

Tentacle

Newsletter of the IUCN Species Survival Commission
Mollusc Specialist Group
ISSN 0958-5079
No. 8 July 1998

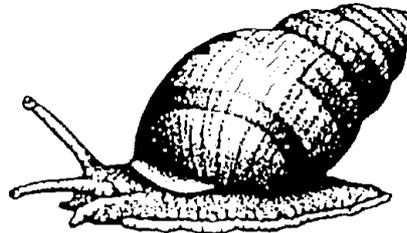
EDITORIAL

The Tokyo Metropolitan Government has shelved its plan to build an airport on the Ogasawaran island of Anijima (see the article by Kiyonori Tomiyama and Takahiro Asami later in this issue of *Tentacle*). This is a major conservation success story, and is especially important for the endemic land snail fauna of the island. The international pressure brought to bear on the Tokyo Government came about only as a result of the publicising of the issue through the internet and in newsletters and other vehicles, like *Tentacle* (see issues 6 and 7). The committed people who instigated this publicity campaign should be proud of their success. But as Drs. Tomiyama and Asami note, vigilance remains necessary, as the final decision on the location of the new airport has not been decided.

In the USA the Endangered Species Act remains under threat from the bill introduced to the senate by Republican senator Dick Kempthorne. The Endangered Species Coalition (of which the American Malacological Union is a member) continues its pressure against this bill and in support of the alternative bill introduced to the House by Democratic representative George Miller. The Kempthorne bill may have been brought to the floor of the senate before this number of *Tentacle* appears, but the issue almost certainly will not have been closed. Further details can be obtained from the Endangered Species Coalition (1101 14th St., NW, suite 1400, Washington, DC 20005, USA; tel 202 682 9400, fax 202 682 1331).

The case brought against the British Broadcasting Corporation (BBC) by Dr. Muniappan regarding comments made about him in its TV program on the demise of *Partula* on Moorea continues (see *Tentacle* 7). Dr. Muniappan was criticised for his support of the introduction of *Euglandina rosea* as a putative biological control agent for the Giant African Snail, *Achatina fulica*. The BBC served its defence on 24 March 1997 and Muniappan served his reply on 12 September. The two sides are now in the process of disclosing to the other all relevant documents. That process should be complete before the end of April 1998. However, it is unlikely that the trial will begin before very late in 1998 and it is far more likely to be next year (from Roy Baker at the BBC).

I reiterate that the content of *Tentacle* depends largely on what is submitted to me - not very much this time. There continue to be many conservation problems for molluscs and I consider *Tentacle* as a means to publicise these problems. To this end I make every effort to distribute



Tentacle as widely as possible, given our limited resources. I would therefore 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; I really don't wish to have to beg and plead! Send me something now, and it will be included in the next issue. Again, to reiterate (see editorial in *Tentacle* 7), I would like to see articles from all over the world, and in particular I would like to see more on "Marine Matters". Don't be shy! I make only very minor editorial changes to articles submitted to me 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.

Printing of this issue was supported by the Conchological Society of Great Britain and Ireland, for which the Mollusc Specialist Group is most grateful.

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IUCN & MOLLUSC SPECIALIST GROUP NEWS**Red List criteria review**

The SSC were mandated at the last Congress to review the IUCN Red List Categories and Criteria following publication of the first list using the quantitative basis for evaluation of taxa. The SSC steering committee has now established this process, and the review will continue for the next year. Last year, members of the SSC (including the Mollusc Specialist Group) were invited to comment on the last exercise, and as the result of comments sent to me, I compiled a document detailing some of the problems that we encountered applying the new criteria to molluscs. This has been placed on the long list of comments about the applicability of the new criteria, and you may expect that we may be asked to provide further examples and/or comments as the review process continues over the year.

The next list is expected to be presented at the World Conservation Congress in the year 2000, although interim updates of the Red List database are possible. As the Red Listing exercise is now a full programme of SSC more emphasis will be placed on ensuring that data are equally robust for all taxonomic groups.

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1996 IUCN Red List available

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), price UK£26.75, US\$40.00. Postage costs are 15% UK, 20% surface mail overseas, 30% air-mail Europe, 40% airmail rest of world. Payment by Visa, Amex, Mastercard, cheque or international money order. If paying by credit card please include the card number, expiry date (at least three months on the date) and the cardholder's signature.

Molluscan Conservation Conference:1996

The proceedings volume from this conference will be available for purchase from July 1998. The entire volume is being 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.

Cost UK£30.00 (including postage and packing costs). Orders to the Treasurer, Conchological Society at National Museum of Wales. Note only sterling cheques or bank drafts payable to Conchological Society of Great Britain & Ireland will be accepted.

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

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"The Conservation Biology of Molluscs"

Proceedings of the 1986 Symposium on Threatened Molluscs, Edinburgh

The proceedings of this symposium were published in 1995 as SSC Occasional Paper No. 9, with the title "The Conservation Biology of Molluscs. Proceedings of a Symposium held at the 9th International Malacological Congress, Edinburgh, Scotland, 1986". The book (81 pp., soft cover) is edited by Alison Kay and includes a "Status report on molluscan diversity and a framework for conservation action" written by her.

The book can be obtained from IUCN Publications Services Unit, 219c Huntingdon Road, Cambridge CB3 0DL, UK (Tel 44 1223 277894, fax 44 1223 277275, e-mail iucn-psu@wcmc.org.uk); price UK£15 (US\$22.50), postage and packing add 15% (UK), 20% surface mail outside UK, 30% airmail Europe, 40% airmail elsewhere. It can also be obtained in the USA from Island Press, Box 7, Covelo, California 95428 (Tel 1 800 828 1302 from within the continental USA, 1 707 983 6432 from anywhere else, fax 1 707 983 6414). A discount of 33.3% is available to member organisations of IUCN (not to individual Specialist Group members).

"Biodiversity and Conservation of the Mollusca" Proceedings of the 1992 Alan Solem Memorial Symposium on the Biodiversity and Conservation of the Mollusca, Siena

This book (ISBN 90-73348-47-1), the proceedings of the symposium held in 1992 at the 11th International Malacological Congress in Siena, edited by A.C. van Bruggen, Susan M. Wells and Th. C.M. Kemperman and published in 1995, can be obtained from the publisher, to whom further enquiries should be addressed: Backhuys Publishers, P.O. Box 321, 2300 AH Leiden, The Netherlands (e-mail: backhuys@euronet.nl). The price is Netherlands Guilders 68.00 (US\$45.00) plus postage and packing. Additional information is available on the Backhuys web page:
<http://www.euronet.nl/users/backhuys/index.html>

Invasive Species Specialist Group

Aliens, the newsletter of the IUCN/SSC Invasive Species Specialist Group often contains items of interest to mollusc conservationists. It is available from its editor: Sarah Lowe, Centre for Conservation Biology, School of Environmental and Marine Sciences, University of Auckland (Tamaki Campus), Private Bag 92019, Auckland, New Zealand. E-mail sjlowe@tmknov1.auckland.ac.nz

IUCN and MSG information sources on molluscs

1996 Red List of Molluscs

The computer database used to compile the 1996 Red List of Threatened Animals is accessible through the World-Wide Web at the World Conservation Monitoring Centre. The URL address is: <http://www.wcmc.org.uk>. 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 is reproduced as an appendix to this issue 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 if you wish to get access to this mailing list.

INTERNET RESOURCES

Mollusca

The MOLLUSCAListserver 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 and R.P. Guralnick 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 MOLLUSCAListserver (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>

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 an unsigned e-mail message to:

listserv@wcmc.org.uk

Unionids

The following was sent to the MOLLUSCA listserv (see above).

I am pleased to announce the initiation of a new Internet listserv ("UNIO") which will focus on the biology, ecology and evolution of freshwater unionid mussels. 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 to post information on mussel-related meetings, symposia, workshops, and funding opportunities. The list is sponsored by the University of Maryland Baltimore County and administered and managed by Rick Tankersley (tankersl@umbc.edu). There are no limitations on who may subscribe to the list and the subscription is free.

To subscribe to UNIO, send an email message to Majordomo@lists.umbc.edu.

The first line of the text of the message (not the subject line) should contain the following statement:

subscribe UNIO your email address

Leave the rest of the message blank (including any signature information).

To post a message to the list, send an e-mail message to UNIO@lists.umbc.edu. Your message will be placed in the list's archive and distributed to all members.

AWWW home page for UNIO is currently under construction at <http://www.umbc.edu/unio>. It will eventually contain archives of postings to UNIO as well as a list of Internet resources and an address book containing the names and e-mail addresses of scientists currently working on mussel related projects.

If you have any questions regarding the list or encounter any problems while attempting to subscribe or post messages, please contact me at tankersl@umbc.edu or <http://research.umbc.edu/~tankersl/>. Also, please feel free to forward this message to any friends or colleagues who may be interested in joining the list.

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Aliens

ALIENS-L is the listserv of the Invasive Species Specialist Group (ISSG) of the IUCN Species Survival Commission. This listserv 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-1

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 phone/fax 64 9 298 5775. Co-manager is Wendy Strahm at IUCN Headquarters: was@hq.iucn.org

World Conservation Monitoring Centre

The entire Red List of Threatened Animals can be searched at this site. The address is:
<http://www.wcmc.org.uk:80/>

Hawaii Biological Survey

The Hawaii Biological Survey (based at 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. The address is:
<http://www.bishop.hawaii.org/bishop/HBS/hbs1.html>

MEETINGS 1998/1999

World Congress of Malacology, Washington, DC, USA, July 1998

This landmark conference, organised jointly by UNITAS Malacologica and the American Malacological Union, will be held at the Smithsonian Institution (the US National Museum of Natural History) 25-31 July 1998. Details can be obtained from Rüdiger Bieler, President UM, The Field Museum, Roosevelt Road at Lake Shore Drive, Chicago, IL 60605-2496, USA; Tel 1 312 922 9410 ext. 270, fax 1 312 663 5397, e-mail bieler@fmnh.org; or from the local organiser, Robert Hershler, AMU President '98, Division of Mollusks, NHB-118, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560; e-mail hershler.robert@nsmnh.si.edu. You can also obtain information from the following website:
<http://www.fmnh.org/wcm/>

American Malacological Union 1999 annual meeting

The 1999 AMU meeting will take place at the Sheraton Hotel Station Square in Pittsburg, Pennsylvania, 4-9 July. There will be a major symposium on "New looks at old mollusks, recent perspectives on molluscan evolution", organised by Harold B. Rollins and Ellis Yochelson. There will be organised topical sessions on Biomineralization, Molluscan Genetics, Women in Malacology. Further details can be obtained from Dr. Robert S. Prezant, Department of Biology, 114 Weyandt Hall, Indiana University of Pennsylvania, Indiana, PA15705-1090, USA. Tel 1 412 357 2352, fax 1 412 357 5700, e-mail rprezant@grove.iup.edu

FRESHWATER BIVALVES IN NORTH AMERICA

First release of endangered juvenile mussels in the United States

by Richard J. Neves

The first release of juvenile freshwater mussels, cultured at the Mussel Conservation Center at Virginia Tech, Blacksburg, Virginia, occurred in September, 1997. A total of 52 federally endangered tan riffleshells (*Epioblasma walkeri*) and 360 wavy-rayed lampmussels (*Lampsilis fasciola*) were released into the Hiawassee River within Cherokee National Forest, Tennessee. The tan riffleshells were 2-3 months old and about 1 mm in length. The wavy-rayed lampmussels were 6-12 months old and ranged from 2-5 mm in length. The State of Tennessee is funding a project to produce and culture juvenile mussels of a suite of endangered species for release into historic habitats within the state. Cooperators in this project include the Tennessee Wildlife Resources Agency, U.S. Fish & Wildlife Service, Virginia Department of Game and Inland Fisheries, Biological Resources Division of the U.S. Geological Survey, and Virginia Cooperative Fish and Wildlife Research Unit.

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Triannual Unionid Report

This series is intended to expedite the exchange of information in an informal format. The most recent issue, report no. 14, appeared in March 1998. If interested, contact Richard G. Biggins, U.S. Fish and Wildlife Service, 160 Zillicoa Street, Asheville, North Carolina 28801, USA. Tel 1 704 258 3939, ext. 228, fax 1 704 258 5330, e-mail richard_biggins@fws.gov

Mussels deleted from CITES list

From: *TRAFFIC Bulletin* 17(1): 19

The following three species were removed from Appendix II at the tenth meeting of the Conference of the Parties to CITES, held in Harare, Zimbabwe, 9-20 June 1997. The amendments entered into force on 18 September 1997.

Fusconaia subrotunda
Lampsilis brevicula
Lexingtonia dolabelloides

Winged mapleleaf mussel (*Quadrula fragosa*)

From: *Endangered Species Bulletin* 23(1): 25

Alate summer/early fall 1997 survey brought good news for conservation of the winged mapleleaf mussel, a rare mollusk found only in a small area of the St. Croix River in Wisconsin and Minnesota. Biologists observed

one- and two-year-old individuals, the first evidence of successful reproduction since the species was listed as endangered in 1991. In addition, one gravid female was observed. This find is of special interest because the gravidity period (the brooding period for glochidia or mussel larvae) previously was unknown, but was suspected to occur in spring or early summer rather than late summer or early fall. The survey work was conducted by the Wisconsin Department of Natural Resources with FWS [United States Fish and Wildlife Service] funding.

SNAILS OF ONE SIXTH OF THE WORLD'S DRY LAND (THE FORMER USSR)

by Alexander N. Suvorov

Countries of the former USSR cover approximately one sixth of the World's dry land, yet remain largely not embraced by international molluscan conservation activities. This communication is a result of work on the "Action Plan for the Conservation of Land and Freshwater Molluscs". In spite of the shortage of knowledge, I shall try to answer some questions related to the conservation of the land molluscs of this region.

There are approximately 690 species and subspecies of land molluscs found within the boundaries of the former USSR. The pattern of their distribution among families is given in Table 1.

The main centers of diversity and endemism are the Caucasus and Tien-Shan. Tien-Shan is a center of radiation of the Enidae, Bradybaenidae and Hygromiidae; the Caucasus is a center for the Hygromiidae, Clausiliidae, Zonitidae, Enidae and Orculidae. Many other families also have endemic species in these regions, although they do not reach such high diversity. Centers of endemism of less significance are the Crimea (18 endemic species), Carpathians, Primorye Territory of the Far East and the mountains of Middle Asia in addition to Tien-Shan.

These centers of endemism are insufficiently studied. Almost every expedition to the difficult to access areas of the Caucasus and Tien-Shan brings new species of land snails. There are approximately 95 species of the former USSR fauna that are known from single or few localities. The Siberian mountains to the east of the Altai are almost unstudied.

There is thus a deficiency of knowledge useful for planning of mollusc conservation activities. It seems that the main cause of this situation is the lack of a conservation tradition in Soviet malacology. Attention is still concentrated on problems of taxonomy, fauna and biogeography to a lesser degree. Great progress has been achieved in these areas. There are a number of fundamental studies and many papers.

Table 1.

Numbers of species, by family, reported from within the boundaries of the former USSR.

Helicinidae	1
Cyclophoridae	1
Diplommatinidae	2
Pomatiidae	2
Aciculidae	4
Carychiidae	4
Succineidae	18
Zonitidae	62
Clausiliidae	77
Ferussaciidae	2
Oleacinae	1
Punctidae	5
Endodontidae	5
Polygyridae	1
Cochlicopidae	5
Orculidae	29
Strobilopsidae	5
Spelaeodiscidae	1
Valloniidae	20
Pupillidae	19
Vertiginidae	27
Chondrinidae	6
Pyramidulidae	1
Enidae	93
Gastrodontidae	2
Euconulidae	2
Daubardiidae	8
Vitrinidae	8
Helicidae	24
Bradybaenidae	60
Helicodontidae	1
Hygromiidae	119
Ariophantidae	4
Agriolimacidae	20
Boettgerillidae	2
Limacidae	28
Trigonochlamydidae	6
Parmacellidae	5
Milacidae	4
Philomycidae	1
Arionidae	8

The main studies are:

Likharev, I.M. 1962. Clausiliids (Clausiliidae). Moscow-Leningrad: *Fauna SSSR: Molluski* 3(4), nov. ser., N83: 1-317 (in Russian).

Likharev, I.M. & Rammelmeyer, E.S. 1952. *Land snails of the USSR fauna*. Moscow-Leningrad: *Opredelitel po faune SSSR* 43: 1-511 (in Russian).

Likharev, I.M. & Wiktor, A. 1980. The fauna of slugs of the USSR and adjacent countries (Gastropoda Terrestria Nuda). Leningrad: *Fauna SSSR: Molluski* 3(5): 1-438 (in Russian).

Riedel, A. 1966. Zonitidae (excl. Daubardiinae) der Kaukasuslander (Gastropoda). *Annales Zoologici* 24(1):

1-303.

- Schileyko, A.A. 1978. Land mollusks of the Helicoidea suprafamily. Leningrad: *Fauna SSSR: Molluski* 3(6): 1-384 (in Russian).
- Schileyko, A.A. 1984. Land snails of the Pupillina (Gastropoda, Pulmonata, Geophila) infraorder of the USSR fauna. Nauka: Leningrad: *Fauna SSSR, nov. ser.* 130: 1-399 (in Russian).
- Schileyko, A.A. 1986. Some data on the anatomy and taxonomy of Daudebardiidae (Gastropoda Pulmonata). Leningrad: *Proceedings of the Zoological Institute* 148: 97-123 (in Russian).
- Schileyko, A.A. 1986. The system and the phylogeny of Vitrinidae (Gastropoda Pulmonata). Leningrad: *Proceedings of the Zoological Institute* 148: 124-157 (in Russian).
- Schileyko, A.A. & Likharev, I.M. 1986. Land snails of the Succineidae family of the USSR fauna. *Proceedings of the Zoological Museum* 24: 197-239 (in Russian).

At the same time, there is only one paper devoted to the conservation of land molluscs (Baidashnikov, 1989); the only species - *Helix buchi* - was included in the USSR Red Data Book. No measures have been undertaken for its conservation.

Disintegration of the USSR caused the appearance of 15 new political-administrative divisions. There are very few studies of the fauna within these new frontiers. Only two publications have been devoted to the fauna of these new republics (Akramovskii, 1976; Uvalieva, 1990). According to my preliminary account there are 280 species and subspecies of land snails in Russia, endemics - 53, introduced species - 10. The same numbers for the rest of countries are: Ukraine - 164, 21, 6; Byelorussia - 62, 0, 0; Moldavia - 79, 0, 1; Estonia - 69, 0, 2; Latvia - 68, 0, 1; Lithuania - 66, 0, 0; Georgia - 225, 49, 4; Armenia - 116, 8, 2; Azerbaijan - 123, 8, 0; Kazakhstan - 132, 55, 4; Kirghizia - 154, 73, 3; Tajikistan - 85, 6, 5; Uzbekistan - 84, 7, 5; Turkmenistan - 62, 4, 4. There are now some new countries with a complete absence of specialists in land snails. Unfortunately the Caucasus countries - the countries with an extraordinary diversity of land molluscs - are among them.

National economies remain retarded in most of the regions. This causes a rapid degradation of lands (especially in a highlands rich with endemic molluscs). The nature conservation legislation is good in most of the countries, but is difficult to implement in conditions of retarded economies. The IUCN categories are not accepted in national agencies. There are almost no organizations and private persons able to support any mollusc conservation activity in countries going through the crisis.

Our limited knowledge of areas and populations does not permit use of most of the IUCN criteria for any species. Nevertheless, approximately 145 species and sub-species are to be recommended as worthy of listing by IUCN.

References

- Akramovskii, N.N. 1976. Fauna of Armenian SSR. Molluscs. *Academy of Sciences of the Armenian SSR: 1-272* (in Russian).
- Baidashnikov, A.A. 1989. Rare land molluscs of Ukrainian Carpathians and ways of their conservation. *Vestnik Zoologii* 3: 37-41 (in Russian).
- Uvalieva, K.K. 1990. Land mollusks of Kazakhstan and adjacent territories. *Nauka: Alma-Ata* 1-224 (in Russian).

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HAWAIIAN LYMNAEID PROPOSED FOR LISTING AS ENDANGERED

From: *Endangered Species Bulletin*, September/October 1997 22(5): 24 (see also 'Elepaio, *Journal of the Hawaii Audubon Society* 57(7): 127).

Newcomb's Snail (*Erinna newcombi*), a small Hawaiian freshwater species, inhabits waterfalls, seeps, and springs in stream drainages on the northern half of the island of Kaua'i. Its historical range has been reduced to five streams on State land. Like many other native Hawaiian animals, Newcomb's snail is threatened by the intentional or accidental introduction of non-native predators. The rosy glandina snail (*Euglandina rosea*) and two species of marsh flies (*Sepedomerus macropus* and *Sepedon aenescens*), which were brought to Hawaii in the 1950s and 1960s to control agricultural pests, prey on the eggs and adults of native snails. In fact the rosy glandina already has eliminated many populations and species of native snails on other Pacific islands. Because Newcomb's snail is vulnerable to extinction, the U.S. Fish and Wildlife Service proposed on July 21, 1997 to list it as endangered.

THE CORSICAN SNAIL *HELIX CERATINA*: ON THE VERGE OF EXTINCTION OR ON THE WAY TO RECOVERY?

by Philippe Bouchet, Theo Ripken & Bernard Recorbet

Corsica is a large (8748 km²) island in the western Mediterranean. During low sea levels during the Ice Ages, Corsica was connected to Sardinia, from which it is now separated by the strait of Bonifacio. The Corsica-Sardinia block has been isolated from other land masses (Spain, France, Italy) since the early Miocene. However, the distances between these islands and the continent are not very large, in the order of 100-150 km. This relative isolation is reflected in the composition of the fauna and flora. Corsica has one endemic bird species, one endemic frog, and 5.4% of its 2442 native plants are endemic. In addition, a number of other taxa are endemics shared with Sardinia. Corsica consists mainly of crystalline rocks, that form mountain ranges attaining elevations of

well over 2000 m. The taxonomy the land snails of Corsica has suffered from the overzealous efforts of late 19th and early 20th century malacologists, who oversplit specific taxa; this does not now facilitate recognition of valid endemic species from the many individual, ecological or geographical variants that have received species names. Many of the ca. 100 species of land snails have not been re-evaluated recently. However, at least 8 valid species appear to be strictly endemic to Corsica. Of these, *Helix ceratina* (Shuttleworth, 1843) is a large (diameter up to 24 mm) species of Helicidae, and the sole representative of the subgenus *Tyrrhenaria* Hesse, 1918. Its last authentic published record dates back to 1902, and there are indications in museum collections that the animal was still alive in 1912. However, it was not found during general surveys of the Corsican mollusc fauna carried out by various European malacologists during the last 20 yr. In view of this evidence, *Helix ceratina* was by some authors feared to be extinct. It first entered the IUCN Red List in 1994 (as Indeterminate) and was classified as Critically Endangered in the 1996 edition.

Helix ceratina has been officially protected by French law since 1979 (initially as *Helix tristis*, but the nomenclature was corrected in 1992). However, despite the legal good intentions, invertebrates have a low profile in conservation, in France as in many other developed countries. In addition, the French law operates in a way that allows conservation measures for protected species, rather than demanding that conservation is actively undertaken to preserve or restore habitats of protected species. This explains why nothing happened between 1979 (legal protection) and 1994 (field work funded by the regional Directorate for Environment). Based on detailed habitat information in the literature, living colonies of *Helix ceratina* were located in October 1994 in the suburbs of Ajaccio. Subsequent field work was carried out to map the different metapopulations and search for the snail in ecologically similar habitats elsewhere in Corsica. Our investigations have confirmed that *Helix ceratina* is strictly restricted to a narrow band of low scrub vegetation with *Genista salzmannii* and *Scrophularia ramosissima* growing on maritime sands at Campo dell'Oro, south-east of Ajaccio on the west coast of Corsica. Suburban development since the 1950s, including Ajaccio airport, roads, a beachfront parking lot and buildings, has fragmented the habitat to only 6 ha. The total population of *Helix ceratina* probably stands at a few thousand individuals. However, during the Neolithic the snail had a much wider distribution in Corsica, as evidenced by shells in archaeological deposits dated between 7500 and 4400 BP. The reasons why *Helix ceratina* has historically become restricted to the Campo dell'Oro site are not known. It may be the result of climatic changes or it may be a consequence of early human impact on the ecosystems of Corsica. In fact, all five native mammals of Corsica had become extinct by Roman times as a result of hunting, extension of agriculture, and introduction of non-native species. (One lagomorph, though, survived into the 18th century on an offshore islet.)

After consultation by the regional Directorate for Environment (DIREN) with local interest-groups, ranging from the Chamber of Commerce to Civil Aviation authorities, the Prefecture of Corse-du-Sud installed in September 1997 a 'Biotope Protection Order' for the

remaining habitat of *Helix ceratina*. This is the first time such a decision has been taken in France specifically for a mollusc. The order forbids future development, construction, removal or deposit of spoil earth, and trespassing by vehicles. This now makes feasible the rehabilitation of areas damaged by trampling and being driven over by vehicles and, more ambitiously, a re-alignment of the access road to the airport to bypass *Helix ceratina* habitat. Concurrently, the feasibility of *ex situ* breeding of *Helix ceratina* has been tested by Gerhard Falkner and the second generation bred in captivity was born at the Paris Museum Vivarium in October 1997. Considering the uncertainty over the long term future of the snail habitat in suburban Ajaccio, we are also contemplating the possibility of establishing new populations at suitable, undeveloped sites along the coastline of Corsica.

References

- Bouchet, P. 1990. La malacofaune française: endémisme, patrimoine naturel et protection. *Revue d'Ecologie (La Terre et la Vie)* 45: 259-288.
- Bouchet, P., Ripken, T. & Recorbet, B. 1997. Redécouverte de l'Escargot de Corse *Helix ceratina* au bord de l'extinction. *Revue d'Ecologie (La Terre et la Vie)* 52: 97-111.
- Bouchet, P., Ripken, T. & Recorbet, B. 1998. Conservation of a narrow-range Mediterranean island endemic, *Helix ceratina* from Corsica. *Journal of Conchology*, Special Publication (in press).
- Vigne, J.D., 1992. Zooarchaeology and the biogeographical history of the mammals of Corsica and Sardinia since the last ice age. *Mammal Review* 22(2): 87-96.

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KANAB AMBERSNAIL, AN ENDANGERED SUCCINEID SNAIL IN SOUTHWESTERN USA

BY VICKY J. MERETSKY & LAWRENCE E. STEVENS

The Kanab ambersnail (*Oxyloma haydeni kanabensis*) was described by Pilsbry in 1948; the type locality is Kanab, Utah, in the southwestern United States. Pilsbry described two populations in the Kanab area; a third population was discovered in 1991 at Vasey's Paradise in the Grand Canyon in Arizona, by Earle Spamer. The species was listed as endangered in 1992 on the basis of the scarcity of populations, one of the Utah populations having disappeared when water diversion dried up the original habitat.

Four population of *Oxyloma* are currently known in northern Arizona and southern Utah - the two *O. h. kanabensis* populations, and two other Grand Canyon populations originally identified as *O. h. haydeni*. Recent genetic investigations by Paul Keim and his students Mark Miller and Joseph Busch at Northern Arizona

University suggest that all four may be genetically unique populations, which raises the question of which ones should be considered to be protected under the Endangered Species Act. The genetic work is in progress and will shortly be available in peer-reviewed form, at which time legal issues can be taken up. In the meantime, the remaining Kanab population and the Vasey's Paradise population are specifically named in the endangered species listing, and we concentrate here on those.

The Glen Canyon Environmental Studies office of the Bureau of Reclamation (now the Grand Canyon Monitoring and Research Center) began regular study of the Grand Canyon population in 1994, and most of our information is derived from those observations. The remaining Kanab population is on private land, and access is limited.

The species is terrestrial, but tolerates immersion well. Breeding individuals range in size from 9 to 23 mm in length. Breeding occurs during summer, usually after June; the species is hermaphroditic, and potentially self-fertilizing. The breeding season is somewhat flexible - length and duration depend at least in part on climate. Adults generally die in the autumn after breeding. All young of the year become dormant in October or November, affixing themselves to leaves, rocks, stems, or litter, or simply closing the shell with an epiphragm without attaching to any particular substrate. They emerge from dormancy in March or April. Estimates suggest the Vasey's Paradise population varies from 10,000 to nearly 100,000 snails during the course of the year, with a peak in late summer.

The two populations occur in somewhat different settings. The Kanab population occurs at approximately 1500 m elevation in wetland vegetation surrounding a spring-fed pond that issues from a sandstone aquifer. The vegetation includes stands of *Typha* and *Juncus*, with *Nasturtium* sp. and other marsh plants. In contrast, the Grand Canyon population occurs at 925 m elevation and occupies a cascade of vegetation associated with a dolomitic spring (Vasey's Paradise) that issues forth from the canyon wall and spills down the face some 100 m to the Colorado River. The vegetation is characteristic of rocky riparian situations, and the snails are found principally on *Mimulus cardinalis*, *Nasturtium officinale* (a non-native species), and *Carex aquatilis*. These plants are relatively fragile, and this, combined with the precarious nature of the terrain and the presence of poison ivy, renders large portions of Vasey's Paradise habitat inaccessible to researchers. Both populations inhabit quite small areas - habitat does not exceed 0.25 ha at either site.

Conservation efforts for the Vasey's Paradise population include monitoring in the field, laboratory attempts at propagation, laboratory diet choice studies, and efforts to establish additional populations in the wild and perhaps also in Phoenix zoo.

Field monitoring was conducted by the Kanab Ambersnail Working Group in the past, and will be conducted this year by the senior author, under contract to the Grand Canyon Monitoring and Research Center of the Bureau of Reclamation. Four visits will be made during the active season to permit population estimation, to

track breeding during the year, to assess habitat availability, and to monitor populations of *Peromyscus maniculatus* and *P. crinitus* that prey on the snails.

Clay Nelson, a graduate student at Northern Arizona University, was successful in bringing snails into the laboratory and constructing habitat with Grand Canyon plants that permitted successful breeding and overwintering of young-of-year snails. He is in the process of planning diet studies. At the end of his work, he will transfer his snails to a facility at the Glen Canyon Dam where they and future generations will serve as part of an educational display. This is particularly fitting since dam operations are a concern in snail management because of the interaction of dam flows with the spring vegetation supporting the wild population.

Dennis Kubly and Jeff Sorensen of the Arizona Game and Fish Department have been surveying springs in and around Grand Canyon in search of additional wild populations, and possible sites for establishment of new, translocated populations. Their efforts resulted in the discovery of one of the unlisted *Oxyloma* populations described above. They have finished suitability surveys and are preparing a list of recommended sites for translocations.

The National Park Service is aware of the other two *Oxyloma* populations, but no formal designation or protection is available to them. Some baseline data will be collected on both this season, and information will also be collected for the first time from the remaining Utah population.

Arecovery plan was prepared in 1995 that sets down listing and delisting criteria, as well as actions needed to reach those goals - ecological study, habitat protection and acquisition, and establishment of additional populations. The role of the recovery plan is complicated by the recent genetic discoveries, but the basic conservation plan is still appropriate. No recovery team was named, but a working group has been in place since 1994.

The Kanab Ambersnail Working Group (KAWG) is composed of the authors, many of the researchers named above, as well as members of the U.S. Fish and Wildlife Service, the Bureau of Reclamation, and the National Park Service. The Group meets quarterly to discuss research and conservation, and responds to information needs from land management agencies. KAWG also addresses issues facing the other two *Oxyloma* taxa in the Grand Canyon. Data are currently available only in reports, but peer-review publications are being drafted. We welcome comments and questions from other mollusc conservation groups.

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MOLLUSCAN BIODIVERSITY WORK IN AFRICA

communicated by Mary Seddon

The UK-funded project on molluscan biodiversity work in East Africa has now enhanced the bases for national molluscan collections and reprints in both Kenya (National Museums of Kenya, Nairobi) and Tanzania (National Museums of Tanzania, Dar-es-Salaam). The staff there would welcome being placed on your reprint distribution lists as literature is difficult to obtain in Africa (see addresses below).

Field surveys have been carried out in forests with local staff over the last two years. In Kenya work is in progress in Kakamega and Mt. Elgon in western Kenya (1996), Mt. Kenya (1997), mountains in northern Kenya (June 1997), and Charles Lange is expecting to visit the forest of Araboke-Sokoke in April 1998. In Tanzania, surveys have been undertaken in the central region (Ulugurus, Udzungwa and Mahenge Mountains) and the Pare Mountains, with further surveys planned to the Crater Highlands in June 1998. The methodology used is similar to that in Tattersfield (1996). Provisional results will be discussed in a paper presented at the Unitas Malacologica meeting in Washington.

There is a provisional checklist of East African non-marine molluscs on computer database, which up-dates the Verdcourt (1983) list published in *Achatina* and this is being reviewed at present.

References

Verdcourt, B. 1983. A list of the non-marine Mollusca of East Africa (Kenya, Tanzania, Uganda excluding Lake Malawi). *Achatina* 11: 200-239.

Names and addresses of project personnel (*) and other contacts are as follows:

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Some more specific news of individual projects are now given.

Visit to UK

On 12 July 1997 Charles Lange (Kenya) and Christine Meena (Tanzania) arrived in London for a three month visit to the National Museum of Wales. Much of their time was spent working with the East African collections in Cardiff. The Melvill-Tomlin collection has material first described in papers on East Africa by authors such as Preston, Connolly, Smith and Melvill.

Charles bought material from Kakamega Forest, Mt. Elgon and Mt. Kenya; he spent a lot of time trying to sort out identification problems. Christine spent her time learning how to identify different taxonomic groups and then trying to sort out the identification of her morphospecies from Pugu Hills and Udzungwa National Park.

In addition they were using the library to build up a reprint collection to take back to their institutions in Kenya and Tanzania, as one of the biggest barriers to working on invertebrates in these countries is the poor literature base. Without a library it is difficult to identify species.

Christine and Charles also got to see other parts of the UK, with site visits to the Newbury bypass to look at environmental impact and site mitigation for molluscs. There, threats to *Vertigo moulinsiana*, a land snail species on the European Union Habitats Directive, has resulted in large areas of snail habitat creation. They also visited the Wye Valley beech woodlands and the Yorkshire Dales limestone pavement woodlands as a contrast to the tropical forests where they normally work.

Time passed very rapidly, and on 11 October Christine and Charles returned to their countries, laden down with reprints and notes!

Fieldwork in Kenya

In June 1997 a second field survey was undertaken in Northern Kenya. Three members of the project team (Peter Tattersfield, Mary Seddon and Charles Lange) travelled north to the Ndoto Mountains, Mt. Kulal, Mt. Nyiro and Marsabit. The trip was not without problems, as the area was under army control following tribal disputes after a series of cattle thefts. Despite these problems, with the assistance of officers of the Kenyan Wildlife Service, local chiefs and the District Commissioner, we managed to get access to these remote mountain areas.

The forest is mainly at high altitudes on the summit areas of these isolated mountains within the midst of the semi-arid grassland and desert areas. This usually involved trekking for several days away from the vehicle.

Mt. Nyiro was the first area we looked at. Here beautiful *Podocarpus* forest occurs extensively on the Plateau. Villagers from Tumm assisted with the sampling under the direction of Charles Lange. The villagers were able to find areas of relatively undisturbed forest, as well as the small area of bamboo, which is located near the highest summit on the plateau. Four sites were sampled and the material is currently being worked on.

We then moved north to Mt. Kulal, which is accessible by track from the mission at Gatab. Mt. Kulal is a UNESCO Man & Biosphere Reserve. The area of forest is quite extensive, covering both the north and south summits. We spent three days sampling with the assistance of local villagers, who were able to take us to the areas of forest that were undisturbed. The forest is notable for the rich epiphytes hanging from the trees and the cloud cover.

Four days later we travelled east to Marsabit National Park - a site famous for elephants and beautiful crater lakes. Because of its status as a national park it was not possible to recruit local help in sampling, therefore the sample size was reduced compared to other sites. The forest here was much drier than at the other sites where we sampled, thus finding live land snails was problematic. However, material of the endemic cyclophorid, *Maizania marsabitensis*, was acquired. The fauna seemed to be more impoverished than at other sites, but we await the final results with interest.

The final leg was to the Ndoto mountains, north of the Mathews Range. Here, access was through the chief at Nkurimit, who assisted with the organisation of guides who knew the mountains. The routes here are not used much for local travel, so are more difficult to find, hence guides are essential. Progress was difficult and sampling took a day longer than we had hoped. However, by day 3 we found good forest with species that we had not seen elsewhere, so the trek was worthwhile.

Currently all samples are being sorted to morphospecies in Cardiff. Once the data are complete and tabulated, a preliminary report will be sent to the Office of the President in Nairobi.

Mt. Kenya project

Charles Warui, an M.Sc student at the University of Nairobi, part supported by the project, carried out a survey on Mt. Kenya using four altitudinal transects through forests with different aspects around the mountain in early 1997. These gave information about the impact of aspect and altitude on the molluscan biodiversity of the mountain. He has finished data analysis and is now on target to submit an M.Sc. thesis by June 1998.

Kakamega project, Kenya

Charles Lange spent three months in the UK reassessing the identification of the material from Kakamega, and is drafting a paper on the differences between the molluscan faunas of indigenous forests and managed plantations in Kakamega Forests. He presented a paper at a meeting in London, and the abstract is given below.

WWF project in Udzungwa, Tanzania

Christine Meena was invited to join Peter Stephenson (WWF Tanzania) to look at the molluscan biodiversity of the Udzungwa National Park, an area we had previously been unable to look at. Christine spent three days in the park, getting material from three sites at different elevations. This material has been identified to morphospecies

level and a preliminary report was submitted to WWF in November 1997.

Coastal zone forests, Tanzania

Dr Kayumbo and Christine Meena also instigated some survey work in the local forests near Pugu in April 1997, following up work that Peter Tattersfield carried out in 1995. It is clear that more of this work is needed as the coastal forest region has a different fauna from that of the mountain forests inland.

Comparison of Molluscan Biodiversity in Plantations and Indigenous Forests of Tropical Ecosystems in Africa.

Modified abstract of the paper read at the Young Malacologists Forum, Malacological Society of London, Natural History Museum, 25 September 1997.

by C. Lange

The biodiversity of Mollusca in forest ecosystems in Africa has been the subject of recent studies in Kenya (Tattersfield, 1996), Tanzania (Emberton et al., 1997), Madagascar (Emberton 1996) and Gabon (de Winter, 1995), but there is as yet, no treatment comparing the levels of diversity of plantations. Such data are important as they allow the impact of forest management or reforestation on the native fauna to be assessed.

This study presents data on a case study from Kakamega tropical rain forest, Kenya. The survey was carried out in September 1996, in the forest areas previously surveyed by Tattersfield (1996). Nine sites were examined in four different forest types (indigenous, Pinus plantation, Bischofia plantation and Maesopsis plantation). At each site four replicate samples were taken, following a similar methodology to Tattersfield (1996).

Lower values of species richness, species abundance and diversity indices were recorded in all forest plantations compared with the indigenous forest. The indigenous forest contained 8 species that were not found in the plantations. It is then clear that if we are to maintain the broadest molluscan biodiversity, we need to retain the original forests rather than clear fell areas and replant with plantation trees. Continued monitoring of these ecosystems' biodiversity is vital to understand their rates of faunal decline.

De Winter, A.J. 1995. Gastropod diversity in a rain forest in Gabon, Western Africa. In: Van Bruggen, A.C., Wells, S.M. & Kemperman, T.C.M., eds. *Biodiversity and Conservation of the Mollusca*. Backhuys publishers: Oegstgeest-Leiden, Netherlands. p. 223-228.

Emberton, K.C. 1996. Conservation priorities for forest floor invertebrates of the Southeastern half of Madagascar: evidence from two land-snail clades. *Biodiversity and Conservation* 5: 729-741.

Emberton, K.C., Pearce, T.A., Kasigwa, P., Tattersfield, P. & Habib, Z. 1997. High diversity and regional endemism in land-snails of Eastern Tanzania. *Biodiversity and Conservation* 6: 1123-1136.

Tattersfield, P. 1996. Local patterns of land snail diversity in a Kenyan rain forest. *Malacologia* 38: 161-180

Molluscan research in the Eastern Arc forests

by Peter Tattersfield, Mary B. Seddon, Christine Meena, N. Kayumbo & P.F. Kasigwa

Modified abstract of a poster presentation at the Eastern Arc Conference, Morogoro, Tanzania, December 1997.

The Mollusca is the second most diverse animal Phylum, with over 115,000 species. The total number of land snails is estimated to be over 30,000, with over 1100 species in East Africa, but with every survey this number increases, as undescribed species are found. Most land molluscs are detritivores and contribute to forest decomposition processes, although the East African fauna is unusual because of the large numbers of carnivorous species. At a practical level, molluscs are easy to sample and are useful indicators of the health of forest ecosystems. They have also contributed much to our knowledge about evolution.

The poster presented the methodology and preliminary results from an ongoing project on East African molluscan biodiversity. Since 1995, molluscan surveys have been carried out in 18 eastern arc and 7 Tanzanian coastal forests. A total of 136 species were recorded during the surveys of the Ulugurus, east and west Usambaras, and Ngurus. This represents about 13% of the total East African fauna and 33% of the known mainland Tanzanian fauna.

Preliminary results indicate that there are high levels of diversity in the Usambaras and Uluguru forests, but the Ngurus appear to be species-poor. The Usambara forests share some species with those of the coastal belt, but the Uluguru fauna appears to be distinct.

The eastern arc forest molluscan faunas are characterised, like other groups, by very high levels of local endemism and strong altitudinal zonation. Being highly sensitive to changes in forest microclimate they are especially susceptible to forest disturbance or degradation. It is clear that sensitive management is essential in the eastern arc forests if current levels of molluscan biodiversity are to be maintained. Species characteristic of the lower altitude forest types may have already been lost.

Some of the data collected during the project have been used in the assessment of Tanzanian molluscs for the 1996 IUCN Red List of Threatened Animals. In total, 79 Tanzanian molluscs were included in the Red List, of which 37 were land snails restricted to the Usambaras.

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News from the UK

England

In England, English Nature have continued to support work on the rare freshwater molluscs such as *Anisus vorticulus*, *Segmentina nitida* and *Myxas glutinosa*. Some of this work will be published in the forthcoming special volume of the 1996 Molluscan Conservation conference (see the announcement in this issue of Tentacle). In addition, further work on *Margaritifera margaritifera* provided some of the evidence used to upgrade this species to full protection under the UK Wildlife and Countryside Act during the quinquennial review. It is now an offence to disturb, damage or kill this species in the UK.

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Wales

In Wales, the National Museum (NMGW) has been awarded a research grant from the Countryside Council for Wales to study the life history of two European Union Habitats & Species Directive snails (*Vertigo geyeri* and *V. angustior*), which have major Welsh strongholds on the Gower and on Anglesey. The £30,000 over three years will support a doctoral studentship for three years and has been awarded to Eva Sharland. She will attempt to discover all she can about the needs of these creatures - do they like it hot or wet, how often do they breed, what do they like to eat. Professor Robert Cameron is supervising Eva, and it will not be an easy task given the size of these animals; it will involve monthly sampling at both sites and laboratory rearing experiments. The aim of the project is to provide reserve management guidelines for the protected sites where these animals live and is part of the UK Biodiversity Action Plan.

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NEWS FROM AUSTRALIA

by Winston F. Ponder

The publication of *The Fauna of Australia*, vol. 5. Mollusca: the southern synthesis (Beesley et al., 1998) is one of the most significant things to happen recently. That book will not only heighten interest in molluscs amongst the broader community, it will (and has) increased interest by the Federal Government agencies responsible for conservation. The book contains a review of molluscan conservation - largely a rehash of Ponder (1997), the text of which is available on <http://www.austmus.gov.au/science/division/invert/>

mal/angered/.

Three species of land snails have now been listed as endangered in New South Wales (*Meridolum corneovirens* from western Sydney, *Thersites mitchellae* from northern NSW coastal rainforest remnants and *Placostylus bivaricosus* from Lord Howe Island (part of NSW). There are illustrations and information on these species on the Australian Museum website at the address given above.

The act under which these NSW species were listed only covers terrestrial organisms. Legislation will shortly be enacted to enable the listing of marine and freshwater species in this state.

Last December I organised a meeting held at the Australian Museum called "The Other 99% - the biodiversity and conservation of invertebrates". This four day meeting was the third to be held at two year intervals in Australia - the previous ones being in Brisbane and Melbourne respectively. They have a national focus but this meeting attracted several overseas people amongst the 200 participants. There were four symposia and almost 100 papers and posters were presented. The symposia addressed topics concerning the description and evaluation of invertebrate diversity, the legislative and policy issues and the communication of information regarding invertebrates. There were two workshops held, one dealing with legislative issues, the other with communicating the invertebrate agenda. While papers and posters specifically dealing with molluscs were few, many of the papers were relevant to the issues concerning molluscan conservation. The proceedings of the meeting, including the workshop results, will be published - occupying quite a bit of my time over the next 12 months!

Environment Australia (EA) has recently published a long-awaited overview of non-marine invertebrate conservation by Alan Yen and Rhonda Butcher (Yen & Butcher, 1997). A consultancy will shortly be awarded to produce a similar volume on marine invertebrate conservation.

I am currently doing a consultancy for EA on Australian marine molluscs potentially threatened by the commercial shell trade. This is needed because under our Federal export legislation each state must have a management plan for any commercially collected group of organisms. If anyone has any thoughts on marine species likely to be affected by collecting, commercial or amateur, please let me know.

Some time ago I asked for people to write letters regarding a serious threat to a species of viviparid in South Australia (*Notopala hanleyi*). This species is extinct in its natural habitat but persists in a few irrigation pipelines. The situation is that the species cannot be listed as endangered in the state because that is not possible under their current legislation. This species occurred in the Murray River in NSW and Victoria and a closely related species (*N. sublineata*) or subspecies was once widespread in a major tributary of the Murray River, the Darling River in NSW. As far as I know, *N. hanleyi* only exists in one or two irrigation pipelines in South Australia. *N. sublineata* also appears to be extinct

throughout its range but also exists in a few irrigation pipelines in NSW. I will be applying to have this species listed as endangered later this year when the appropriate legislation (see above) is enacted. Previously it was thought that *N. sublineata* was widespread in inland rivers in Queensland but those records are another closely related species, *N. alisoni*. I am currently revising the taxonomy of the Australian viviparids.

References

- Beesley, P.L., Ross, G.J.B. & Wells, A. (eds.) 1998. *The Fauna of Australia, vol. 5. Mollusca: the southern synthesis*. CSIRO Publishing: Melbourne. (Ponder, W.F. Conservation. Vol. 5A, p. 105-115).
- Ponder, W.F. 1997. Conservation status, threats and habitat requirements of Australian terrestrial and freshwater Mollusca. *Memoirs of the Museum of Victoria* 56(2): 421-430.
- Yen, A. & Butcher, R. 1997. *An overview of the conservation of non-marine invertebrates in Australia*. Environment Australia, Canberra. 346 p.

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PACIFIC ISLAND LAND SNAIL PAGE

Victory! Ogasawaran land snails will survive on Anijima

by Kiyonori Tomiyama & Takahiro Asami

The Tokyo Metropolitan Government (TMG) is likely to abandon its notorious plan to construct an airport on Anijima Island in the Ogasawara archipelago (see *Tentacle* issues 6 & 7). As far as we know, in the last two years TMG has received more than 200 letters of protest from organizations and individuals all over the world, including *Tentacle* readers. We believe these international voices made major contributions to this delightful victory and thank all of you who made their views known to TMG.

The ecosystem unique to the Ogasawara archipelago, which could be called the "Asian Galapagos" because of the many equivalent features noted by Darwin in the *Origin* (1859, p.383), fortunately remains intact - but only on the single small island Anijima. The biota surviving on this uninhabited island, including the unusually diverse fauna of terrestrial molluscs, has been under threat of being extinguished by construction of a jet-airport with a 1800 m runway, unthinkably too big for the 2000 Ogasawaran residents or even for extravagant tourism (see *Tentacle* issues 6 & 7 for more details of this problem and of the natural history of the island).

For a decade, TMG had insisted on the environmental appropriateness of the Anijima airport, based on subjective assessments made by private consulting companies. However, TMG seems eventually to have faced the necessity of more rigorous scientific evaluation prior to continuing their planned airport construction, perhaps

because of the many protests from around the world. Last year TMG entrusted professional researchers with the environmental assessment and reevaluation of airport construction in Ogasawara. In November, 1997, the committee of environmental scientists in charge reported the results of their 7 month investigation. Their report clearly demonstrates the pristine nature of the Ogasawaran biota remaining only on Anijima and stresses the importance of special protection of Anijima. Further, the report listed nine possible alternative locations for the airport construction, decisively excluding Anijima. TMG is supposed to develop a new airport plan for Ogasawara in several months, based on this report. Thus, it is unlikely that Anijima will again be chosen to be destroyed.

Wherever an airport is going to be built, it would be threatening for the fragile ecosystems of oceanic islands such as Ogasawara, as small as 10% of the Galapagos in area. Thus, we should not yet be fully satisfied with this news of success, but rather need to keep very much aware of what happens next. However, this success in persuading TMG not to construct the airport on Anijima, and thereby to preserve what is left of the original Ogasawaran environment and land snails was not possible without international protests, and the support of readers of *Tentacle*.

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New Zealand *Paryphanta* deleted from CITES list

From: *TRAFFIC Bulletin* 17(1): 19.

Paryphanta spp. were removed from Appendix II at the tenth meeting of the Conference of the Parties to CITES, held in Harare, Zimbabwe, 9-20 June 1997. The amendment entered into force on 18 September 1997.

Partulids declared "protected" in French Polynesia

by Jean-Yves Meyer

In December 1997, all species of the family Partulidae in French Polynesia (about 66 *Partula* spp. and 14 *Samoana* spp.), locally called "areho", were legally declared "protected species" by the French Polynesian Assembly. This implies a total and permanent prohibition of their destruction, capture, transportation, utilization, possession, as well as the degradation of their native habitats (arrêté N°1332 CM).

However, some exceptions for scientific purposes might be allowed by the French Polynesian government for in- and ex-situ conservation. The family Partulidae, with its 100 % endemism, forms one of the most original groups

of the terrestrial biota of French Polynesia. Moreover, about 57 *Partula* species are already extinct and many other species are close to disappearing, mainly because of predation by the carnivorous snail *Euglandina rosea*. Many species have been saved from extinction in the wild thanks to *ex-situ* conservation experiments in European and American zoos and universities. Atrial of reintroduction of *Partula* species extinct in the wild has been recently conducted with some success on the island of Moorea (see previous issues of *Tentacle*).

Furthermore, *Euglandina rosea* is also legally recognized to be a threat to biodiversity, especially the endemic Partulids. This predator is now considered to be a noxious species: introduction of live specimens and their transport from one island to another is forbidden, and destruction is authorized (arrêté N°1333 CM).

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Partulid and other land snails of the National Park of American Samoa

by Robert H. Cowie & Robert P. Cook

In March and May 1998 we conducted surveys in the National Park of American Samoa, on the islands of Tutuila, Ta'u and Ofu. The purpose of the surveys was to document the land snail fauna of this newly established Park.

On Tutuila we made 80 collections of snails from 11 of the ridges that run from the main backbone ridge of the island to the ocean. These transects broadly covered the entire area of the Park on Tutuila. Samples were taken at evenly spaced elevations on each ridge and for a standard length of time at each site, to permit estimates of relative abundances. We collected both from vegetation and in the litter.

On Ta'u and Ofu we made a total of 71 collections from various accessible areas, including the summits of both islands. Our sampling protocol was similar to that used on Tutuila, covering a broad range of elevations and distinguishing arboreal from ground-dwelling snails.

The collected material still remains to be fully analysed, but preliminary observations indicate that a number of native species, especially Helicinidae, are widespread and abundant, especially on Tutuila and the upper slopes of Ta'u. Species of Helicarionidae also seem fairly widespread, although occurring in relatively low numbers. On Tutuila, however, the introduced carnivorous snails *Euglandina rosea* and *Gonaxis kibweziensis* are widely distributed and often common. *E. rosea* has been recorded previously from Ta'u but we did not see any. Ofu still appears free of both *Achatina fulica* (the introduced giant African snail) and these carnivorous snails. Non-native helicarionid snails and veronicellid slugs were also found, but the most common species of all were introduced Subulinidae.

We did not collect Partulidae (with one exception), considering them potentially too threatened. However, we did record all individuals seen. We found three species on Tutuila: *Eua zebrina*, *Samoana conica*, and *Samoana abbreviata*, in decreasing order of abundance. These species were by no means widely distributed in the Park, being found only in certain areas. We could see no obvious reason for this patchiness, with populations being found high on the main ridge top as well as only 10 m inland from the high tide line at one locality. An explanation may yet emerge as the data are mapped and analysed.

No partulids have been recorded previously from Ta'u and we did not see any on that island. However, on Ofu we made perhaps our most significant discoveries: twelve individuals of the Ofu endemic *Samoana thurstoni*, expanding its known distribution; and, most surprising, an apparently thriving population of a species of *Eua*, this genus not having been previously recorded from Ofu. (We collected a small number of these *Eua* sp., feeling justified in doing this because of the apparent robust status of the population and as vouchers supporting this new island record.)

While we were pleased to find more partulids than we had expected, especially *S. abbreviata*, which hitherto was considered possibly extinct, *Samoana thurstoni*, which has apparently always been extremely localised, and the *Eua* sp. on Ofu, there is no cause for complacency. *Euglandina rosea* and *Gonaxis kibweziensis* are widely distributed on Tutuila, and perhaps still have the potential to expand their distributions, with the abundant introduced subulinids as a ready food source; and rat predation of partulids is common. In addition, proposed development in the Tutuila unit of the park and neighbouring areas has the potential to impact the partulids seriously. It is particularly important that *Achatina fulica* and the predatory snails be kept out of Ofu. More survey work will be needed to better document the distribution and abundance of partulids, and provide adequate data for evaluating proposed developments.

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Hawaiian *Achatinella*/*Partulina* tree snail update

by Michael G. Hadfield

Field studies of *Achatinella mustelina* in the Wai'anae Mountains and other species in the north Ko'olau Mountains of Oahu continue to provide useful demographic data on the snails as well as important information on the presence and effects of introduced predators. In 1997 the first good data on the population biology of *Achatinella livida* were obtained.

Efforts to improve in situ conservation are under way, including predator abatement and predator exclusion

around threatened populations of *Achatinella mustelina*. In particular, this work involves development of a toxic bait specifically targeted at the introduced predatory snail *Euglandina rosea*.

The basic methods for successful propagation of the tree snails in captivity are now well tested. We have seven *Achatinella* species and a number of *Partulina* species in our captive breeding program. We continue to work to improve survivorship of all snails, especially those less than one year old. Controlled-climate greenhouses have been constructed and once temperatures in them are stabilized and we are confident that the trees in them are thriving, our captive-propagation capacity will be greatly improved and enlarged. There will be more room, and the conditions will more closely emulate favorable field habitats.

Progress on developing methods for conducting molecular-genetic studies of the snails has been significant. A preliminary phylogeny for certain species of *Achatinella* and *Partulina*, with *Perdicella* and *Newcombia* as out-groups, has been generated.

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Homogenization of the non-marine snail faunas of Pacific islands

by Robert H. Cowie

From: *World Conservation*, the quarterly bulletin of IUCN-The World Conservation Union April 1997 - January 1998: 18. [to be reprinted, with corrections]

The once luxuriant radiations of often spectacularly colourful endemic snails on Pacific islands are vanishing. They are being replaced by a homogeneous set of mostly tropical tramps. Notable among these are the giant African snail (*Achatina fulica*) and the suite of predatory snails introduced deliberately in ill-conceived attempts to control it.

Others include *Bradybaena similaris* of eastern Asia, the slugs *Laevicaulis alte* (probably African) and *Vaginulus plebeius* (Neotropical), and a number of species in the family Subulinidae, one of which, the Neotropical *Allopeas gracile*, was even as long ago as the turn of the century considered "the most widely distributed land snail in the world". The now almost ubiquitous European garden snail, *Helix aspersa*, is established in slightly cooler localities (above about 1000 m in Hawaii), as is the carnivorous *Oxychilus cellarius* [should read *Oxychilus alliarius*; a mistake in the original publication; although *O. cellarius* may also be present in Hawaii], also western European in origin.

In the freshwater realm, South American "apple snails" (family Ampullariidae; *Pomacea* spp.) have been introduced to Hawaii, Guam, Palau and New Guinea, as well as to many South-east Asian countries. They are serious rice and taro pests, and would pose a significant threat to natural wetlands of these and other islands, were they

introduced.

Other freshwater species include common aquarium snails and others transported on aquatic plant material (mostly Lymnaeidae, Physidae, Planorbidae). Hawaii now has more introduced than native species of freshwater snails.

With the catastrophic exception of *Euglandina rosea*, most of these non-indigenous species have occupied habitat that was already seriously modified by human activities. They have probably only rarely interacted with native snail species. However, they are mostly relatively recent introductions - the rate of introduction has increased over the latter half of the twentieth century, and continues to do so. As these established aliens, as well as newly introduced species expand into previously unoccupied territory, they will likely come into increasing contact with remnant populations of native species - the outcome is unlikely to be good. [While this may be the case in Hawaii, since the original article was written, I have realized that this may not be the case on islands where the native habitat has been less dramatically modified and where non-indigenous snails are abundant in the native habitat; there may indeed be significant impacts].

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MARINE MATTERS

Please note Winston Ponder's request for input in his article above ("News from Australia"). The relevant paragraph is reprinted here:

I am currently doing a consultancy for Environment Australia on Australian marine molluscs potentially threatened by the commercial shell trade. This is needed because under our Federal export legislation each state must have a management plan for any commercially collected group of organisms. If anyone has any thoughts on marine species likely to be affected by collecting, commercial or amateur, please let me know.

Ancient cephalopod needs protection

From: *Oryx* 32(2): 98 (which took it from *Sea Wind*, September-December 1997, 11(4): 20-23)

Nautilus pompilius and *N. macromphalus*, members of a relic order of cephalopod molluscs, may be facing extinction in the Philippines because of the high demand for their shells as souvenirs. Research during the late 1970s and early 1980s concluded that overfishing had reduced populations of these species and there has been little evidence of a recovery. *Nautilus* species are long-lived and have low reproductive rates. They are difficult to culture and so captive breeding is unlikely to be successful. These poorly known species are found in restricted habitat along vertical coral reefs of continental shelves in the tropical south-east Pacific [should read "south-west"]. At night they swim to the surface, allowing easy capture in baited traps. Information is being collected towards

proposing *Nautilus* spp. for listing under CITES.

RECENT PUBLICATIONS RELEVANT TO MOLLUSC CONSERVATION

The following are the abstracts of papers presented at a symposium on "Gene Conservation: management and evolutionary units in freshwater mussel management", *Journal of Shellfish Research* 16(1): 322-327 [1997].

- Berg, D.J., Hoeh, W.R. & Guttman, S.I. Alternate models of genetic structure in unionid populations: conservation and management implications.
- Black, M.C. Biomarker assessment of environmental contamination with freshwater mussels.
- Bowen, B.W. Management units and evolutionary significant units in conservation.
- Hoeh, W.R., Guttman, S.I. & Berg, D.J. Correlation between mating system and distribution of genetic variation in *Utterbackia* (Bivalvia: Unionidae).
- Johnson, R.L., Fang Qing-Liang & Farris, J.L. Genetic diversity among several species of unionid mussels in Arkansas.
- Kandl, K.L., Liu, H.-P., Mulvey, M., Butler, R. & Hoeh, W.R. Clarification of *Pleurobema pyriforme* as a species or species-complex and implications for the conservation of rare freshwater mussels.
- Karl, S.A. Geographic scale and molecular stock assessment.
- Liu, H.-P. & Mulvey, R. Molecular phylogenetic relationships among freshwater mussels of the subfamily Anodontinae: conservation implications.
- Lohofener, R. Species and subspecies: protecting aquatic invertebrates under the Endangered Species Act of 1973, as amended.
- Morrison, P.A. The role of National Wildlife Refuges in conserving biological and genetic diversity of freshwater mussels.
- Mulvey, M. & Liu, H.-P. Genetic relationships among Atlantic slope lanceolate Elliptio: RFLPs of amplified ITS region and allozymes.
- Nammack, M. NMFS [National Marine Fisheries Service] and the evolutionary significant unit concept for Pacific salmon.
- Roe, K.J. & Lydeard, C.L. Species delineation and the identification of evolutionarily significant units in the freshwater mussel genus *Potamilus*.
- Villella, R., King, T. & Starliper, C. Translocation programs in freshwater mussels: genetic and disease concerns.
- von Oettingen, S. & Mignogno, D. National strategy for the conservation of native freshwater mussels.
- Williams, J.D. Conservation status of freshwater mussels: families Margaritiferidae and Unionidae.

Other publications

- Beesley, P.L., Ross, G.J.B. & Wells, A. (eds.) 1998. *The Fauna of Australia, vol. 5. Mollusca: the southern synthesis*. CSIRO Publishing: Melbourne.
- Boles, L.C. & Lipcius, R. 1997. Potential for population regulation of the zebra mussel by finfish and the blue crab in North American estuaries. *Journal of Shellfish Research* 16(1): 179-186.
- Cowie, R.H. 1998. Patterns of introduction of non-indige-

- nous non-marine snails and slugs in the Hawaiian Islands. *Biodiversity and Conservation* 7(3): 349-368
- Cowie, R.H. 1998. Catalog of the nonmarine snails and slugs of the Samoan Islands. *Bishop Museum Bulletin in Zoology* 3, viii + 122 p.
- Cowie, R.H. & Howarth, F.G. 1998. Biological control: disputing the indisputable. *Trends in Ecology and Evolution* 13(3): 110.
- D'Itri, F.M. (ed.) 1997. *Zebra mussels and aquatic nuisance species*. Ann Arbor Press: Chelsea, Michigan. ix + 638 p.
- Gatenby, C.M., Parker, B.C. & Neves, R.J. 1997. Growth and survival of juvenile rainbow mussels, *Villosa iris* (Lea, 1829) (Bivalvia: Unionidae), reared on algal diets and sediment. *American Malacological Bulletin* 14(1): 57-66.
- Hosaka, K.-I. & Fukuda, H. 1996. Discovery of a population of an endangered brackish-water snail *Stenothyra japonica* (Gastropoda: Neotaenioglossa: Stenothyridae) and characteristics of the accompanied molluscan fauna in Onoda City, Yamaguchi Prefecture, western Japan, with a comment on the conservation value. *The Yuriyagai: Journal of the Malacozoological Association of Yamaguchi* 4: 65-96.
- Malakoff, D. 1997. Extinction on the high seas. *Science* 277: 486-488.
- Mulvey, M., Lydeard, C., Pyer, D.L., Hicks, K.M., Brimbox, J., Williams, J.D. & Butler, R.S. 1997. Conservation genetics of North American freshwater mussels *Amblema* and *Megalonais*. *Conservation Biology* 11(4): 868-878.
- Nichols, S.J. & Wilcox, D.A. 1997. Burrowing saves Lake Erie clams. *Nature* 389: 921.
- Obermeyer, B.K., Edds, D.R., Prophet, C.W. & Miller, E.J. 1997. Freshwater mussels (Bivalvia: Unionidae) in the Verdigris, Neosho, and Spring River basins of Kansas and Missouri, with emphasis on species of concern. *American Malacological Bulletin* 14(1): 41-55.
- Patterson, M.A., Parker, B.C. & Neves, R.J. 1997. Effects of quarantine times on glycogen levels of native freshwater mussels (Bivalvia: Unionidae) previously infested with zebra mussels. *American Malacological Bulletin* 14(1): 75-79.
- Ponder, W.F. Conservation. In Beesley, P.L., Ross, G.J.B. & Wells, A. (eds.) 1998. *The Fauna of Australia, Vol. 5. Mollusca: the southern synthesis*. CSIRO Publishing: Melbourne. Vol. 5A, p. 105-115.
- Preece, R.C. 1998. Impact of early Polynesian occupation on the land snail fauna of Henderson Island, Pitcairn group (South Pacific). *Philosophical Transactions of the Royal Society of London B* 353: 347-368.
- Reynolds, J.E. 1997. Report of the Conchological Society Partula colony 1996. *Conchologists' Newsletter* 9(3) [no. 143]: 875-880.
- Schloesser, D.W., Smithee, R.D., Longton, G.D. & Kovalak, W.P. 1997. Zebra mussel induced mortality of unionids in firm substrata of western Lake Erie and a habitat for survival. *American Malacological Bulletin* 14(1): 67-74.
- Yamashita, H., Okamoto, M., Harato, M. & Fukuda, H. 1997. The present status and conservation values of endangered mollusks in tidal flats and estuaries of Japan—1. *Tellina* (*Serratina*) *capsoides* (Bivalvia: Veneroida: Tellinidae). *The Yuriyagai: Journal of the Malacozoological Association of Yamaguchi* 5: 101-115.

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Note that some of these details have changed since the previous issue of Tentacle.

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APPENDIX

1996 IUCN RED LIST - BIVALVIA

The following lists and information have been taken from the World Conservation Monitoring Centre's (WCMC) website:
http://www.wcmc.org.uk/species/animals/animal_redlist.html

The web version of the IUCN Red List of Threatened Animals is updated periodically in light of new information and differs slightly from the printed version of the 1996 IUCN Red List which was valid at the time of printing in September 1996. The list below was taken from the website on 28 January 1998.

Comments, amendments [we know there are errors and blunders!] and suggestions should be directed to Mary Seddon (see list of Mollusc Specialist Group Members, above)

IUCN Red List Categories

Further details, including details of "criteria A to E" (see below) are available on the WCMC website.

EXTINCT (EX) Ataxon is Extinct when there is no reasonable doubt that the last individual has died.

EXTINCT IN THE WILD (EW) Ataxon is Extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. Ataxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR) Ataxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria A to E.

ENDANGERED (EN) Ataxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria A to E.

VULNERABLE (VU) Ataxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the criteria A to E.

LOWER RISK (LR) Ataxon is Lower Risk when it has been evaluated, but does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:

1. Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories

above within a period of five years.

2. Near Threatened (nt). Taxa which do not qualify for

Conservation Dependent, but which are close to qualifying for Vulnerable.

3. Least Concern (lc). Taxa which do not qualify for Conservation Dependent or Near Threatened (not actually listed).

DATADEFICIENT (DD) Ataxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. Ataxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat or Lower Risk. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE) Ataxon is Not Evaluated when it has not yet been assessed against the criteria.

EXTINCT

UNIONIDAE

<i>Dysnomia arcaiformis?</i>	USA
<i>Dysnomia biemarginata</i>	USA
<i>Dysnomia flexuosa</i>	USA
<i>Dysnomia haysiana</i>	USA
<i>Dysnomia lefevrei</i>	USA
<i>Dysnomia lenior</i>	USA
<i>Dysnomia lewisii?</i>	USA
<i>Dysnomia personata</i>	USA
<i>Dysnomia propinqua</i>	USA
<i>Dysnomia sampsoni</i>	USA
<i>Dysnomia stewardsoni</i>	USA
<i>Unio cariei</i>	Réunion

EXTINCT IN THE WILD

No species listed

CRITICALLY ENDANGERED

MARGARITIFERIDAE

<i>Margaritifera auricularia</i>	Belgium, Czech Republic, France, Germany, Italy, Luxembourg, Netherlands, Portugal, Spain, United
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Kingdom			
<i>Margaritifera hembeli</i>	USA	<i>Pleurobema curtum</i>	USA
<i>Margaritifera margaritifera durrovensis</i>	Ireland	<i>Pleurobema flavidulum</i>	USA
		<i>Pleurobema furvum</i>	USA
UNIONIDAE		<i>Pleurobema georgianum</i>	USA
<i>Alasmidonta mccordi</i>	USA	<i>Pleurobema gibberum</i>	USA
<i>Alasmidonta raveneliana</i>	USA	<i>Pleurobema hagleri</i>	USA
<i>Alasmidonta robusta</i>	USA	<i>Pleurobema hanleyianum</i>	USA
<i>Alasmidonta wrightiana</i>	USA	<i>Pleurobema johannis</i>	USA
<i>Amblema neislerii</i>	USA	<i>Pleurobema marshalli</i>	USA
<i>Arkansia wheeleri</i>	USA	<i>Pleurobema murrayense</i>	USA
<i>Cyprogenia stegaria</i>	USA	<i>Pleurobema nucleopsis</i>	USA
<i>Dromus dromas</i>	USA	<i>Pleurobema perovatum</i>	USA
<i>Elliptio chipolaensis</i>	USA	<i>Pleurobema plenum</i>	USA
<i>Elliptio nigella</i>	USA	<i>Pleurobema rubellum</i>	USA
<i>Elliptio steinstansana</i>	USA	<i>Pleurobema taitianum</i>	USA
<i>Elliptioideus sloatianus</i>	USA	<i>Pleurobema troschelianum</i>	USA
<i>Epioblasma arcaeformis</i>	USA	<i>Pleurobema verum</i>	USA
<i>Epioblasma biemarginata</i>	USA	<i>Popenaias popeii</i>	USA
<i>Epioblasma brevidens</i>	USA	<i>Potamilus capax</i>	USA
<i>Epioblasma capsaeformis</i>	USA	<i>Ptychobranthus greenii</i>	USA
<i>Epioblasma flexuosa</i>	USA	<i>Ptychobranthus jonesi</i>	USA
<i>Epioblasma florentina curtisi</i>	USA	<i>Quadrula couchiana</i>	USA
<i>Epioblasma haysiana</i>	USA	<i>Quadrula fragosa</i>	USA
<i>Epioblasma lenior</i>	USA	<i>Quadrula sparsa</i>	USA
<i>Epioblasma lewisii</i>	USA	<i>Quadrula stapes</i>	USA
<i>Epioblasma metastriata</i>	USA	<i>Quadrula tuberosa</i>	USA
<i>Epioblasma obliquata perobliqua</i>	USA	<i>Quincuncina mitchelli</i>	USA
<i>Epioblasma othcaloogensis</i>	USA	<i>Toxolasma cylindrellus</i>	USA
<i>Epioblasma penita</i>	USA		
<i>Epioblasma personata</i>	USA	ENDANGERED	
<i>Epioblasma propinqua</i>	USA	HYRIIDAE	
<i>Epioblasma sampsonii</i>	USA	<i>Diplodon dunkerianus</i>	Brazil
<i>Epioblasma stewardsonii</i>	USA	<i>Diplodon fontaineanus</i>	Brazil
<i>Epioblasma torulosa torulosa</i>	USA		
<i>Epioblasma turgidula</i>	USA	MARGARITIFERIDAE	
<i>Fusconaia cor</i>	USA	<i>Margaritifera margaritifera</i>	
<i>Fusconaia cuneolus</i>	USA	Austria, Belgium, Czech Republic, Denmark,	
<i>Hemistena lata</i>	USA	Finland, France, Germany, Ireland, Luxembourg,	
<i>Lampsilis binominata</i>	USA	Norway, Poland, Portugal, Russia, Spain,	
<i>Lampsilis streckeri</i>	USA	Sweden, United Kingdom	
<i>Lampsilis virescens</i>	USA	<i>Margaritifera marrianae</i>	USA
<i>Lasmigona decorata</i>	USA		
<i>Lemiox rimosus</i>	USA	UNIONIDAE	
<i>Lexingtonia subplana</i>	USA	<i>Cyprogenia aberti</i>	USA
<i>Medionidus mcglameriae</i>	USA	<i>Disconaias salinasensis</i>	USA
<i>Medionidus parvulus</i>	USA	<i>Elliptio arca</i>	USA
<i>Medionidus penicillatus</i>	USA	<i>Elliptio fraternum</i>	USA
<i>Medionidus simpsonianus</i>	USA	<i>Elliptio spinosa</i>	USA
<i>Obovaria retusa</i>	USA	<i>Elliptio waltoni</i>	USA
<i>Pegias fabula</i>	USA	<i>Epioblasma obliquata obliquata</i>	USA
<i>Plethobasus cicatricosus</i>	USA	<i>Fusconaia escambia</i>	USA
<i>Plethobasus cooperianus</i>	USA	<i>Fusconaia masoni</i>	USA
<i>Pleurobema altum</i>	USA	<i>Lampsilis abrupta</i>	USA
<i>Pleurobema avellanum</i>	USA	<i>Lampsilis altilis</i>	USA
<i>Pleurobema bournianum</i>	USA	<i>Lampsilis cariosa</i>	USA
<i>Pleurobema chattanoogaense</i>	USA	<i>Lampsilis higginsii</i>	USA
<i>Pleurobema clava</i>	USA	<i>Lampsilis powellii</i>	USA
<i>Pleurobema collina</i>	USA		

<i>Lampsilis rafinesqueana</i>	USA
<i>Medionidus acutissimus</i>	USA
<i>Medionidus walkeri</i>	USA
<i>Potamilus amphichaenus</i>	USA
<i>Potamilus inflatus</i>	USA

VULNERABLE**HYRIIDAE**

<i>Castalia martensi</i>	Brazil
<i>Diplodon expansus</i>	Brazil
<i>Diplodon pfeifferi</i>	Brazil
<i>Westralunio carteri</i>	Australia

UNIONIDAE

<i>Lampsilis dolabraeformis</i>	USA
<i>Lampsilis reeviana reeviana</i>	USA
<i>Pleurobema oviforme</i>	USA
<i>Pleurobema strodeanum</i>	USA

TRIDACNIDAE

<i>Tridacna derasa</i>	Australia, Fiji, French Polynesia, Guam, Indonesia, New Caledonia, Northern Marianas, Palau, Papua New Guinea, Philippines, Solomon Islands, Tonga, Vanuatu
<i>Tridacna gigas</i>	Australia, Federated States of Micronesia, Fiji, Guam, Indonesia, Japan, Kiribati, Malaysia, Marshall Islands, Myanmar, New Caledonia, Northern Marianas, Palau, Papua New Guinea, Philippines, Solomon Islands, Taiwan, Thailand, Tuvalu, USA, Vanuatu
<i>Tridacna rosewateri</i>	Mauritius
<i>Tridacna tevoroa</i>	Fiji, Tonga

**LOWER RISK:
CONSERVATION DEPENDENT****UNIONIDAE**

<i>Simpsonaias ambigua</i>	USA
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TRIDACNIDAE

<i>Hippopus hippopus</i>	American Samoa, Australia, Federated States of Micronesia, Fiji, Guam, India, Indonesia, Japan, Kiribati, Malaysia, Marshall Islands, Myanmar, New Caledonia, Northern Marianas, Palau, Papua New Guinea, Philippines, Singapore, Solomon Islands, Taiwan, Thailand, Tonga, Tuvalu, Vanuatu, Western Samoa
<i>Hippopus porcellanus</i>	Indonesia, Palau, Philippines
<i>Tridacna maxima</i>	American Samoa, Australia, British Indian Ocean Territory, China, Cook Islands, Egypt, Federated States of Micronesia, Fiji, French Polynesia, Guam, India, Indonesia, Japan, Kenya, Kiribati,

Madagascar, Malaysia, Maldives, Marshall Islands, Mauritius, Mozambique, Myanmar, New Caledonia, Northern Marianas, Palau, Papua New Guinea, Philippines, Pitcairn Islands, Saudi Arabia, Seychelles, Singapore, Solomon Islands, South Africa, Sri Lanka, Taiwan, Thailand, Tokelau, Tonga, Tuvalu, US Minor Pacific Islands, Vanuatu, Viet Nam, Western Samoa

Tridacna squamosa

American Samoa, Australia, British Indian Ocean Territory, Egypt, Federated States of Micronesia, Fiji, French Polynesia, Guam, India, Indonesia, Japan, Kenya, Kiribati, Madagascar, Malaysia, Maldives, Marshall Islands, Mauritius, Mozambique, Myanmar, New Caledonia, Northern Marianas, Palau, Papua New Guinea, Philippines, Saudi Arabia, Seychelles, Singapore, Solomon Islands, South Africa, Sri Lanka, Thailand, Tokelau, Tonga, Tuvalu, USA, Vanuatu, Viet Nam, Western Samoa

LOWER RISK: NEAR THREATENED**UNIONIDAE**

<i>Actinonaias pectorosa</i>	USA
<i>Anodontooides radiatus</i>	USA
<i>Cyclonaias tuberculata</i>	USA
<i>Ellipsaria lineolata</i>	USA
<i>Elliptio ahenea</i>	USA
<i>Elliptio angustata</i>	USA
<i>Elliptio congaraea</i>	USA
<i>Elliptio dariensis</i>	USA
<i>Elliptio downiei</i>	USA
<i>Elliptio folliculata</i>	USA
<i>Elliptio hopetonensis</i>	USA
<i>Elliptio lanceolata</i>	USA
<i>Elliptio mcmichaeli</i>	USA
<i>Elliptio producta</i>	USA
<i>Elliptio shepardiana</i>	USA
<i>Fusconaia askewi</i>	USA
<i>Fusconaia barnesiana</i>	USA
<i>Fusconaia lananensis</i>	USA
<i>Fusconaia ozarkensis</i>	USA
<i>Fusconaia subrotunda</i>	USA
<i>Fusconaia succissa</i>	USA
<i>Lampsilis bracteata</i>	USA
<i>Lampsilis cardium</i>	USA
<i>Lampsilis fullerhati</i>	USA
<i>Lampsilis haddletoni</i>	USA
<i>Lampsilis ornata</i>	USA
<i>Lampsilis ovata</i>	USA
<i>Lampsilis perovalis</i>	USA
<i>Lampsilis reeviana brevicula</i>	USA
<i>Lampsilis satura</i>	USA
<i>Lampsilis splendida</i>	USA
<i>Lampsilis straminea straminea</i>	USA
<i>Lasmigona complanata alabamensis</i>	USA

<i>Lasmigona holstonia</i>	USA
<i>Lasmigona subviridis</i>	USA
<i>Leptodea leptodon</i>	USA
<i>Leptodea ochracea</i>	USA
<i>Lexingtonia dolabelloides</i>	USA
<i>Ligumia nasuta</i>	USA
<i>Ligumia recta</i>	USA
<i>Medionidus conradicus</i>	USA
<i>Obovaria jacksoniana</i>	USA
<i>Obovaria rotulata</i>	USA
<i>Obovaria subrotunda</i>	USA
<i>Obovaria unicolor</i>	USA
<i>Plethobasus cyphus</i>	USA
<i>Pleurobema beadleianum</i>	USA
<i>Pleurobema cordatum</i>	USA
<i>Pleurobema decisum</i>	USA
<i>Pleurobema pyriforme</i>	USA
<i>Pleurobema riddellii</i>	USA
<i>Pleurobema rubrum</i>	USA
<i>Pseudanodonta complanata</i>	
Austria, Belarus, Belgium, Bulgaria, Czech Republic, Estonia, Finland, Germany, Hungary, Kazakhstan, Latvia, Lithuania, Moldova, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Ukraine, United Kingdom	
<i>Ptychobranhus occidentalis</i>	USA
<i>Ptychobranhus subtentum</i>	USA
<i>Pyganodon gibbosa</i>	USA
<i>Quadrula asperata</i>	USA
<i>Quadrula cylindrica cylindrica</i>	USA
<i>Quadrula houstonensis</i>	USA
<i>Quadrula refulgens</i>	USA
<i>Quadrula rumphiana</i>	USA
<i>Quincuncina infucata</i>	USA
<i>Strophitus connasaugaensis</i>	USA
<i>Strophitus subvexus</i>	USA
<i>Unio crassus</i>	
Austria, Belarus, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Kazakhstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Moldova, Netherlands, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Ukraine	

SPHAERIDAE

<i>Pisidium fultoni</i>	Australia
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DATA DEFICIENT**PECTINIDAE**

<i>Nodipecten magnificus</i>	Ecuador
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UNIONIDAE

<i>Alasmidonta marginata</i>	Canada, USA
<i>Alasmidonta varicosa</i>	Canada, USA
<i>Epioblasma florentina</i>	USA
<i>Unio turtoni</i>	France

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The following people have not renewed their membership of Members of the Group

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