to a full-time survey of *Nautilus* exploitation in the Pacific. Only this sort of intensive investigation will provide the data necessary to support a listing with CITES—which, some researchers feel, is a protection long since overdue.

This report was compiled with the help of personal communications from Bruce Carlson, John Forsyth, Neil Landman, Heike Neumeister, Ron O'Dor, W. Bruce Saunders, Lyle Vail, and Peter Ward, with thanks to Damaris Christensen and Heike Neumeister for their additional assistance.

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From Australia

The Australian marine molluscs considered to be potentially vulnerable to the shell trade by Winston Ponder and Jillian Grayson. This report is available at <http://www.environment.gov.au/bg/plants/wildlife/pondrpt1.pdf>

Overview of the conservation of marine invertebrates of Australia and its territories by Winston Ponder, Pat Hutchings and Rebecca Chapman. This is being undertaken for Environment Australia. It will be the marine equivalent of *An overview of the conservation of non-marine invertebrates* by Alan Yen and Rhonda Butcher (Environment Australia, Canberra. xii+346 pp.). The overview will include reviews of current knowledge of threatening processes, threatened taxa, communities and ecosystems, legislation, different approaches to conservation etc. The production of the overview is well advanced and semifinal drafts will be ready in July 2000.

For more information, contact Winston Ponder (details in the list of Mollusc Specialist Group members, below).

And from Canada...

Winston Ponder told this correspondent that he would pass on her request for assistance to a molluscan newsletter. So here it is!

From: "JH Cline" <osweco@nb.sympatico.ca>

To: <wponder@mail.usyd.edu.au>

Subject: wrinkle ware

Date: Wed, 7 Jun 2000 13:49:14 -0400

Dear Dr. Ponder,

Having searched for information re gastropods (specifically edible periwinkles), I have stumbled upon your website.

I live on a small island (Deer Island), 45th parallel, southwestern point of New Brunswick, Canada. On a map of Canada you will find

me in a sheltered area of the Bay of Fundy called the Passamaquoddy Loop, adjacent to the most northeasterly point of the US. We are noted for the highest tides in the world, largest tidal pool in the western hemisphere, much fog, and "Diddy boots". The primary industry of this area being aquaculture (salmon), yet historically, herring and ground fishing were the sustainers of life. Lobster was a poor man's dish until the mid sixties!

My interest in data accumulated on gastropods stems from my grass roots employment activity, being that of cultivating the edible sea snail for sale to local markets. I am an independent fisherwoman, making a modest income and solely at the mercy of mother nature (tides and weather conditions). I have been active in this milieu for the past two seasons. During this time, I have developed in-depth curiosities regarding the activities of the periwinkle. As the cultivation of the "winkle" is of little interest to the mainstream fishing industry of this area, response to my inquiries have been unsatisfactory. Be it due to ignorance or myth, what is relayed to me as truth does not accurately equate with my own discoveries.

Observing merely on a local level, I am left with the impression that there are severe factors impacting on the fate of the snail population in this area. For example, several thousand tons of contaminated salmon nets are placed on local beaches every season. They may lay on a stretch of shore for several months. What was a suitable habitat for the snail has, as I suspect, become deprived of oxygen, tidal filtration and a breeding ground for bacteria, toxicities and carcinogens. I have no scientific or academic credentials in this area of expertise. What I have concluded to date is based on what I have observed due to hands-on exposure to the species. Rock weed cultivation appears to be another detrimental activity affecting the snail habitat. In May 1999, I "winkled" at a particularly fruitful location. During summer months I noted the activity of kelp cultivators on those particular rock ledges. In May 2000, I returned to investigate on my suspicions, finding traces of genocide for the life which existed there one year prior. I am interested to acquire information regarding the position sea snails hold in the eco-structure, feeding habits, migration, reproduction, predators of the snail, environmental impacts, evolution, percentages for global consumption, predictions for their future, etc.

Prior to relocating to this area (paternal birth location) I was teaching in Montreal, Canada. Periwinkle cultivation was not segmented in my professional forecast. However, I am here and drawn to the outdoor, independent nature of this seaside activity. I am self-selected to participate in this form of "fishing" and generally unsupported when suggesting possibilities for researching the status of snails. Having made discreet statements regarding environmental impacts of the salmon industry and the destruction that it causes on other marine life forms, I am met with defensive resistance to my verbalized notions.

I am interested in learning of my present environment, having decided to embark on my own research adventure. My tools/equipment are limited to a dinosaur computer, 35 mm camera, a few local maps/charts and a 17 ft fiberglassed boat with 30 hp engine. As the natives may state, "she's gone off shore" (an expression to indicate a loss of faculties), I prefer to think that I'm just in a little over my head!

Alas, having attempted to sketch an impression of my scenario, any information or directives which you could provide me will be graciously accepted. Likewise, please correspond if my front line position could be of any assistance to you. Looking forward to your reply, in any regard.

Sincerely,

J Helene Cline, Lambertville, Deer Island, New Brunswick, Canada

NEW CD-ROMs

Freshwater & estuarine molluscs. An interactive, illustrated key for New South Wales by W F Ponder, S A Clark & M J Dallwitz. CD-ROM, ISBN 0643065784, Aus\$99.

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Land snail diversity in Sri Lanka. An illustrated guide prepared for the launch of the Darwin Initiative programme

by F. Naggs & D. Raheem, photography by H. Taylor. CD-ROM, ISBN 0565091565, printed version ISBN 0565091514.

From the Introduction:

“This volume represents the first stage in the Darwin Initiative Programme ‘Land snail diversity in Sri Lanka’ and consists of a species list of the known fauna, in most cases with images of specimens. It is largely an uncritical compilation with limited revisionary content and should not be considered as available for the purposes of zoological nomenclature. The generic and higher-level classification is based on that of K.C. Vaught’s 1989 *A Classification of the living Mollusca*. Wherever available, type specimens have been figured but the time-consuming and critical evaluation of type status will be part of the next phase. Where a specimen lot exhibits significant variation, two or more individuals have been figured. There are 402 coloured plates of 227 species and additional subspecies, with four views of each specimen. The longer-term objective is to produce a resource that condenses a wide range of primary information on the Sri Lankan snail fauna, much of which is currently available only in the specimen collections and libraries of the Natural History Museum, London. Additional specimens have been obtained from other museums.

“These results are, and will continue to be made available in electronic form, currently on compact disc; ultimately they will be available on the World Wide Web. The technology exists to carry this process further with computerised 3-D images that can be rotated, images magnified by scanning electron microscopy and much more. However, our immediate objective is to produce a comprehensive tool that can be used to address real questions in the

field rather than to produce a token of what might be achieved. The compact disc is currently a copy of the printed version and is not interactive. As the programme advances facsimiles of the primary literature will be added for each species, as will information from the project’s field surveys, such as images of living specimens and information on distribution and habitat.”

Copies can be ordered from Fred Naggs, Department of Zoology, The Natural History Museum, London SW7 5BD, UK. e-mail F.Naggs@nhm.ac.uk

An interactive version is close to completion and will replace this version. A basic and simple version will go on the WWW.

RECENT PUBLICATIONS RELEVANT TO MOLLUSC CONSERVATION

- Beasley, C.R. & Roberts, D. 1999. Assessing the conservation status of the freshwater pearl mussel in the north of Ireland—relevance of growth and age characteristics. *Journal of Conchology* 36(6): 53-61.
- Berkendorff, K. 1998. Shellharbour, NSW: a valuable molluscan habitat threatened by development. *Australian Shell News* 98: 1-4.
- Berkman, P.A., Haltuch, M.A., Tichich, E., Garton, D.W., Kennedy, G.W., Gannon, J.E., Mackey, S.D., Fuller, J.A. & Liebenthal, D.L. 1998. Zebra mussels invade Lake Erie muds. *Nature* 393: 27-28.
- Cameron, R.A.D. & Cook, L.M. 1999. Island land snail relocated. *Journal of Molluscan Studies* 65: 273-274.
- Carlton, J.T. 1999. Molluscan invasions in marine and estuarine communities. *Malacologia* 41: 439-454.
- Coote, T., Loeve, E., Meyer, J.-Y. & Clarke, D. 1999. Extant populations of endemic partulids on Tahiti, French Polynesia. *Oryx* 33(3): 215-222.
- Cowie, R.H. 1998. *Catalog of the nonmarine snails and slugs of the Samoan Islands. Bishop Museum Bulletin in Zoology* 3. Bishop Museum Press, Honolulu. viii + 122 p.
- Cowie, R.H. 1998. Homogenization of Pacific island snails. *World Conservation* 4/97-1/98: 18.
- Cowie, R.H. 1998. Predatory snails in Hawaii and the Pacific: biocontrol run amok. *World Conservation* 4/97-1/98: 33.
- Cowie, R.H. in press. Non-indigenous land and freshwater molluscs in the islands of the Pacific: conservation impacts and threats. In: *Invasive species in the Pacific: a technical review and regional strategy* (ed. G. Sherley), p. 143-172. South Pacific Regional Environment Programme, Apia.
- Cowie, R.H. in press. Can snails ever be effective and safe biocontrol agents? *International Journal of Pest Management*.
- Cowie, R.H. & Cook, R.P. 1999. The distribution and abundance of land snails in the National Park of American Samoa, with particular focus on Partulidae. *Cooperative National Park Resources Studies Unit, University of Hawaii at Manoa, Technical Report* 125, iii + 143 p.
- Cowie, R.H. & Cook, R.P. in press. Extinction or survival: partulid tree snails in American Samoa. *Biodiversity and Conservation*.
- Emberton, K.C. 1998. *Boucardicus victorhernandezii*, a new, endangered species of cyclophorid land snail from Madagascar. *American Malacological Bulletin* 14(2): 97-90.
- Eno, N.C., Clark, R.A. & Sanderson, W.G. (eds.) 1997. *Non-native species in British waters: a review and directory*. Joint Nature Conservation Committee, Peterborough. 152 p.
- Fukuda, H., Asami, T., Yamashita, H., Sato, M., Hori, S. & Nakamura, Y. 2000. Marine molluscan and brachiopod fauna of Tanoura, Nagashima Island, Kaminoseki-chô, Yamaguchi Prefecture, Japan. *The Yuriyagai: Journal of the Malacozoological Association of Yamaguchi* 7(2): 115-196.
- Geller, J.B. 1999. Decline of a native mussel masked by sibling species invasion. *Conservation Biology* 13: 661-664.
- Hayes, T. 1998. Conservation of native freshwater mussels: an overview. *Endangered Species Update* 15: 108-110.
- Henley, W.F. & Neves, R.J. 1999. Recovery status of freshwater mussels (Bivalvia: Unionidae) in the North Fork Holston River, Virginia. *American Malacological Bulletin* 14(2): 65-73.
- Holznagel, W.E. & Lydeard, C. 2000. A molecular phylogeny of North American Pleuroceridae (Gastropoda: Cerithioidea) based on mitochondrial 16s rDNA sequences. *Journal of Molluscan Studies* 66: 233-257.
- Kristensen, T.K. and Brown, D.S., 1999. Control of intermediate host snails for parasitic diseases—a threat to biodiversity in African freshwaters? *Malacologia* 41: 379-391.

- Kuris, A.M. & Culver, C.S. 1999. An introduced sabellid polychaete pest infesting cultured abalones and its potential spread to other California gastropods. *Invertebrate Biology* 118(4): 391-403.
- McMurray, S.E., Schuster, G.A. & Ramey, B.A. 1999. Recruitment in a freshwater unionid (Mollusca: Bivalvia) community downstream of Cave Run Lake in the Licking River, Kentucky. *American Malacological Bulletin* 15(1): 57-63.
- Neves, R.J. 1999. Conservation and commerce: management of freshwater mussel (Bivalvia: Unionoidea) resources in the United States. *Malacologia* 41(2): 461-474.
- O'Beirn, F.X., Neves, R.J. & Steg, M.B. 1998. Survival and growth of juvenile freshwater mussels (Unionidae) in a recirculating aquaculture system. *American Malacological Bulletin* 14(2): 165-171.
- Parker, B.C., Patterson, M.A. & Neves, R.J. 1998. Feeding interactions between native freshwater mussels (Bivalvia: Unionidae) and zebra mussels (*Dreissena polymorpha*) in the Ohio River. *American Malacological Bulletin* 14(2): 173-179.
- Quintana, M.G. & Laczkó, A.C.M. 1997. Biodiversidad en peligro. Caracoles de los rápidos en Yacetyré. *Ciencia Hoy* 7(41): 22-31 [see also *Tentacle* issue 7].
- Ricciardi, A., Neves, R.J. & Rasmussen, J.B. 1998. Impending extinctions of North American freshwater mussels (Unionoidea) following the zebra mussel (*Dreissena polymorpha*) invasion. *Journal of Animal Ecology* 67(4): 613-619.
- Robinson, D.G. 1999. Alien invasions: the effects of the global economy on non-marine gastropod introductions into the United States. *Malacologia* 41: 413-438.
- Schneider, D.W., Ellis, C.D. & Cummings, K.S. 1998. A transportation model assessment of the risk to native mussel communities from zebra mussel spread. *Conservation Biology* 12: 788-800.
- Vaughn, C.C. & Taylor, C.M. 1999. Impoundments and the decline of freshwater mussels: a case study of an extinction gradient. *Conservation Biology* 13: 912-920.

The following publications are from the *Abstracts of the World Congress of Malacology, Washington, DC, 25-30 July 1998* (eds. Bieler, R. & Mikkelsen, P.M.), Field Museum, Chicago. Many other abstracts in this volume may be of interest.

- Bouchet, P. Mangareva: splendor and decline of a Pacific island land snail fauna. p. 39.
- Cummings *et al.* North American freshwater mussels: distribution, biology, and conservation. p. 76.
- Darrigran, G. New data about the invading freshwater mussel *Limnoperna fortunei* (Dunker, 1857) (Mytilidae) in the neotropical region. p. 77.
- Neves, R.J. Conservation and commerce: the management of freshwater mussel resources in the United States. p. 239.
- Popov, V. Taxonomy, ecology, geographic distribution, and conservation of terrestrial mollusks in Crimea. p. 267.
- Robinson, D.G. Alien invasions: the effects of the global economy on snail introductions. p. 278.
- Seddon, M.B. Red Listing for mollusks: a review of the data needs and the value as a tool for conservation. p. 299.
- Seddon *et al.* Implications for land snail faunas of the conversion of eastern African rainforest to commercial plantation. p. 300.
- van Riel, P. *et al.* Genetic divergence between populations of *Leptaxis azorica* in the Azores and the implications for conservation (Pulmonata: Hygromiidae). p. 337.

SSC MOLLUSC SPECIALIST GROUP

Note that some of these details have changed since the previous issue of *Tentacle*. If your details are incorrect, please inform Robert Cowie.

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