

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

TENTACLE



Editorial

Since the publication of *Tentacle* No. 6 two major events have taken place. First, the publication of the new 1996 IUCN Red List of Threatened Animals (the Gastropoda are listed as an appendix to this issue of *Tentacle*; Bivalvia will appear in a later issue), and second, the Molluscan Conservation conference that was held in Cardiff (UK). Both involved major contributions from many Mollusc Specialist Group (MSG) members and others, but especially from Mary Seddon and Philippe Bouchet (MSG co-chairs). Mary co-organised the Cardiff meeting (a conference report is included in this issue) and, with Philippe Bouchet (MSG co-chair), went above and beyond the call of duty in contributing to the Red List, so much so that the MSG, "under the leadership of Mary Seddon and Philippe Bouchet" was singled out in the acknowledgements section. Applying the new IUCN categories was difficult from the start, and cajoling the information out of the various contributors from around the world must have been even harder. But this effort to list the molluscs as consistently and comprehensively as possible, given the scanty knowledge of most species, will hopefully pay off in terms of focussing our efforts and promoting the cause of mollusc conservation. Mary and Philippe deserve our thanks and congratulations. [As of 1 January 1997, Philippe has stepped down as co-chair and been replaced by Winston Ponder - see article below.]

In the UK, the British Broadcasting Corporation (BBC) finds itself faced with a lawsuit over statements made in its recent excellent TV programme recounting the extinction of partulid tree snails in French Polynesia. The immediate cause of their extinction was the introduction of the carnivorous snail *Euglandina rosea* in ill-conceived attempts to control the giant African land snail, *Achatina fulica*. A major proponent of biological control of *A. fulica* using predators such as *E. rosea* and the flatworm *Platydemus manokwari* is a Dr. R. Muniappan, formerly of the University of Guam. Dr. Muniappan is taking the BBC to court over comments made about him during the programme.

In the USA, the moratorium on listing species or designating critical habitat under the Endangered Species Act (ESA) (see

Tentacle 6) was lifted during 1996. In addition, legislation proposed in the House by Congressmen Pombo and Herger

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that would further undermine the ESA, was essentially defeated. However, new legislation is now being proposed in the Senate by Republican senators Kempthorne and Chafee that would again significantly undermine the ESA. The ESA therefore continues to need strong support from concerned individuals and organisations. The Endangered Species Coalition (of which the American Malacological Union is a member) has developed a bill to be introduced in the US Congress to strengthen the ESA by replacing it with a new "Endangered Natural Heritage Act". For more information on the Endangered Species Coalition see *Tentacle* 6.

In Japan, the fight to prevent the destruction of the endemic fauna and flora, especially land snails, of the island of Anijima in the Ogasawara archipelago continues. In this issue of *Tentacle*, Takahiro Asami and Kiyonori Tomiyama call on all concerned people and organisations to exert international pressure on the Tokyo Metropolitan Government to rethink its plans to build a new airport on the island. Pressure resulting from a previous call for action (see *Tentacle* 6) appears to have had some impact, but the issue is now coming to a critical point.

Once again, this issue of *Tentacle* has contributions from around the world. Nevertheless, there is still perhaps an over-emphasis on the USA (or more correctly an under-emphasis on other parts of the world, since there is no reason to downplay the significance of the threats to molluscs, especially freshwater bivalves, in the USA). This emphasis is in part because my own situation means that I come across US literature and news most readily. Please send me more items from around the world in order that *Tentacle* can be better balanced.

Also, while terrestrial and freshwater molluscs are generally far more severely threatened than marine species, there is very little on marine molluscs in this issue. There are, however, significant marine problems worthy of discussion (e.g., shell collecting, impacts of non-indigenous species) and I would like to see more on "Marine Matters" in *Tentacle*.

In the past, the MSG has received small amounts of funding from the Shell oil company in support of publication of *Tentacle*. This is no longer the case. Personally I am happy about this. With the present environmental and human rights record that Shell currently enjoys, I do not think we should be giving them the opportunity to pay lip-service to environmental and conservation efforts by advertising their support of conservation groups like the MSG. This view is in line with the attitude of an increasing number of organisations, including such esteemed societies as the Royal Geographic Society (UK), as discussed in a news article in the journal *Nature* (issue of 11 January 1996).

The previous issue of *Tentacle* (No. 6) was delayed at the printers, so that when it eventually appeared some of the news items were not as topical as they should have been. Hopefully, this latest issue will have appeared in a more timely fashion. Please continue to send me your news for inclusion in *Tentacle* 8—don't wait until I have to beg you!

Finally, a footnote. 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.

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IUCN AND MOLLUSC SPECIALIST GROUP NEWS

Change at the top

As of 1 January 1997 and after two terms as co-chair of the Mollusc Specialist Group (MSG), Philippe Bouchet stood down. He has moved on to become a member of the Species Survival Commission Steering Committee, and from that position will have the opportunity to promote the cause of mollusc conservation even more effectively. He has done a sterling job with the MSG and will no doubt continue to be a major influence in mollusc conservation internationally.

Philippe has been replaced as co-chair by Winston Ponder of the Australian Museum in Sydney. Mary Seddon remains as co-chair for an additional term.

Molluscan conservation: a strategy for the 21st century

by David Long

This article is based on one which appeared in the March 1997 issue of *The Conchologists' Newsletter*, and the February 1997 issue of the *Bulletin of the Malacological Society of London*. It is intended to issue the conference proceedings as a Conchological Society Special Publication in 1997.

Given that the Mollusca are the second largest animal phylum in terms of numbers of described species and that 40% of the recorded animal extinctions since 1600 are of molluscs, it is surprising that they do not feature more highly in the consciousness of the wildlife conservation movement. In a significant move to rectify this state of affairs, the first ever conference to be dedicated to the conservation of molluscs took place in Cardiff from the 20th to the 22nd of November 1996. Organised by Mary Seddon and Ian Killeen on behalf of the Conchological Society of Great Britain and Ireland, the National Museum and Galleries of Wales and the World Conservation Union (IUCN) Mollusc Specialist Group, the first two days were based at the National Museum and the last at Cardiff City Hall. Ian Killeen has pointed out that the idea developed from a conversation in a pub, but the conference can also be logically presented as a development from the Alan Solem Memorial Symposium on the Biodiversity and Conservation of the Mollusca held at the International Malacological Congress in Sienna in 1992 (see below for publication information for that symposium).

Between 80 and 100 delegates attended. Although most were from Britain there was a sizeable and very important overseas contingent including Mariano Gimenez-Dixon of IUCN, Philippe Bouchet (Museum National d'Histoire Naturelle, Paris), Maria Ramos and Rafael Araujo (Madrid), Arthur Bogan (USA),

Vincent Flores (Mauritius) and delegates from Finland, Kuwait, South Africa, Belgium and Eire.

The conference could be divided into general international scene setting on day one; problems and particular cases (with an emphasis on Great Britain and Ireland and on *Margaritifera*) on day two; and specific international problems (and captive breeding) on day three.

The international scene

The major international organisations and legislation for conservation are:

IUCN. 114 bivalves and 806 gastropods are currently listed in the threatened categories (see <http://www.wcmc.org.uk:80/>). IUCN has some 800 Governmental and non-governmental organisations as members, and aims to help drafting national strategies, to provide management expertise and to help with information on the status of species. The expert input is provided by members of specialist groups like the Mollusc Specialist Group.

CITES. the Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1975, is an internationally agreed listing of species whose threatened status requires that trade in them is regulated, either by a requirement for an export licence, or for an import licence, or both. 134 states have signed the Convention. Species covered in the appendices include 32 Unionidae, *Achatinella* species, the Tridacnidae, *Strombus gigas*, *Papustyla pulcherrima*, and *Paryphanta* species.

Within the European Community, the "Habitats Directive" (92/433/ECC), which matches the commitments to the Biodiversity Convention agreed at the 1992 Rio Earth Summit, institutes the designation of Special Areas of Conservation (SACs), lists habitats and species of plants and animals which are rare, endangered or vulnerable, and obliges member states to take action to protect them. The intricacies of state, European Union and International actions are difficult to unravel, but as examples, the UK funded the move of 600 square metres of *Vertigo moulinsiana* habitat out of the line of the Newbury bypass; research into human threats to the molluscs of maerl beds is funded through the European Community MAST III (Marine Science and Technology) programme; as a result of the Directive the Countryside Council for Wales is required to monitor, and take action to conserve, *Vertigo angustior* at sites in South Wales; the Spanish receive funding from the Bern Convention Secretariat for work on *Margaritifera auricularia* (now down to 20 known living individuals; its larval host is probably the W. European Sturgeon, extinct in Spain - see article below). Within the UK, the Habitats Directive strengthens the protection provided by the 1981 Wildlife and Countryside Act and its schedules (e.g. most SACs will already be Sites of Special Scientific Interest).

But this legal framework is selective and there is a risk of concentrating resources on "scheduled" species (even if they really should not be so treated) at the expense of equally deserving cases. The law also risks being sidestepped as Graham Oliver pointed out, for example on the grounds that species "y", a recent segregate from species "x", is not the scheduled species "x" - a warning about being too closely bound to the taxonomy used in protected species schedules.

What are the priorities?

Molluscan conservation efforts have predominantly targeted non-marine species even though there are perhaps 80,000 living marine species compared with 20,000 or so non-marine. This priority would appear justified: since 1600 there have been nearly 250 extinctions among non-marine molluscs, and four among marine species. Mary Seddon revealed that of 252 species extinct or extinct in the wild and 967 at high risk, North American unionids (also see articles below) and island species were worst hit. The non-marine element is more obviously exposed to threats, the whole of their habitat being more accessible to human activity.

The conservation of marine molluscs has to protect the fauna from less visible threats than, say, deforestation - to some extent out of sight is out of mind. Sue Wells pointed out that enclosed bays vulnerable to pollution and coral reefs and mangroves required protection. Protection from the shell trade was particularly important with marine species - one million giant clams were removed annually from the Philippines at the peak of trading. After habitat loss, alien introductions are the primary cause of species extinction; this is well demonstrated by *Crepidula fornicata* and *Crassostrea gigas* in the UK and *Dreissena polymorpha* in the US. Ten marine molluscs are listed by the Joint Nature Conservation Committee (JNCC) as non-native to UK waters.

In many ways the bias towards non-marine conservation and the debate about species versus habitat conservation reflect what is going on in conservation as a whole. But particular difficulties arise with molluscs. For marine and freshwater species one is dealing with a mobile environment. The fauna (perhaps the non-marine fauna in particular) is only well-known in limited parts of the world - Europe, North America, New Zealand and, possibly, Australia - so we do not know what there is to conserve. Degrees of endemism and species' ranges vary; the ranges of non-marine mollusc species in the tropics are often smaller than those of Holarctic species. Island faunas often have a high degree of endemism, now usually impoverished. One Pacific island has 100 endemic land snail species, some known only from a single ridge or valley, and the "limestone islands" of the Malayan peninsula hold several dozen species in areas less than 100 ha. Rarity is a good indication of which species are in danger of extinction, but Robert Cameron warned that the impressive "species swarms" which are a characteristic of many terrestrial mollusc faunas would fare less well than species which are the only representative of a genus or family. There is clearly much surveying, ecology and taxonomy to be done so as to focus conservation efforts to best effect. But the pace of events does not permit actions to proceed in series, conservation measures need to be taken now in many cases.

Examples of conservation in action

Turning to some of the cases we heard of, there was the narrow-ranged endemic, *Helix ceratina* in Corsica, which is not listed under the Habitats Directive or in the Bern Convention but is protected under French law, but which exists only in a coastal dune site vulnerable to trampling. The conservation and status of pearl mussels, *Margaritifera margaritifera* and the one population of *M. auricularia*, received a good deal of attention because of their decline in much of Europe and the association with "treasure hunting". There have been enormous declines in

species richness in some freshwater habitats in the south eastern United States. The problems for non-marine mollusc conservation in tropical areas and islands, besides undescribed faunas, include unpredictable effects of introduced predators or vegetation - for instance, *Euglandina rosea* has devastated defenceless *Partula* species, but has had less effect on islands where molluscs have developed defences against indigenous predators, and on Mauritius, exotic vegetation can shelter native species so attempts to recreate "native" vegetation can be disastrous for the molluscs. Further details are given below.

The "take-home" message

My impression was that there is much that could be done to improve the conservation of molluscs. However, to do this as a discrete activity is not easy, especially because of the limited share of expenditure and effort on conservation which conservation of molluscs can expect to attract. More account needs to be taken of molluscs within general conservation activities and we should emphasise the importance of molluscs within the context of "wildlife conservation" at every opportunity.

By the end of the conference it was clear that those attending felt that it had been a success, particularly in developing international links in this field, and that further similar meetings would be valuable. One particular action was that many attendees were prepared to take action in relation to the sale, by Sainsbury's Homebase chain in the UK, of tropical shells, including land molluscs, as "renewable natural products" (or words to that effect) - a problem drawn to our attention by Sue Wells. As a result of this and action by the Marine Conservation Society, Sainsbury's, who appear not to have been aware that the renewability claim might be incorrect, are reconsidering their policy on whether to continue stocking this line of merchandise.

Four Case Studies from the Cardiff Conference

(a) British riverine Species

The removal of *Vertigo moulinsiana* from the route of the proposed Newbury Bypass was a feat of civil engineering. 600 square metres of *Glyceria* turf 3-500 mm thick were moved, with the snails concentrated in the moist leaf mat at the base. A millstream was then diverted through the scrape with a 1 in 200 gradient. New growth was reported within a month. However, *V. moulinsiana* has been added to 52 10 km squares since 1970 and will be in five SACs, so their Red Data book status seems dubious. Translocation (this one cost around £0.25 million) should not become a first option for the future. *Pseudamnicola*, a clean river species, is a more worthy case for conservation, and could become a flagship species.

Ian Killeen suggested that molluscs could be used as bioindicators for ditch management. *Anisus vorticulus*, *Segmentina nitidula*, *Vallonia maurostoma* and *Pisidium pseudosphaerium* flourish in late successional stages of ditches. A Community Conservation Index (highest conservation score x average score per taxon) of 10 would indicate little value, while one of 20 would indicate high value.

Some species seem to defy attempts at conservation - *Myxas glutinosa*, now Britain's rarest freshwater snail (see article below) has a reputation for disappearing from one site and turning up at another.

(b) North American unionids

Art Bogan drew attention to the fate of North American freshwater bivalve taxa (also see other articles in this issue): of 344 species, 35 are extinct, 49 endangered, 5 threatened in the US and 61 are candidates for threatened or endangered category. Only 20% appear to be maintaining their populations. The central problem is modification and destruction of habitat, notably sedimentation, but damming has caused the loss of obligate fish hosts of unionid glochidia larvae, and zebra mussels (*Dreissena polymorpha*) introduced in the 1980s have smothered many populations of the native mussels. Conservation has had a positive effect - eight unionids have returned to the upper Ohio River since the 1970 Clean Water Act, but unionids have gained protection only by appeals to the public conscience based on the value of the whole ecosystem.

(c) Pearl mussels

Margaritifera margaritifera has become severely depleted in Britain by pearl fishing, loss of salmonid hosts from acid rain, eutrophication and land drainage (a site in Snowdonia was destroyed before piles of dead mussel shells along the banks revealed its presence), and only one population, in West Cumbria, is recruiting. Protection measures include provision of good conditions for sea trout (the probable main vector), tree shade to control algal growth, and regulation of cattle watering stretches. In Finland, large populations persist but most are outside conservation areas. A formula is used to set the level of fines for removal (£500 for a *M. margaritifera*, £6,000 for a sea eagle). Other methods of conservation are stopping flow of silt into rivers from peatland drainage, restoration of pool riffles, adding fish vectors, and restocking - this is 90% successful between different stretches of the same river, but only 50% successful from one river to another.

(d) Polynesian tree snails

Thirty taxa of *Partula* are now cared for in 17 different institutions in Europe and N. America; most are now extinct in the wild as a direct result of the introduced predator *Euglandina rosea*. Some species in captive breeding programmes have been lost, but 20 species have been saved from extinction. Viability was checked by releasing specimens into Kew Gardens tropical house and monitoring their success: release of 3 species in a 20 x 20 m predator exclusion zone on Moorea has started, but *Euglandina* re-invaded when the electric fence broke down (see previous issues of *Tentacle* and the Pacific Island Land Snail Page in this issue).

I, and I am sure all other delegates, are very grateful to Mary Seddon and Ian Killeen for organising such a successful conference and to all those obvious enthusiasts who so willingly took part in it. Can we have another soon?

I thank Bill Bailey and Philippe Bouchet for helpful suggestions.

David Long, 20 Hall Road, Leckhampton, Cheltenham GL53 0HE, UK.

"The Conservation Biology of Molluscs" Proceedings of the 1986 Symposium on Threatened Molluscs, Edinburgh

The proceedings of this symposium were published 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, 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>

1996 IUCN Red List available

The new 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% airmail 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.

Progress report on the Action Plan for the Conservation of Land and Freshwater Molluscs

Little progress has been made on the Action Plan since the last issue of *Tentacle*. The reason is that Philippe Bouchet,

Action Plan editor, and Olivier Gargominy, project assistant, have both been involved in production of a CD-ROM on 'Extinct and Endangered Species'. The CD is to be published under the umbrella of UNESCO by Electronic MultiMedia Enterprises, a CD-ROM publisher with branches in Europe, USA, Brasil and Japan. The CD is about modern species extinctions in general, i.e., not just molluscs, but we have taken this splendid opportunity to present, alongside with whales and tigers, the case of the Pacific islands tree snails (*Partula*) and other non-"charismatic" animals and plants. The *Partula* case is illustrated with video footage by the BBC based on Paul Pearce-Kelly's work at London Zoo and in the Society Islands. In addition, we have brief species presentations of several other endangered or extinct molluscs: the eel-grass limpet *Lottia alveus*, hydrobiids, North American unionids, the Corsican *Helix ceratina*, St Helena subulinids, Paraná river *Aylacostoma* (see article below), giant clams, etc. The CD-ROM also contains international reference texts with lists of protected species, e.g. CITES, Bern Convention, etc.

I apologize to contributors to the Action Plan for the delay generated by our little CD-ROM adventure. This will be finished by the end of June, and we expect to resume Action Plan work full speed by July. The additional time has not been totally in vain, though. Over the last few months Mary Seddon and I have participated in several international meetings (World Conservation Congress, Montreal; Steering Committee of the Species Survival Commission, Gland). Through our interactions with non-mollusc conservationists, we now probably have a better grasp of what kind of message and data we should deliver to the community. I will make sure that this is reflected in the final draft of the Action Plan.

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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 gastropods is reproduced as an appendix to this issue of *Tentacle*. It is hoped to list the bivalves in a future issue.

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

`listproc@ucmp1.berkeley.edu`

Then on the first line of the body of the message:
`sub mollusca <your_name>`

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

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:

`listserver@wcmc.org.uk`

Mollia

The MOLLIA web site is for logistic information about malacology - a resource for information on periodicals, meetings, and primary data (published or unpublished), available by the internet. This web site has many links to diverse sites providing extensive information about mollusc biology, museum collections, molluscs in the *Zoological Record*, mollusc research people. It also contains the UNITAS Malacologica newsletters, which have a lot of information complementing information in *Tentacle*. MOLLIA, like MOLLUSCA, is maintained and managed at the University of California Museum of Paleontology, Berkeley, USA. The address is:
<http://www.ucmp.berkeley.edu/mologis/mollia.html>

Unionids

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

I am pleased to announce the initiation of a new internet listserver ("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.

A WWW 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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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>

Fieldguide to the freshwater snails of Florida

This World Wide Web fieldguide is an on-line version of Fred Thompson's long out-of-print (hardcopy) edition that appeared in 1984 under the title: *The Freshwater Snails of Florida, A Manual for Identification*. A revised edition is being prepared and will be on the web in the future. The address is: <http://www.fimnh.ufl.edu/natsci/malacology/fl-snail/snails1.htm>

MEETINGS 1997/1998

Conservation and Biodiversity of Invertebrates

The third meeting on the Conservation and Biodiversity of Invertebrates will be held in Sydney, Australia, 9-12 December 1997. The objective of this meeting will be to demonstrate the importance of invertebrates in biodiversity research and in nature conservation. For further information contact one of the organisers:

Gerry Cassis, phone: 2 320 6346

Pat Hutchings, phone: 2 320 6243

Richard Major, phone: 2 320 6183

Winston Ponder, phone: 2 320 6120

All at the Australian Museum, 6 College Street, Sydney, NSW 2000, Australia. Fax: 2 320 6050; e-mail invert@amsg.Austrmus.oz.au

Third Latin American Congress of Malacology, Ensenada, Mexico, October 1997

The congress will be held in conjunction with the Mexican congress of Malacology and Conchilology at Ensenada, Baja California, Mexico, 13-17 October 1997. Details can be obtained from Roberto Cipriani, Department of Geophysical Sciences, University of Chicago, 5734 S. Ellis Ave., Chicago, Illinois 60637, USA. Tel. 1 312 955 4040, ext. 51170; fax 1 312 702 9505; e-mail rciprian@midway.uchicago.edu; or from Miguel Angel Del Rio Portilla, e-mail midelrio@cicese.mx; or on the Web at <http://www.cicese.mx/oceano/acuicultura/IIIclama.html>

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@imnh.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@nmnh.si.edu

U.S. FISH & WILDLIFE SERVICE DISCONTINUES CATEGORY 2 LIST

by Barry Roth

In a notice published 5 December 1996 (Federal Register [FR] 61: 64481-64485), the United States Fish and Wildlife Service (the "Service") has confirmed its decision to discontinue the practice of maintaining a list of "Category 2" candidate species for endangered or threatened status under the Endangered Species Act of 1973.

Numerous mollusk species are affected. Table 1 presents mollusk taxa identified as Category 2 candidates in FR 59: 58982 ff., 15 November 1994, the most recent publication of such a list. The list has also been made available on the web at <http://ucmp1.berkeley.edu/barryr/cat2.html>. Category 2 species formerly were defined as "taxa for which information now in the possession of the Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which persuasive data on biological vulnerability and threat are not currently available to support proposed rules" (FR 59: 58983).

The Service attempts to justify this action, in part, as follows:

"When the Service first started publishing comprehensive lists of candidates and potential candidates, no comparable list existed because few organizations were tracking species of concern. Now, a number of agencies and organizations track species that may be declining, including State natural resource agencies and Natural Heritage Programs, Federal land-management agencies, the Biological Resources Division of the U.S. Geological Survey (USGS), professional societies, and conservation organizations. The added attention and wider range of focus means that there is vastly superior information available on species of concern than was maintained in the Service's list of category-2 species. Duplicative effort to maintain lists is not the best use of limited endangered species funding.

"The quality of the information supporting the former category-2 list varied considerably, ranging from extremely limited or old data to fairly comprehensive assessments. It is the intent of the Service to work with all interested parties and to use scientifically credible sources of peer-reviewed information, when available, to identify new candidate species.

"The need for a species of concern list extends beyond implementation of the Endangered Species Act. Using the old category-2 list as a "species of concern" list was inappropriate; it is widely believed that sensitive, rare, and declining species are more inclusive than those found in the old category-2 list. Many Divisions of the Fish and Wildlife Service, such as Migratory Birds, Refuges, Endangered Species, Habitat Conservation, Environmental Contaminants, and Fish and Wildlife Management Assistance will continue to work with partners to identify and protect species of concern.

"The result of such collaboration should be a far more comprehensive and reliable accounting of biological resources that are declining or otherwise at risk. This approach is consistent with the purposes of numerous Federal environmental policies and statutes, not just the Act." (FR 61: 64481-64482)

The notice goes on to summarize comments and recommendations received in response to the initial proposal to discontinue the list (FR 61: 7596-7599, 28 February 1996). It also reiterates the Service's interest in receiving comments and information relating to the biological status and threats of particular taxa that are, or should be, regarded as candidates for protection under the Endangered Species Act.

Under the revised listing system, only those species for which there is enough information (in the opinion of the Service) to support a listing proposal will be called candidates. These were formerly known as "Category 1" candidate species. A former Category 3, consisting of a mixture of non-candidate species, thought to be either extinct, taxonomically invalid, or too widespread to be considered at risk also no longer exists.

It is too early to assess the effects of these changes in listing procedures. But because the Service formerly encouraged state and local governments to take Category 2 candidates into account in their environmental planning, there is reason to believe that the new classification will significantly lower the level of protection afforded the nation's mollusk fauna.

- Cowie, R.H., Evenhuis, N.L. & Christensen, C.C. 1995. *Catalog of the native land and freshwater molluscs of the Hawaiian Islands*. Backhuys Publishers, Leiden. vi + 248 pp.
- Turgeon, D.D., Bogan, A.E., Coan, E.V., Emerson, W.K., Lyons, W.G., Mikkelsen, P.M., Quinn, J.F., Jr., Roper, C.F.E., Rosenberg, G., Roth, B., Sweeney, M.J., Scheltema, A.H., Thompson, F.G., Vecchione, M. & Williams, J.D. In preparation. *Common and Scientific Names of Aquatic Invertebrates from the United States and Canada: Mollusks*. 2nd ed. American Fisheries Society Special Publication.

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Table 1. Former United States Fish and Wildlife Service Category 2 candidate mollusk species.

Gastropoda

Neritidae

Neritilia hawaiiensis Kay, 1979

Viviparidae

Campeloma decampi (Binney, 1865)
Lioplax cyclostomaformis (Lea, 1841)

Pleuroceridae

Elimia acuta (Lea, 1831)
Elimia alabamensis (Lea, 1861)
Elimia albanyensis (Lea, 1864)
Elimia aterina (Lea, 1863)
Elimia bellula (Lea, 1861)
Elimia boykiniana (Lea, 1840)
Elimia capillaris (Lea, 1861)
Elimia crenatella (Lea, 1860)
Elimia fascinans (Lea, 1861)
Elimia haysiana (Lea, 1843)
Elimia hydei (Conrad, 1834)
Elimia interrupta (Haldeman, 1840)
Elimia interveniens (Lea, 1862)
Elimia nassula (Conrad, 1834)
Elimia olivula (Conrad, 1834)
Elimia porrecta (Lea, 1863)
Elimia prestriata (Lea, 1852)
Elimia pybasi (Lea, 1862)
Elimia strigosa (Lea, 1841)
Elimia teres (Lea, 1841)
Elimia troostiana (Lea, 1838)
Elimia varians (Lea, 1861)
io fluviatilis (Say, 1825)
Leptoxis ampla (Anthony, 1855)

Leptoxis compacta (Anthony, 1854)
Leptoxis crassa (Haldeman, 1841)
Leptoxis melanoides (Conrad, 1834)
Leptoxis minor (Hinckley, 1912)
Leptoxis picta (Conrad, 1834)
Leptoxis plicata (Conrad, 1834)
Leptoxis praerosa (Say, 1821)
Leptoxis taeniata (Conrad, 1834)
Leptoxis virgata (Lea, 1841)
Lithasia armigera (Say, 1821)
Lithasia curta (Lea, 1868)
Lithasia duttoniana (Lea, 1841)
Lithasia geniculata Haldeman, 1840
Lithasia jayana (Lea, 1841)
Lithasia lima (Conrad, 1834)
Lithasia salebrosa (Conrad, 1834)
Lithasia verrucosa (Rafinesque, 1820)
Pleurocera alveare (Conrad, 1834)
Pleurocera annulifera (Conrad, 1834)
Pleurocera brumbyi (Lea, 1852)
Pleurocera corpulenta (Anthony, 1854)
Pleurocera curta (Haldeman, 1841)
Pleurocera foremani (Lea, 1843)
Pleurocera postelli (Lea, 1862)
Pleurocera pyrenella (Conrad, 1834)
Pleurocera showalteri (Lea, 1862)
Pleurocera viridulum (Anthony, 1854)
Pleurocera walkeri Goodrich, 1928

Littorinidae

Littorina subrotundata (Carpenter, 1865) [as *Algamorda newcombiana* (Hemphill, 1877)]

Hydrobiidae

Antrorbis breweri Hershler & Thompson, 1990
Aphaostracon asthenes Thompson, 1968
Aphaostracon monas (Pilsbry, 1899)
Aphaostracon pycnum Thompson, 1968
Aphaostracon xynoelictum Thompson, 1968
Cincinnatia helicogyra Thompson, 1968
Cincinnatia mica Thompson, 1968
Cincinnatia monroensis (Dall, 1885)
Cincinnatia parva Thompson, 1968
Cincinnatia ponderosa Thompson, 1968
Cincinnatia vanhyningi (Vanatta, 1934)
Cincinnatia wekiwae Thompson, 1968
Clappia cahabensis Clench, 1965
Clappia umbilicata (Walker, 1904)
Cochliopa texana Pilsbry, 1935
Fluminicola columbianus (Keep, 1887)
Fontigens tartarea Hubricht, 1963 [as *F. holsingeri* Hubricht, 1976]
Fontigens turritella Hubricht, 1976
Lepyrium showalteri (Lea, 1861)
Phreatodrobia imitata Hershler & Longley, 1986
Pyrgulopsis, three unnamed spp.
Pyrgulopsis aardahli Hershler, 1989
Pyrgulopsis agarhecta (Thompson, 1969)
Pyrgulopsis arizonae (Taylor, 1987) [as *Apachecoccus*]
Pyrgulopsis avernalis (Pilsbry, 1935) [as *Fluminicola*]
Pyrgulopsis bacchus Hershler, 1988
Pyrgulopsis bernardina (Taylor, 1987) [as *Yaquicoccus*]
Pyrgulopsis castor (Thompson, 1977)
Pyrgulopsis conica Hershler, 1988
Pyrgulopsis crystalis Hershler & Sada, 1987
Pyrgulopsis davisii (Taylor, 1987) [as "*Fontelicella*"]
Pyrgulopsis erythropoma (Pilsbry, 1899)
Pyrgulopsis fairbanksensis Hershler & Sada, 1987
Pyrgulopsis glandulosa Hershler, 1988
Pyrgulopsis isolata Hershler & Sada, 1987
Pyrgulopsis merriami (Pilsbry & Beecher, 1892) [as *Fluminicola*]
Pyrgulopsis metcalfi (Taylor, 1987) [as "*Fontelicella*"]

- Pyrgulopsis micrococcus* (Pilsbry, 1893)
Pyrgulopsis montezumensis Hershler, 1988
Pyrgulopsis morrisoni Hershler, 1988
Pyrgulopsis nanus Hershler & Sada, 1987
Pyrgulopsis ogmorhaphis (Thompson, 1977)
Pyrgulopsis olivacea (Pilsbry, 1895)
Pyrgulopsis owensensis Hershler, 1989
Pyrgulopsis ozarkensis Hinkley, 1915
Pyrgulopsis pachyta (Thompson, 1977)
Pyrgulopsis perturbata Hershler, 1989
Pyrgulopsis pisteri Hershler & Sada, 1987
Pyrgulopsis robusta (Walker, 1908)
Pyrgulopsis simplex Hershler, 1988
Pyrgulopsis sola Hershler, 1988
Pyrgulopsis thompsoni Hershler, 1988
Pyrgulopsis trivialis (Taylor, 1987) [as "*Fontelicella*"]
Pyrgulopsis wongi Hershler, 1989
Somatogyrus amnicoloides Walker, 1915
Somatogyrus aureus Tryon, 1865
Somatogyrus biangulatus Walker, 1906
Somatogyrus constrictus Walker, 1904
Somatogyrus coosaensis Walker, 1904
Somatogyrus crassilabris Walker, 1915
Somatogyrus crassus Walker, 1904
Somatogyrus currierianus (Lea, 1863)
Somatogyrus decipiens Walker, 1909
Somatogyrus excavatus Walker, 1906
Somatogyrus hendersoni Walker, 1909
Somatogyrus hinkleyi Walker, 1904
Somatogyrus humerosus Walker, 1906
Somatogyrus nanus Walker, 1904
Somatogyrus obtusus Walker, 1904
Somatogyrus parvulus Tryon, 1865
Somatogyrus pilsbryanus Walker, 1904
Somatogyrus pygmaeus Walker, 1909
Somatogyrus quadratus Walker, 1906
Somatogyrus sargenti Pilsbry, 1895
Somatogyrus strengi Pilsbry & Walker, 1906
Somatogyrus tenax (Thompson, 1969)
Somatogyrus tennesseensis Walker, 1906
Somatogyrus virginicus Walker, 1904
Somatogyrus wheeleri Walker, 1915
Stiobia nana Thompson, 1978
Tryonia angulata Hershler & Sada, 1987
Tryonia brunei Taylor, 1987
Tryonia cheatumi (Pilsbry, 1935)
Tryonia circumstriata (Leonard & Ho, 1960 [as *T. stocktonensis* Taylor, 1987])
Tryonia clathrata Stimpson, 1865
Tryonia elata Hershler & Sada, 1987
Tryonia ericae Hershler & Sada, 1987
Tryonia gilae Taylor, 1987
Tryonia imitator (Pilsbry, 1899)
Tryonia margae Hershler, 1989
Tryonia quitobaquita Hershler, 1988
Tryonia robusta Hershler, 1989
Tryonia rowlandsi Hershler, 1989
Tryonia variegata Hershler & Sada, 1987
- Assimineidae**
- Assimineia infima* Berry, 1947
- Valvatidae**
- Valvata virens* Tryon, 1863
- Acroloxidae**
- Acroloxus coloradensis* (Henderson, 1930)
- Physidae**
- Physella microstriata* (Chamberlain & Berry, 1930)
Physella spelunca (Turner & Clench, 1925)
Physella utahensis (Clench, 1925)
Physella zionis (Pilsbry, 1926)
- Planorbidae**
- Amphigyra alabamensis* Pilsbry, 1906
Helisoma jacksonense (Henderson, 1932)
Neoplanorbis carinatus Walker, 1908
Neoplanorbis smithi Walker, 1908
Neoplanorbis tantillus Pilsbry, 1906
Neoplanorbis umbilicatus Walker, 1908
Planorbella magnifica (Pilsbry, 1903)
Planorbella multivolvis (Case, 1847)
- Ancylidae**
- Ferrissia mcneilli* Walker, 1925
Rhodacme elatior (Anthony, 1855)
Rhodacme filosa (Conrad, 1834)
- Achatinellidae**
- Newcombia canaliculata* (Baldwin, 1905)
Newcombia cumingi (Newcomb, 1853)
Newcombia lirata (Pfeiffer, 1853) [as *N. plicata* "Mighels, 1912-1914" (sic)]
Newcombia perkinsi Sykes, 1896
Newcombia pfeifferi (Newcomb, 1853)
Newcombia sulcata (Pfeiffer, 1857)
Partulina anceyana (Baldwin, 1895)
Partulina carnicolor Baldwin, 1906
Partulina confusa (Sykes, 1900)
Partulina crassa (Newcomb, 1854)
Partulina crocea (Gulick, 1856)
Partulina dolei (Baldwin, 1895)
Partulina dubia (Newcomb, 1853)
Partulina dwrightii (Newcomb, 1855)
Partulina fusioidea (Newcomb, 1855)
Partulina gemana (Newcomb, 1854)
Partulina grisea (Newcomb, 1854)
Partulina horneri (Baldwin, 1895)
Partulina induta (Gulick, 1856)
Partulina kaeana Baldwin, 1906
Partulina lemmoni Baldwin, 1906
Partulina marmorata (Gould, 1847)
Partulina mighelsiana (Pfeiffer, 1848)
Partulina mucida (Baldwin, 1895)
Partulina mutabilis Baldwin, 1908
Partulina natti (Hartman, 1888)
Partulina nivea (Baldwin, 1895)
Partulina perdix (Reeve, 1850)
Partulina physa (Newcomb, 1854)
Partulina plumbea (Gulick, 1856)
Partulina porcellana (Newcomb, 1853)
Partulina proxima (Pease, 1862)
Partulina radiata (Gould, 1845)
Partulina redfieldi (Newcomb, 1853)
Partulina rufa (Newcomb, 1853)
Partulina semicarinata (Newcomb, 1854)
Partulina splendida (Newcomb, 1853)
Partulina subpolita Pilsbry & Cooke, 1912
Partulina talpina (Gulick, 1856) [as *P. gouldii* (Newcomb, 1853)]
Partulina tapaniana (Adams, 1851)
Partulina terebra (Newcomb, 1853)
Partulina tessellata (Newcomb, 1854)
Partulina thaunumiana Pilsbry in Pilsbry & Cooke, 1913
Partulina theodorei (Baldwin, 1895)
Partulina ustulata (Gulick, 1856)
Partulina variabilis (Newcomb, 1854)
Partulina virgulata (Mighels, 1845)
Partulina winniei Baldwin, 1908
Perdicella carinella Baldwin, 1906
Perdicella fulgurans Sykes, 1900
Perdicella helena (Newcomb, 1853)
Perdicella kuhnsi (Pilsbry in Pilsbry & Cooke, 1913)
Perdicella maniensis (Pfeiffer, 1856)
Perdicella ornata (Newcomb, 1854)
Perdicella thwingii (Pilsbry & Cooke, 1914)
Perdicella zebra (Newcomb, 1855)
Perdicella zebrina (Pfeiffer, 1856)

Amastriidae

- Carelia*, ca. 12 spp.
Laminella sanguinea (Newcomb, 1854)
Leptachatina lepida Cooke in Hyatt & Pilsbry, 1910

Partulidae

- Partula salifiana* Crampton, 1925
Samoana abbreviata (Mousson, 1869)
Samoana conica (Gould, 1846)
Samoana thurstoni (Cooke & Crampton, 1930)

Pupillidae

- Gastrocopta dalliana dalliana* (Sterki, 1898)
Vertigo, unnamed sp.
Vertigo alabamensis Clapp, 1915
Vertigo arthuri von Martens, 1882
Vertigo briarensis (Leonard, 1972)
Vertigo hebari Vanatta, 1912
Vertigo hubrichti (Pilsbry, 1934)
Vertigo meramacensis (Van Devender, 1979)
Vertigo occulta (Leonard, 1972)
Vertigo ovata Say, 1822

Helicodiscidae

- Helicodiscus diadema* Grimm, 1967
Helicodiscus hexodon Hubricht, 1966

Discidae

- Discus marmorensis* Baker, 1932
Discus shimekii cockerellii (Pilsbry, 1898)

Oreohelicidae

- Oreohelix eurekaensis eurekaensis* Henderson & Daniels, 1916
Oreohelix eurekaensis uinta Brooks, 1939
Oreohelix florida Pilsbry, 1939
Oreohelix haydeni corrugata Henderson & Daniels, 1916
Oreohelix haydeni haydeni (Gabb, 1869)
Oreohelix idahoensis idahoensis (Newcomb, 1866)
Oreohelix jugalis (Hemphill, 1890)
Oreohelix nevadensis Berry, 1932
Oreohelix parawanensis Gregg, 1941
Oreohelix pilsbryi Ferriss, 1917
Oreohelix strigosa berryi Pilsbry, 1915
Oreohelix strigosa cooperi (Binney, 1858)
Oreohelix strigosa goniogyra Pilsbry, 1934
Oreohelix vortex Berry, 1932
Oreohelix waltoni Solem, 1975
Oreohelix yavapai Pilsbry, 1905
Radiocentrum avalonense (Hemphill in Pilsbry, 1905)

Arionidae

- Binneya notabilis* Cooper, 1863

Succineidae

- Catinella gelida* (Baker, 1927)
Succinea, two unnamed spp.
Succinea guamensis Pfeiffer, 1857
Succinea piratarum Quadras & Möllendorff, 1894
Succinea quadrasi Möllendorff, 1894

Trochomorphidae

- Trochomorpha apia* (Hombron & Jacquinot, 1853)

Helicarionidae

- Diastole matafaoi* Baker, 1938
Diastole schmeltziana (Mousson, 1865)

Zonitidae

- Glyphyalinia clingmani* (Dall, 1890)
Glyphyalinia pecki Hubricht, 1966
Glyphyalinia raden (Dall, 1898)
Paravitrea aulacogyra (Pilsbry & Ferris, 1906)
Paravitrea ceres Hubricht, 1978
Paravitrea ternaria Hubricht, 1978
Paravitrea varidens Hubricht, 1978

Polygyridae

- Ashmunella hebari* Pilsbry & Vanatta, 1923
Ashmunella macromphala Vagvoigyi, 1974
Ashmunella pasonis (Drake, 1951)
Cryptomastix magnidentata (Pilsbry, 1940)

- Daedalochila hippocrepis* (Pfeiffer, 1848) [as *Polygyra*]
Euchemotrema hubrichti (Pilsbry, 1940)
Euchemotrema leai cheatumi (Fullington, 1974)
 (?) *Fumonelix clingmanica* (Pilsbry, 1904) [as *Mesodon clingmanicus*]
Mesodon trossulus Hubricht, 1966
Millerelix peregrina Rehder, 1932 [as *Polygyra*]
Patera cienchi (Rehder, 1932)
Stenotrema pilsbryi (Ferris, 1900)
Triodopsis soelneri (Henderson, 1907)
Vespericola karokorum Talmadge, 1962
Xolotrema occidentale (Pilsbry & Ferriss, 1894) [as *Triodopsis occidentalis*]

Megomphicidae

- Ammonitella yatesii* Cooper, 1869

Bradybaenidae

- Monadenia circumcarinata* (Stearns, 1879)
Monadenia fidelis minor (Binney, 1885)
Monadenia fidelis pronotis Berry, 1931
Monadenia mormonum buttoni (Pilsbry, 1900)
Monadenia mormonum hirsuta Pilsbry, 1927
Monadenia setosa Talmadge, 1952
Monadenia troglodytes Hanna & Smith, 1933
Monadenia yosemitensis (Lowe, 1916) [as *M. hillebrandi yosemitensis*]

Helminthoglyptidae

- Eremarionta immaculata* (Willett, 1937)
Eremarionta millepalmarum (Berry, 1930)
Eremarionta morongoana (Berry, 1929)
Eremarionta rowelli bakerensis (Pilsbry & Lowe, 1934) [as *Micrarionta*]
Eremarionta rowelli mccoiana (Willett, 1935) [as *Micrarionta*]
Helminthoglypta allynsmithi Pilsbry, 1939
Helminthoglypta arrosa pomocensis Smith, 1938
Helminthoglypta callistoderma (Pilsbry, 1917)
Helminthoglypta coelata (Bartsch, 1916) [as *H. traski coelata*]
Helminthoglypta mohaveana Berry, 1927
Helminthoglypta nickliniana awania (Bartsch, 1919)
Helminthoglypta nickliniana bridgesii (Newcomb, 1861)
Helminthoglypta sequoicola consors Berry, 1938
Helminthoglypta stiversiana williamsi Smith, 1938 [as *H. arrosa williamsi*]
Maricopella allynsmithi (Gregg & Miller, 1969) [as *Sonorella*]
Micrarionta facta (Newcomb, 1864)
Micrarionta feralis (Hemphill, 1901)
Micrarionta gabbi (Newcomb, 1864)
Micrarionta opuntia Roth, 1975
Sonorella, unnamed sp.
Sonorella christenseni Fairbanks & Reeder, 1980
Sonorella grahamensis Pilsbry & Ferris, 1919
Sonorella metcalfi Miller, 1976
Sonorella fodseni Miller, 1976

Bivalvia**Margaritiferidae**

- Cumberlandia monodonta* (Say, 1829)
Margaritifera marrianae Johnson, 1983

Unionidae

- Alasmidonta arcata* (Lea, 1838)
Alasmidonta marginata Say, 1818
Alasmidonta varicosa (Lamarck, 1819)
Alasmidonta wrighthiana (Walker, 1901)
Anodonta californiensis Lea, 1852
Anodontoides denigrata (Lea, 1852)
Cyprogenia aberti (Conrad, 1850)
Disconaias salinasensis (Simpson, 1908)
Elliptio, unnamed sp.

Elliptio judithae Clarke, 1986
Elliptio lanceolata (Lea, 1828)
Elliptio monroensis (Lea, 1843)
Elliptio nigella (Lea, 1852)
Elliptio shepardiana (L. Lea, 1834)
Elliptio spinosa (Lea, 1836)
Elliptio vaccamawensis (Lea, 1863)
Elliptio waltoni (Wright, 1888)
Epioblasma triquetra (Rafinesque, 1820)
Fusconaia escambia Clench & Turner, 1956)
Fusconaia masoni (Conrad, 1834)
Lampsilis australis Simpson, 1900
Lampsilis binominata Simpson, 1900
Lampsilis cariosa (Say, 1817)
Lampsilis fullerkeri Johnson, 1984
Lampsilis haddletoni Atheam, 1964
Lampsilis rafinesqueana Frierson, 1927
Lampsilis subangulata (Lea, 1840)
Lasmigona, unnamed sp.
Lasmigona holstonia (Lea, 1838)
Lasmigona subviridis (Conrad, 1835)
Leptodea leptodon (Rafinesque, 1820)
Lexingtonia dolabelloides (Lea, 1840)
Medionidus penicillatus (Lea, 1857)
Medionidus simpsonianus Walker, 1905
Medionidus walkeri (Wright 1897)
Obovaria rotulata (Wright, 1899)
Pleurobema oviforme (Conrad, 1834)
Pleurobema pyramidatum (Rafinesque, 1820)
Pleurobema pyriforme (Lea, 1857)
Pleurobema rubellum (Conrad, 1834)
Pleurobema strodeanum (Wright 1898)
Pleurobema verum (Lea, 1861)
Popenaias popei (Lea, 1857)
Potamilus amphichaenus (Frierson, 1898)
Ptychobranchius jonesi (van der Schalie, 1934)
Ptychobranchius occidentalis (Conrad, 1836)
Quadrula cylindrica cylindrica (Say, 1817)
Quadrula cylindrica strigillata (Wright, 1898)
Quincuncina burkei Walker, 1922
Quincuncina mitchelli (Simpson, 1896)
Simpsonaias ambigua (Say, 1825)
Toxolasma lividus (Rafinesque, 1831)
Toxolasma pullus (Conrad, 1838)
Truncilla cognata (Lea, 1860)
Villosa choctawensis Atheam, 1964
Villosa fabalis (Lea, 1831)
Villosa ortmanni (Walker, 1925)
Villosa perpurpurea (Lea, 1861)

Sphaeriidae

Pisidium sanquinichristi Taylor, 1987
Pisidium ultramontanum Prime, 1865

From last published list (Federal Register 59: 58982, ff., 15 November 1994). Taxon names edited for conformity with current molluscan literature (e.g., Cowie *et al.*, 1995; Turgeon *et al.*, in preparation).

MYXAS GLUTINOSA, THE UK'S RAREST FRESHWATER SNAIL

by Jeremy Biggs

This request first appeared on the MOLLUSCA listserver on the Internet (see note above) on 7 February 1997.

Our group (Pond Action) is currently working on the conservation biology of *Myxas glutinosa*, which is the UK's rarest freshwater snail (last recorded in 1993 near Oxford - the first record in Britain since 1970).

At the moment we are trying to find out more about the status of this species throughout Europe. To this end we'd be pleased to hear from any biologists who have recently seen this animal ANYWHERE in Europe.

In return for any information received, we'd be pleased to send copies of reports that we have written for the UK Government conservation authorities about this species in Britain.

With thanks for your help.

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CONSERVATION OF FRESHWATER PEARL MUSSELS (BIVALVIA: MARGARITIFERIDAE) IN RUSSIA

by V.V. Ziuganov, A.A. Zotin, V.V. Beletsky & E.G. Popkovitch

From: *Program & Abstracts, 62nd Annual Meeting, American Malacological Union, 1996*, p. 57.

There are four methods of restoring pearl mussels (Margaritiferidae): creation of protected territories; reintroduction; semiartificial propagation; artificial culturing of pearl mussels. The main measures to protect the species of Margaritiferidae include the preservation of their biotopes, maintenance of salmonid host fish populations, and stringent control over illegal pearl fishing. Therefore, initially, it is necessary to create a protected zone of the habitats of pearl mussels, including the complete ban of any economic activity in the protected watershed, including timbering, extraction of geological resources, military training, development of tourist facilities, etc. Simultaneously, monitoring of the status of pearl mussel populations and active restoration of the mussels must be undertaken.

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STATUS AND CONSERVATION OF *MARGARITIFERA* IN WESTERN EUROPE WITH SPECIAL REFERENCE TO THE BRITISH ISLES

by P.G. Oliver & H.C.G. Chesney

From: *Program & Abstracts, 62nd Annual Meeting, American Malacological Union, 1996, p. 47.*

Margaritifera is represented in Europe by two species, *M. margaritifera* and *M. auricularia* both encompassing a number of contentious lesser taxa. *M. margaritifera* was once widespread in Europe and Britain as the basis of pearl fisheries. As a consequence there are numerous literature records of its presence. In the 1970s, biologists in Germany and the UK first saw decline in populations with 90% loss in central Europe and 80% loss in England and Wales. Today only 3-5 rivers in UK and 2-3 in Ireland are believed to hold recruiting populations. *M. auricularia* was more limited in range and confined to large river systems in SE England, Germany, France, Spain, and Morocco. It was believed extinct, but a relict population of 20 individuals was recently found in NE Spain [see next article]. The dramatic decline of both species was first noted by conservation organizations in 1983 and [both] were included in IUCN Invertebrate Red Data Book. Despite available data, pearl fishing is legal in the UK provided the mussel is not harmed and returned to the river. Proposed management in reserves brought renewed focus to the biology of the species and to the causes of decline. In *M. margaritifera*, lack of recruitment appears to be the major obstacle to recovery. Eutrophication effects are crucial to environmental requirements of the post-glochidia. Nitrification may have more serious effects on juveniles. Recovery programs require further research into population genetics, glochidial/juvenile culture, and river/water quality management.

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RECOVERY FOR PEARL MUSSEL IN SPAIN

From: *Oryx* 31(1): 16 [1997], and *Naturopa Newsletter* 96-6:3.

A species of mollusc last recorded in 1916 has been rediscovered by researchers from the Museo de Ciencias Naturales, Madrid. The pearl mussel *Margaritifera auricularia* was strictly protected by the Bern Convention in 1987, and in 1992 the Standing Committee of the Convention recommended a survey of the species in the River Ebro. Twenty individuals were found alive in a channel close to the river. There is still concern for the future of this species, however, because its larvae spend a parasitic phase in the gills of a sturgeon that is no longer found in the Ebro. The Spanish Government will implement a recovery plan for the mussel.

LAND SNAIL PROTECTED IN WEST VIRGINIA, USA

From: *Endangered Species Bulletin* September/October 1996 21(5): 31.

Flat-spined Three-tooth Land Snail (*Triodopsis platysayoides*). Construction was completed recently on a "snail fence" at Cooper's Rock State Forest in Monongalia County, West Virginia. The purpose of the fence is not to keep snails in, but to reroute human foot traffic in the area containing the largest known population of this threatened species. Foot traffic not only crushes the snails but also destroys the leaf litter in which they live. This project was funded by the FWS [United States Fish and Wildlife Service] through the Ohio River Valley Ecosystem program and the West Virginia Nongame Wildlife Fund.

FRESHWATER BIVALVES IN NORTH AMERICA

Articles in *Endangered Species Bulletin*

The following three articles appeared in the March/April 1996 issue of *Endangered Species Bulletin* (vol. 21, issue 2):

Benson, A.J. The exotic zebra mussel. pp. 14-15.
 Neves, R. Rescuing Ohio River mussels. pp. 16-17.
 Hartfield, P. & Butler, R.S. Fishing mussels. pp. 18-19.

And the following appeared in the November/December 1996 issue (vol. 21, issue 6):

Neves, R.J. The mussel/fish connection. pp. 12-13.

Poaching continues

The following article appeared in the January/February 1997 issue of *Audubon* (vol. 99, issue 1):

Luoma, J.R. Shell game. pp. 50-55. 95.

The article outlines the ongoing impacts of poaching. "High prices for freshwater-mussel shells - paid by Asian pearl culturers - are now attracting poachers who strip U.S. sanctuaries of many endangered mollusks." Estimates suggest "that as many as 1 in 4 of the 1,200 musselers working in west Tennessee break the law - often in a big way." And "poaching a sanctuary can bring in \$1,000 a night".

Triannual Unionid Report

This series is intended to expedite the exchange of information in an informal format. The most recent issue, report no. 11, appeared in March 1997. 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.

National Native Mussel Committee

The following message was originally sent out on 3 March 1997 and cross-posted to the MOLLUSCA listserv.

From: JRVIVERS@aol.com
 Sender: owner-unio@lists.umbc.edu
 To: unio@lists.umbc.edu
 Date: 97-03-03 17:19:35 EST

To all native mussel enthusiasts:

At the recent organizational meeting of the National Native Mussel Committee [a subcommittee of the Mississippi Interstate Cooperative Resource Association (MICRA)], several attendees raised the issue that several development projects exist across the country that are "done deals" (i.e. they will be constructed regardless of what anyone tries to do to stop them), and they will destroy significant native mussel resources.

As the editor of the MICRA newsletter, "River Crossings", I agreed to solicit information from you regarding such projects. Please send me (e-mail or otherwise) a short description of any such project you know of, include a description of their locations (anywhere in the US), and their anticipated impacts on freshwater mussels. I will use the information you provide to develop an article for "River Crossings" which will attempt to draw attention to the magnitude of and national implications of these losses.

Thank you for your interest and concern for our native mussel resources.

Jerry L. Rasmussen, MICRA Coordinator/Executive Secretary, P.O. Box 774, Bettendorf, IA 52722-0774, USA

Unionids in Texas

by Thomas E. Yancey

This note first appeared on the MOLLUSCA listserv (see note above) on 28 December 1996.

A new comprehensive publication on the freshwater mussels (unionids) of Texas has recently been released. This report gives details of names, distribution (maps show documented sites), shell characters (plus some details of soft tissue), habitat, spawning, glochidia, and fish hosts for all of the unionids in the state. All species are well illustrated with B&W and color photos.

This report was produced because the Texas Parks & Wildlife Dept. realized very little was known of Texas unionids, at a time when a surge of commercial shell collecting in Texas in the late 1980's and early 1990's made it necessary to set policy and regulations on these bivalves. The result is the first comprehensive and well illustrated report of freshwater bivalves for this region. However, it is clear from the sites shown on the distribution maps that much more survey work is needed, especially on the Brazos River. There is a major climatic gradient from east to south Texas and unionid distributions show this quite well in the contrast between east Texas species and central-south Texas species. There are a

few endemics and some species which just make it into the state from the Oklahoma-Arkansas region. This report cites the known occurrences of Rio Grande unionids.

The report is: *Freshwater Mussels of Texas*, by R.G. Howells, R.W. Neck & H.D. Murray, 1996, 218 p., ISBN 1-885696-10-8, distributed by the University of Texas Press, P.O. Box 7819, Austin, Texas 78713-7819, USA. Cost at time of release was about \$35.00 including shipping & handling, but pricing may differ when ordering from the distributor.

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Salvage of freshwater mussels from the Ohio River for captive propagation

by R.J. Neves, C. Gatenby & B. Parker

From: *Program & Abstracts, 62nd Annual Meeting, American Malacological Union, 1996*, p. 46.
 [see also an article by Richard Neves in *Endangered Species Bulletin* March/April 1996 21(2): 16-17]

The exotic zebra mussel (*Dreissena polymorpha*) is spreading rapidly in the mainstem Ohio River, and severe infestations on native unionids have been reported in the lower river. Because federally endangered mussels occur within the lower river and the zebra mussel threatens all unionid species throughout the river, permits were issued in 1995 by the U.S. Fish and Wildlife Service and the appropriate states to salvage endangered mussels and collect other species for quarantine and relocation to ponds at federal research facilities in West Virginia. Nearly 3,000 specimens of six species were collected in summer 1995 and are being held in ponds to monitor survival, growth, and reproductive condition over the next two years. A list of other unionid species that should be considered for relocation from zebra mussel-infested waters in the Ohio River Basin was solicited from affected states by the Ohio River Valley Ecosystem Team. Plans are underway to expand the salvage project and evaluate the feasibility of using ponds as refugia for other unionid species, potentially at risk of extirpation from large rivers of the watershed.

Richard J. Neves, Dept. of Fisheries and Wildlife Sciences, Virginia Tech, Blacksburg, VA 24061, USA
 C. Gatenby, B. Parker, Biology Dept., Virginia Tech, Blacksburg, VA 24061, USA

Freshwater mussels in West Virginia

From: *Endangered Species Bulletin*, January/February 1996 21(1): 31.

West Virginia Division of Natural Resources biologists . . . conducted surveys for two mussel taxa in the upper Greenbrier River drainage that are considered "species of concern." The green floater (*Lasmigona subviridis*) was located at two known localities and discovered at one new site, and the presence of juveniles indicated reproduction. The eiktoe (*Alasmidonta marginata*) was found at two new

sites. These surveys were funded by the Monongahela National Forest and the West Virginia Nongame Wildlife and Natural Heritage Program. Mussel surveys in the Middle Island Creek drainage, funded with an ESA [Endangered Species Act] section 6 grant, located the endangered clubshell (*Pleurobema clava*) at three sites on Meathouse Fork.

Biologists discovered a new site for the endangered fanshell mussel (*Cyprogenia stegaria*) in the backchannel of Muskingum Island when they examined shells from a muskrat midden on the Ohio River Islands National Wildlife Refuge. The freshly dead mussels were 9 and 11 years of age. This further supports the theory that the upper Ohio River is an important recovery area for this species.

Fat pocketbook pearlymussel (*Potamilus capax*)

From: *Endangered Species Bulletin*, November/December 1996 21(6): 23.

Funded with an ESA section 6 grant to the Missouri Department of Conservation, Dr. Chris Barnhart of Southwest Missouri State University has identified for the first time one of the suitable fish hosts for this endangered mussel. During its parasitic larval stage, approximately 200 juvenile fat pocketbook pearlymussels successfully matured on the freshwater drum (*Aplodinotus grunniens*). The drum has been suspected as a potential host in the past, but was never confirmed. During the research, Dr. Barnhart and the Neosho National Fish Hatchery are attempting to rear the juvenile mussels to the stage that they can be reintroduced to the wild.

Dwarf wedge mussel (*Alasmidonta heterodon*)

From: *Endangered Species Bulletin*, November/December 1996 21(6): 23.

Last year [1995], during a statewide survey of freshwater mussels in New Hampshire, two previously unknown sites for this endangered mussel species were discovered in the mainstem of the Connecticut River, which forms the boundary between New Hampshire and Vermont. Two live dwarf wedge mussels were found in the upper Connecticut River near Dalton, New Hampshire, and shells were found near Lancaster, New Hampshire.

After these discoveries were made, two bank stabilization projects on the Vermont side of the the Connecticut River were proposed for construction in the general vicinity of the new mussel sites. To assess the potential impacts of these projects on the species, biologists from the FWS [United States Fish and Wildlife Service] New England Office and divers from the Vermont Agency of Transportation and Vermont Department of Environmental Conservation, volunteers from The Nature Conservancy, and a private individual have explored a stretch of the river. Survey results indicate that a large, scattered population of dwarf wedge mussels extends along the 8-mile (13-kilometer) stretch surveyed and probably further upstream and downstream as well. The mussels were found on sand bars and clay banks,

unusual locations for this species in New England, as well as on the more typical sand/pebble/cobble substrate.

Mussels listed as endangered

Modified from: *Endangered Species Bulletin*, March/April 1997 22(2): 31.

The US Fish and Wildlife Service listed five species of freshwater mussels native to the southeastern U.S. as endangered on January 10. All five have undergone significant reductions in range and numbers, and exist now in relatively small, isolated populations. They are:

Cumberland elktoe (*Alasmidonta atropurpurea*)
Oyster mussel (*Epioblasma capsaeformis*)
Cumberlandian combshell (*Epioblasma brevidens*)
Purple bean (*Villosa perpurpurea*)

These species were eliminated from much of their historical range by the conversion of freshwater stream and river habitats to impoundments. At present the main threat to their survival is water quality degradation, primarily resulting from poor land-use practices that lead to siltation and run-off of contaminants.

THE STATUS AND DISTRIBUTION OF *PHYSELLA JOHNSONI*, THE THREATENED BANFF SPRINGS SNAIL

by Dwayne A. W. Lepitzki

In some of the hot thermal springs on Sulphur Mountain in Banff National Park (BNP), Alberta, Canada, lives an inconspicuous little snail that is found nowhere else in the world. The snail was originally described and collected from only a handful of hot and cool springs in BNP in the late 1920s (Clench, 1926; Clarke, 1973). Over 35 years elapsed until it was next collected, in 1965, from one location only (Clarke, 1973). Shortly thereafter, Clarke (1977) suggested



Physella johnsoni (from Clarke, 1981)

that the species was "clearly endangered and should be protected". The snail was also identified as a Special Resource of Banff National Park (Achuff *et al.*, 1986). The Banff-Bow Valley Study (Pacas *et al.*, 1996) most recently suggested that the species was "acutely endangered".

These few details were all that was known about the snail until the present study. The major objective was to determine the status and distribution of the snail. Beginning in January 1996, all historic locations inhabited by the snails were visited every three weeks. Maps of the hot springs and their outflow streams, drawn with the aid of compass and tape measure, delineated sections or micro-sites. Micro-site boundaries were based on the contour and outline of the hot spring and outflow stream.

Each of the hot springs and its outflow stream was visually searched for snails at each visit. All snails inhabiting each micro-site were counted with the aid of a hand tally counter. Snails were not handled; the largest and smallest individuals within each micro-site were measured with a ruler *in situ*. Water temperature was recorded periodically along each of

the hot springs using an electronic probe.

During 1996, no live freshwater snails were found at three of the historic locations; live physids identical to the description for *Physella johnsoni* were found at five others. Although live physids were found at the Cool Springs at Third Vermilion Lake, they were *Physella gyrina*, a common species found throughout Canada (Clarke, 1973, 1981).

Numerous shells of *Physella johnsoni* were found in the outflow stream of one of the historic locations, suggesting that the species was recently present. A single shell of *P. johnsoni* was found at one hot spring on the last visit in 1996 and no shells were found at another. Perhaps the species disappeared from these two hot springs decades ago.

Population trends for *P. johnsoni* have never been previously recorded. We found that populations fluctuated extensively (Fig. 1). From 2.6 to 26.9 fold differences were found in snail numbers within each hot spring in 1996. The smallest observed number of snails in each of two hot springs was alarmingly low: 43 and 147.

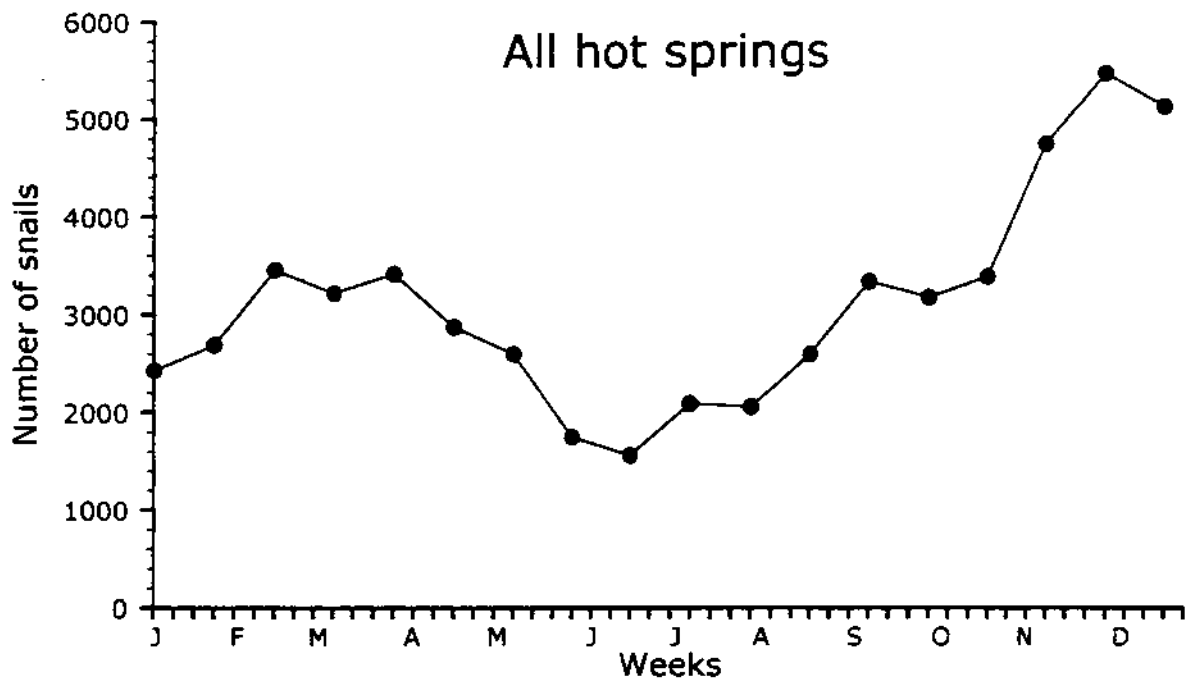


Fig. 1. Total number of *Physella johnsoni* in each of the hot springs on Sulphur Mountain, Banff National Park, Alberta, Canada, 1996. Hot springs were visited once every three weeks and snails were counted.

Three possible patterns in snail numbers were noticed in 1996. In Hot Spring 1, numbers increased gradually. In Hot Spring 2, an exponential increase occurred during the latter part of the year. At the other three hot springs, numbers increased from January, declined from February to June, but recovered to peak or nearly peak levels by November or December. If the five separate populations were combined (Figure 2), snail numbers declined in April and May and increased starting in July. Lowest numbers were found in early June while peak numbers occurred in early December.

The seasonal decline in total numbers occurred at or slightly before a seasonal decline in water temperature and increase in flow rate. A decline in water temperatures in May and the corresponding increase in water flow are common

characteristics of hot springs in BNP (Van Everdingen, 1972).

The snails also appear to have an extremely limited micro-distribution and nearly 80% were found in water between 30 and 34 °C. At most hot springs, the vast majority of snails were found in the pool where the spring originates. Even within 15 m of the hot springs' origin, numbers decreased dramatically. The only other extant snail known to inhabit hot springs in Canada also has an extremely limited distribution and micro-distribution. *Physella wrighti* is only found along a 34 m section of an outflow stream at Laird Hot Springs in northern British Columbia (Te & Clarke, 1985).

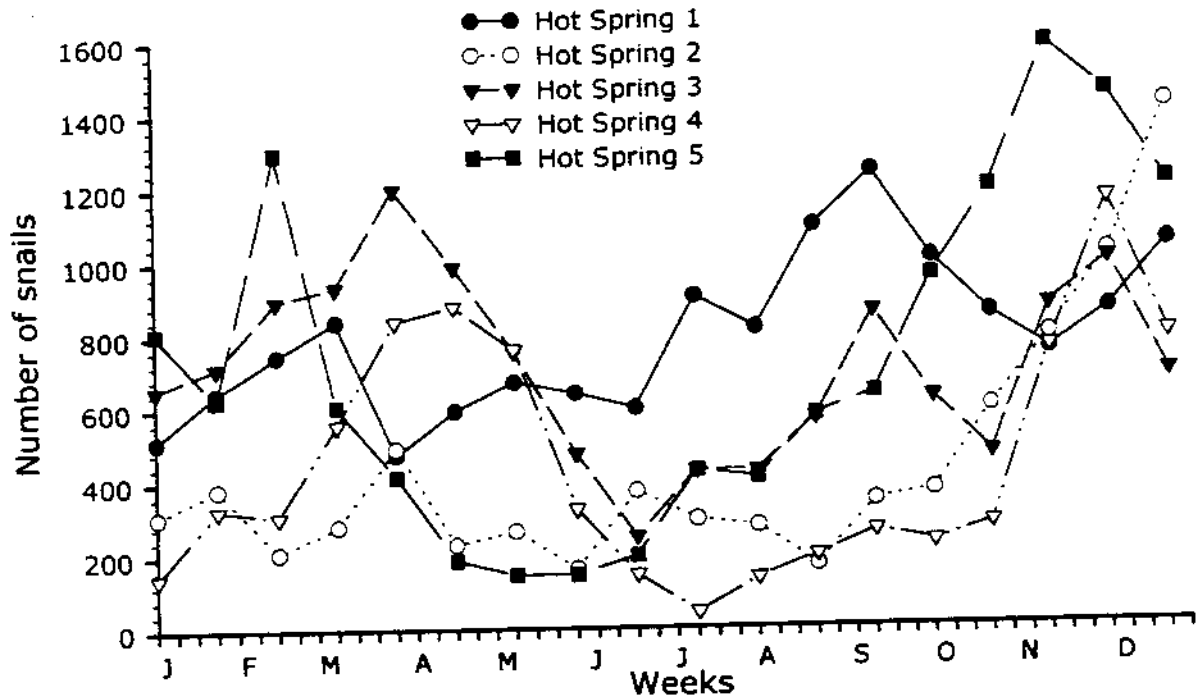


Fig. 2. Total number of *Physella johnsoni* in all the hot springs on Sulphur Mountain, Banff National Park, Alberta, Canada, 1996. Hot springs were visited once every three weeks and snails were counted.

Much of the biology and ecology of *P. johnsoni* remains unknown. We do not know if the seasonal fluctuations and limited micro-distribution are indicative of a yearly cycle, are part of a long-term trend, or are unique events. We know nothing of the snail's reproductive biology besides the presence of very small individuals at some hot springs throughout the year. Although we do know that fluctuations in water temperature and flow rate in hot springs are normal, the cessation of water flow at one hot spring in 1996 may be the first instance of a second Sulphur Mountain hot spring drying during winter. It is documented that the Upper Hot Spring ceased to flow from 12 March until 11 May 1923 (Elworthy, 1926; Van Everdingen, 1970). The effect of the flow cessation on the snail is unknown. As *P. johnsoni* were collected at the Upper Hot Spring in 1927 (Clarke, 1973), four years after water stopped flowing, the species may be able to survive these periodic events.

Data from the year-long survey were also used to produce a Status Report for COSEWIC (Committee on the Status of Endangered Wildlife in Canada). On 17 April 1997, COSEWIC designated *Physella johnsoni* as "threatened". Threatened means the species is likely to become endangered (faces imminent extirpation or extinction) if limiting factors are not reversed. A long term monitoring and research program aimed at better understanding the biology and ecology of *P. johnsoni* is continuing.

Funding was provided by the Hot Springs Enterprise Unit of Parks Canada and the Cave and Basin National Historic Site. The Canadian Wildlife Federation through COSEWIC funded the Status Report. Research Permits and Restricted Activity Permits were provided by Parks Canada. Parks Canada and Historic Sites are continued sources of funding. Brenda Lepitzki (Heritage Communicator, Historic Sites, BNP) assisted with the surveys and contributed to all aspects of this study.

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INVERTEBRATES IN CUBA

The following announcement was submitted by the Association of Systematics Collections, based in Washington, D.C., USA:

Cocuyo is a newsletter about the activities of scientists who study the invertebrates of Cuba. It is produced by editors Julio A. Genaro and Jorge I. Fontenla of the Museo Nacional de Historia Natural in Havana and published and mailed with support from RARE Center for Tropical Conservation in Philadelphia, USA. The editors are interested in article contributions and exchanges. Contact: Julio A. Genaro, Museo Nacional de Historia Natural, Obispo #61, Esquina a Oficinas, Habana Vieja 10100, Cuba; fax 537 62 0353; or E. Hathway, Association of Systematics Collections, 1725 K Street, NW, Suite 601, Washington, DC 20006; fax 1 202 835 7334; e-mail hathway@ascoll.org

CONSERVATION OF WEST JAVA LAND SNAILS

by Ristiyanti M. Marwoto

West Java (46,890 km²) is the busiest province and a centre for much industrial development in Indonesia. It is divided into four regions: Jakarta (Serang, Karawang, Cirebon), Bogor (Rangkasbitung, Subang, Indramayu), Bandung (Cianjur, Bandung, Garut, Lembah Citanduy) and the Southern Mountains (from Pelabuhan Ratu to Nusakambangan). There are four National Parks in the area: Ujung Kulon, Gede Pangrango, Halimun and Kepulauan Seribu. The Bandung region is a volcanic area with four depression zones: Cianjur, Bandung, Garut and Ci Tanduy. Cianjur is an important and interesting area for conservation with three mountain peaks: Salak (2,211 m), Gede (2,958 m) and Pangrango (3,019 m). Recently, more and more areas, especially near the tea plantation area and hills at Puncak and Cianjur (foot of Mt. Salak and Gede Pangrango), have been opened and cleared for commercial exploitation, including real estate, golf courses, tourism (restaurants, hotels), camp grounds, etc. These areas are habitat for many species of land snails.

Some species of land snails are found in the mountains, living in the leaf litter, and on bushes, stalks and leaves. According to van Benthem Jutting (1948, 1950, 1952), there are 171 species of land snails recorded from Java, and about 157 species have been reported from West Java. Some of those species are endemic to local areas or rare: e.g., *Amphidromus alticola*, *Pseudopartula galericulum godeana*, *Ganesella bantamensis*, *Pterocyclus sluiteri* (only found in Mount Gede), *Pupina treubi*, *P. compacta* and *Dyakia clypeus* (Van Benthem Jutting, 1952; Dharma, 1993).

The Museum Zoologicum Bogoriense (MZB), in Bogor, West Java, is the only Museum housing land snail reference collections. The Museum was built in 1894 but has collections of no more than 50% of the total number of species of land snails from West Java: only about 68 species. As a consequence, the information available for West Java land snail diversity is very poor. The collection of *Geothrochus conus*, a common land snail living in the mountains is a good

example illustrating the condition of information and collections in the MZB. There are only five numbered collection locations of *G. conus* from West Java, although it is a common species and has a wide distribution. These specimens were collected between 1931 and 1939. Another example is *Dyakia rumphii*, collected between 1930 and 1931 from Cibodas, Garut and Jampang and most recently in 1966.

From another point of view the knowledge of land snails in Indonesia (especially taxonomically) is poor and they have never been discussed as an important faunal component for conservation action. Usually, conservation focusses on vertebrates such as birds, mammals, reptiles, and some species of insects (mostly butterflies).

In accordance with the use of land and forest for commercial exploitation, especially at Cianjur there are some questions:

1. What will happen to the land snails living in those areas?
2. What should we do to conserve habitat that is changing?
3. What is the current status of the species treated by van Benthem Jutting?
4. How should we study the diversity and biology of the species in the light of their status in the collections in the MZB?

It is not easy to answer these questions, not only because of the limited knowledge of systematics, but also because of the lack of expertise and facilities to develop and curate the MZB collections. But the first step should be a promotion of the diversity and determination of the status of land snails to motivate public awareness and concern for molluscan conservation programmes.

A preliminary survey was conducted between June and September 1996 by visiting some places in Bogor and surroundings (foot of Mt. Salak and Gede Pangrango). The aim of the survey was to study the diversity of land snails and take pictures of live specimens to learn the characters of the animals and their habitat. The information will be compiled and could be published as a Guide Book of Land Snails from West Java. The shells have been deposited in the MZB to add to the reference collection of land snails from West Java.

Sukamantri (foot of Mt. Salak, 600 m). The *Pinus mercurii* plantation area belongs to the Forest Department. There is a camping area inside the forest which is visited by students, especially in the holiday season. Here we found dead shells of *Dyakia rumphii*, *Pupina treubi*, *P. compacta*, *Cyclophorus rafflesii rafflesii* and *Geothrochus conus*. *P. compacta* is a new record for West Java, previously only reported from Central and East Java (van Benthem Jutting, 1948). At Warungloa village we found *Dyakia clypeus*, an endemic species for Java. In West Java this species was recorded from Sukabumi, Cibodas, Gunung Putri and Garut.

Gunung Bunder (foot of Mt. Salak, 500 m). This area of *Pinus mercurii* plantation belongs to the Forest Department and has a big camping area. A beautiful waterfall has just been opened for tourism and the bushes around the waterfall have already been cut, making the area very clean. Here we found many dead shells and only one live specimen of *Geothrochus conus* and some dead shells of *Dyakia rumphii*.

Situ Gunung (foot of Mt. Gede Pangrango); part of Gede Pangrango National Park, 1,100 m. We found dead shells of

Geotrochus conus, *Amphidromus palaceus*, *Elaphroconcha bataviana*, *Cyclophorus* sp., *Landouria rotatoria*, *Dyakia rumpii* and *Lagochilus* sp.

The rare and endemic species *Amphidromus alticola* and *Pseudopartula galericulum gedeana* were found at Perbawati, the rain forest part of Gede Pangrango National Park (about 1,150 m). Both snails were found alive near the river. *P. galericulum gedeana* was found attached to leaves and *A. alticola* was on the ground in leaf litter. No specimens of either species had previously been collected and deposited in the MZB. Live specimens of *Landouria rotatoria* were also found in the same area on bushes about 2 m from the ground. Most of the *L. rotatoria* in the MZB are old shells; usually we also only found dead shells, most of them colourless or the shells already faded.

Leuweung Sancang is a small rain forest area along the beach south of Garut. *Amphidromus heerianus* were found abundant in this area, both dead shells and live specimens. Recently, local people have begun to use the area along the beach to build temporary "warung" (a small shop for food and drink) for local tourists. This has involved cutting and clearing the plants and bushes that are the habitat of *Amphidromus*. At the same area we also found *Cassidula vespertilionis* and *Pythia pantherina*, which were abundant in the litter of leaves and dead wood. The small land snail *Leptopoma altum* was abundant, attached to the leaves of zalacca palm.

This preliminary survey was too brief to allow evaluation of the status of the species. However, it is very useful as a baseline from which to obtain more detailed information of the habitat, diversity and status of the species. During the survey we took 200 pictures of live land snails and extended knowledge of the distribution of the common species *Geotrochus conus*, *Landouria rotatoria*, *Cyclophorus rafflesi rafflesi*, *C. perdix perdix*, and *Elaphroconcha bataviana* from West Java. A single specimen of *Amphidromus alticola* and *Pseudopartula galericulum gedeana* constitute new collection records for the MZB, as do the records of *Pupina treubi* and *P. compacta*. Previously there were no slug collections in the MZB. We therefore collected some specimens and took some photographs in order to develop the MZB collection. Further surveys are still needed to build a conservation awareness of West Java land snails, which could be applied not only in the National Park areas but also in areas where endemic and rare species are recorded.

The MZB is the primary source of information for the diversity of the Indonesia fauna, but good information is not available for many species. Development of good information on the land snails of West Java would help not only scientists and students but also government and people who are concerned about mollusc conservation.

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- van Benthem Jutting W.S.S. 1948. Systematic Studies on the Non-Marine Mollusca of the Indo-Australian Archipelago. I. Critical Revision of the Javanese Operculate Landshells of the Families Hydrocenidae, Helicarionidae, Helicinidae, Cyclophoridae, Pupinidae and Cochlostomatidae. *Treubia* 19 (3): 539-604.
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- van Benthem Jutting W.S.S. 1952. Systematic Studies on the Non-Marine Mollusca of The Indo-Australian Archipelago. III. Critical Revision of the Javanese Pulmonate Land-snails of the Families Ellobiidae to Limacidae, with an Appendix on Helicarionidae. *Treubia* 21 (2): 291-435.

Ristiyanti M. Marwoto, Collection Manager of Mollusca, Museum Zoologicum Bogoriense, Ir. H. Juanda no. 9, Bogor 16122, Indonesia. [Thanks to Irvan, the photographer who helped in the survey]

AYLACOSTOMA IN YACYRETÁ, SOUTH AMERICA

by Manuel G. Quintana

"You could remain immovable in a powerful stream,
but not in the world of men"

Virgil

Downstream from the now disappeared Guayri Falls (flooded when Brazil and Paraguay built the Itaipú hydroelectric plant), the Upper Paraná river runs along the Paraguay/Argentina border confined between vertical walls up to 100 m high, deeply eroding the stony Serra Geral plateau. Around 56°W, during a remote geologic time, the Paraná was temporarily delayed by a basaltic mantle that obstructed its way to the southwest. An amygdaloid rock called spilite, showing a vacuolar appearance due to steam bubbles, was originated in contact with freshwater. Finally, the Paraná surpassed this bed, divided in multiple branches that then anastomosed to form a large and complex system with more than 300 islands (Ibicuí, Yacyretá, Talavera, Apipé Grande, and lesser islands), many rapids such as Apipé, and deeper passages such as Mbaracayá.

This portion of the Paraná, having a flat bed and serious obstacles for navigation, became radically different from the preceding river, which was deep and carved between high gullies. Downstream was also completely different, where the water runs towards the confluence with the Paraguay River, and also in its last sections, which developed a wide floodplain and finally reach their end in the Plata estuary. Such a limnic singularity brought about endemic forms of life



Fig. 1. *Aylacostoma* habitat before flooding of the reservoir

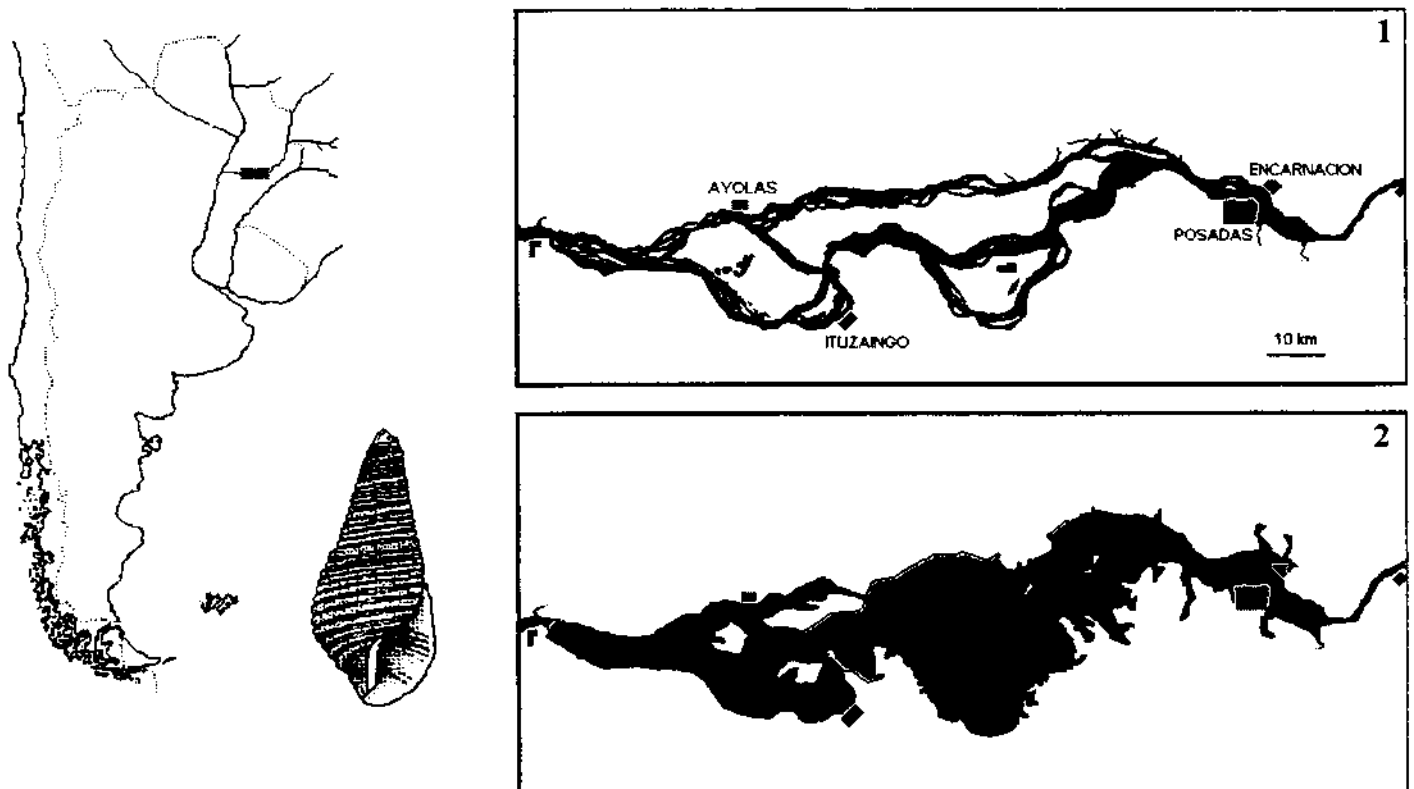


Fig. 2. The Upper Paraná River between Santa Ana and Itá-Ibaté. Original (1) and foreseen (2) hydrography with the Yacyretá dam and reservoir.

in this particular section, which were not able to expand their distribution to other parts of the basin. Instead, they developed a remarkable "ecological fidelity" to the river bottom in the rapids area. This is the case of the prosobranch snails belonging to the genus *Aylacostoma*, a group of particular scientific interest within the mollusk fauna of Argentina and Paraguay. These mollusks have a unique reproductive system characterized by parthenogenesis (reproduction without males) and simultaneous development of up to three embryos inside a marsupium, or adventitious pouch, located within the parent's neck. These young snails are "born" when they have attained a surprisingly big size, and are thus able to withstand the violence of the rapids. They feed while protected within a thicket of diatoms, green and red algae growing upon the adult's shell.

Aylacostoma belongs to a group of mollusks of cenozoic origin, which invaded South America from the northern hemisphere in late Cretaceous or early Tertiary periods, when both continents became connected for the first time, some 65 million years ago. An abundant fossil record in strata from the Paleocene ranging to the southern tip of Patagonia evidences its early and successful adaptive radiation. Climatic and hydrographic changes, however, restricted its distribution towards the north. Nowadays, the group is limited to fluvial systems in northern South America. Just one relict area from its former southern distribution persisted outside the tropics, in the Plata basin until three years ago: the Yacyretá-Apipé rapids, now flooded by the main Yacyretá reservoir (1,600 km²) (Fig. 2).

Those rapids represented the unique habitat of a group of endemic species from Argentina and Paraguay (*Aylacostoma guaraniticum*, *A. chloroticum*, *A. stigmaticum*, *A. cingulatum*),

where they were discovered and described as late as the 1950s. This discovery was a late and surprising addition of a tropical family (Thiaridae) to the faunistic inventory of these temperate countries. Their populations were abundant but had a very limited range, and were made up completely of females. Due to their particular mode of reproduction, all individuals are essentially identical within each population or micro-deme (diversity only shows up as a few mutant or senile specimens) whereas differences appear only between demes. These populations could be regarded as clones, since the offspring are not produced by the mating of males and females with different features, but are exact replicas of a single parent. In cases such as the present one, the low genetic variability leads to a very low adaptive potential to withstand environmental changes. Moreover, due to their viviparity and low mobility, these snails do not disperse from their birth place. Even if reproduction without mating is the rule in these species, this may be periodically compensated by gene recombination by a still unknown mechanism. The cytological structure of the individuals (haploid, diploid or polyploid), as well as many biological features of the Argentine-Paraguayan forms, are still completely unknown.

Although their 4 cm long shell makes them conspicuous to a keen observer, and several thousands were present in a limited area, these snails were totally unknown to the local people. However, plentiful shell collections were gathered by occasional visitors during the lowest waters of this century. This evidences the secret life of these animals and their fidelity to the bottom of the Paraná river in the rapids area, characterized by its difficult access and risky navigation.

Since the Yacyretá area was the only place where they were found, their total extinction was expected on flooding of the

reservoir, which would lead to the disappearance of the rapids and all the organisms so strictly adapted to life in this habitat. Indeed, the former rapids became covered by more than 10 m of still water. Thus, the rocky, well-illuminated bottom bathed by clear and oxygen-rich waters promoting a dense layer of algae, changed to its present appearance: a dark and muddy bottom in which algae were unable to survive. Given this scenario, in August 1993 a team of biologists from the Argentine Museum of Natural Sciences (MACN) were permitted by the Entidad Binacional Yacyretá, in charge of the dam, to survey the typical locations of the snails in this portion of the river. Many sites were surveyed, including the few rapids still existing, since most of them (such as the renowned Apipé rapids) were lost during the early flooding of the dam. A dense *Aylacostoma* population consisting of five different morphotypes was found along a 150 m stretch of shore in the rapids area. Of these, three could be identified as known species, but the other two might be new varieties that, unfortunately, were to be discovered scarcely before their inclusion in the long list of casualties due to human activities.

difficulties, adequate conditions for its development were achieved in a system of aquaria which simulates the characteristics of its habitat. Meanwhile, repeated visits to the populated site within the reservoir showed that, unfortunately, our pessimistic expectations of certain extinction were not wrong.

In the present circumstances, maintenance in captivity of the available stock, research on its complex life history, and culture under controlled conditions are still essential goals to be accomplished. It is necessary to promote definitive and concrete actions in order to preserve genomes expressing such original biological features in the interest of saving endangered biodiversity.

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PACIFIC ISLAND LAND SNAIL PAGE

Publicity is valuable. The demise of *Partula turgida* (see *Tentacle* No. 6) was picked up by Radio Australia and reported in the March/April 1996 issue of *Pacific Magazine* (vol. 21, issue 2). Also reported by Radio Australia and in the same issue of *Pacific Magazine*, was the spread of the giant African snail, *Achatina fulica*, in Western Samoa. Incorrectly, this report stated that *A. fulica* had been eradicated from American Samoa. Fiji quarantine officials were said to have been placed on alert against the possible spread of *A. fulica* from Western Samoa in agricultural produce.

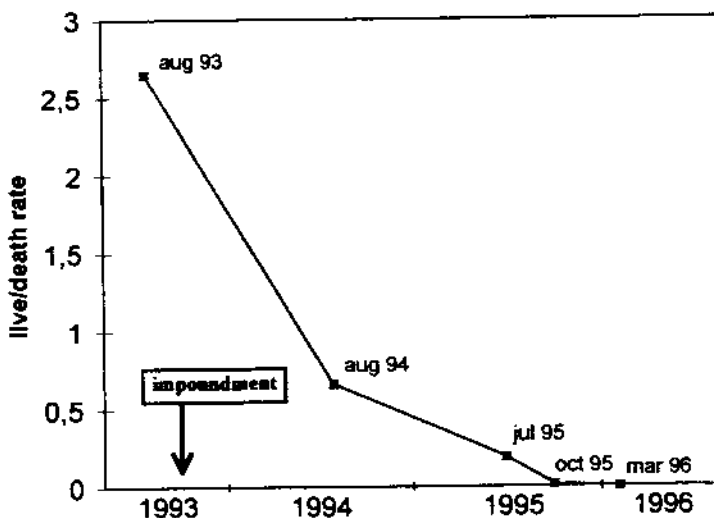
When the Fauna and Flora International (Publisher of *Oryx*) Conservation Committee met last year, a minute's silence was held to commemorate *Partula turgida*. This species' demise prompted an editorial by Jacqui Morris, Editor of *Oryx* (vol. 30, issue 2) that outlined the *Partula* story, and mentioned the "dedicated band of conservationists working co-operatively world-wide to prevent their extinction".

Partula update

by Dave Clarke & Paul Pearce-Kelly

1. Latest developments in French Polynesia for the conservation of native tree snails

In 1996, there were two Pacific Island Land Snail Group (PILSG) field surveys to French Polynesia, primarily to work on the *Partula* snail enclosure set up on the island of Moorea. This protected area of forest was originally set up in 1994 to house a population of captive bred *Partula* snails. This snail enclosure is believed to be the world's smallest wildlife reserve. Due to problems in 1995, the most significant of which was a malfunctioning of the vital electric fence, the predatory snail *Euglandina* had breached the fence protecting the re-introduced *Partula* snails. The enclosure was subsequently fully renovated, with the electric fence design simplified, and members of the PILSG provided funds to pay a local person to maintain and monitor the reserve supervised by our colleagues at the American Richard B. Gump research station. With the enclosure prepared, in spring 1996 new groups of captive bred *Partula* could be released. These animals came from



Live:death index and total specimen number (N) in each sample:

August 93: 2.65 (358); August 94: 0.66 (851);
July 95: 0.19 (228); October 95: 0.04 (539);
March 96: 0.00 (622).

Fig. 3. Extinction of *Aylacostoma* in Yacyretá - 1993-96.

The Entidad Binacional Yacyretá, realizing the devastating and unavoidable effect of the dam on the wild populations of these mollusks, proposed a joint plan of actions to MACN, in order to do whatever possible to minimize this impact. The Paraná was exhaustively surveyed from the reservoir to the confluence with the Paraguay River, trying to detect still unknown *Aylacostoma* populations downstream, or similar habitats where the recovered snails from the reservoir could be relocated. Both expectations were frustrated. Therefore, a large number of specimens were collected by dredge and scuba diving from the unique population discovered previously (and already covered by a further 10 m of water!). This sample was successfully transported to the laboratories of the Invertebrates Division of the MACN. Not without

successful breeding groups at the University of Nottingham, Detroit Zoo, the Endangered Species Breeding Unit (Martin Mere, UK), Bristol Zoo and London Zoo. The snails were couriered to Tahiti by staff from the Zoological Society of London and Nottingham University. Just before the release all the snails were carefully coded with small identification marks on the shell, for study of niche usage within the enclosure. It was planned that with regular reports sent from the staff in Moorea, the core members of the PILSG involved in supervising the project could monitor the progress of the snails over time. A full survey for results of the niche usage experiment would take place after one year, although it was envisaged that there would be at least one interim visit to check things.

A change in on-site management of the research station, and the ensuing unsettled situation, led to a lack of regular monitoring reports and doubts over the integrity of the barrier around the enclosure. This prompted a return to the reserve in November 1996, coinciding with the half-way mark of the study, a critical point 6 months after the snails were released.

Unfortunately, there had been an unnoticed gap under one part of the fencing, caused by soil erosion after heavy rainfall. This, along with some uncontrolled overhanging foliage at sides of the enclosure, had allowed some of the predatory *Euglandina* snails to avoid the chemical and electric barriers, and encroach on the area. An intensive but careful search of the enclosure revealed several *Euglandina*, which had obviously impacted on the *Partula* snails. However, live specimens of all three *Partula* species were found, and one section of the reserve had a very healthy population of *Partula suturalis*, with a spread of development stages. This proved that the snails were successfully breeding, as only adult snails were released 6 months previously. A detailed programme of searching the whole 20 m² area, literally centimetre by centimetre, turning and examining every leaf on the ground and examining every plant, has given us the best opportunity to ensure the enclosure is now once again predator-free.

The condition of the enclosure structure was again reviewed, and it is in remarkably good shape thanks to the careful construction 2 years previously, by Professor James Murray of the University of Virginia. Some minor repairs were carried out, in particular rust treatment where the metal fence had been damaged by a fallen tree.

Some preliminary experiments on the activity patterns of *Euglandina* snails were carried out, with relation to the enclosure defences. Of particular interest were the very small newly hatched predators, and observations of their reaction to the electric fence were attempted, but these normally very active creatures proved very uncooperative. However, when properly maintained there are no doubts of the effectiveness of the enclosure barrier. Appropriate monitoring of the enclosure in the future is the key to success of the Polynesian snail reserve, and confirmation of the protocols with staff in Moorea will hopefully ensure the future of our delicate populations of *Partula*.

Whilst in Polynesia, contacts were reaffirmed with Tahiti Government personnel, the main liaison being Jean-Yves Meyer, now in the Ministry of Research. The "Musée de Tahiti et des Iles" was also visited, where the excess animals from the release in early 1996 were deposited - these snails have

been doing extremely well and reproducing successfully under the care of the museum's Director, Manousche Lehartel. These will hopefully be put on show in the Museum at a later date, so that local Polynesians will be able to see a recently extinct part of their culture, and learn of their global importance and the conservation work going on in the rest of the World.

Thanks go to the Richard B. Gump South Pacific Research Station staff and the University of California at Berkeley for their continued support of the project. The continued monitoring of the *Partula* enclosure is being funded by the *Partula* holding collections in Europe and North America.

2. First captive specimens of Vanuatu tree snails

The most recent *Partula* species to come into captivity arrived in October 1996 from the island group of Vanuatu (formerly the New Hebrides) in the south-west Pacific. The new snails are believed to be *Partula turneri*, and they are a large handsome species with markings rather like a mint humbug sweet! These animals, 5 adults and 4 young, were collected on the island of Tanna by Professor Bill Sutherland of the University of East Anglia. We have been working for some time with the Vanuatu Protected Areas Initiative to gather information on the five partulid snail species of the region. So far we know that the introduced predator snail is present on at least one of the islands in the group; therefore all the native tree snails are under threat. Initially housed at the Invertebrate Conservation Centre, London Zoo, three of the snails have been sent to Nottingham University to form a satellite group. The snails appear to be doing well and have already produced some of the largest births we have seen from *Partula* snails of any species - up to 7mm at birth!

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Crisis for Ogasawaran land snails on Anijima

by Takahiro Asami & Kiyonori Tomiyama

1. Airport construction and destruction of an endemic ecosystem - what you can do

The only good remnant of the ecosystem unique to the Ogasawara archipelago (Fig. 1) is about to be wiped out by airport construction on Anijima, a tiny uninhabited island. The extraordinarily diverse fauna of terrestrial molluscs endemic to Ogasawara remains only on Anijima (see *Tentacle* no. 6, and below, for details). The battle with the Tokyo Metropolitan Government (TMG) to save this remnant is nearing a climax.

In the previous issue of *Tentacle*, the background and core problems associated with airport construction on Anijima were reviewed. Through the Internet, as well as in *Tentacle*, we requested simple individual action by writing letters of protest to the Governor of Tokyo. So far a great number of academic societies and environmental organizations, such as the Socie Italiana di Malacologia, the American Malacological Union and the Sierra Club in the US, as well as a variety of individuals, protested against the Anijima airport, suggesting that it be constructed more appropriately on another island.

We are extremely grateful to those of you who reacted positively.

Recently several positive movements with good political impacts have been made. The Nature Conservation Society of Japan demonstrated in a press conference that a consultant company NIPPON KOEI manipulated their

February 1996. However, since then the pier has not been used, and no further construction has been undertaken. Instead, in October 1996, TMG again made available a major budget for another environmental assessment by a private company. TMG has already spent large funds for the same purpose in 1994, making NIPPON KOEI manipulate their assessment to demonstrate that Anijima is of no specific value. Repetition of the extravagant assessment indicates that TMG is now under substantial pressure to make up further "data" to assert the environmental appropriateness of the Anijima airport.

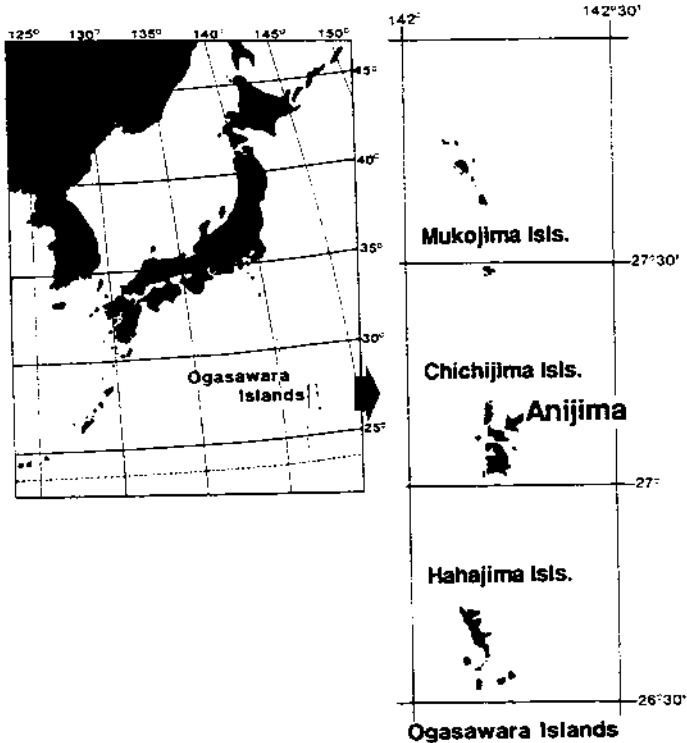


Fig. 1. Location of the Ogasawara archipelago, 1000 km from Tokyo.

environmental survey to deny the extraordinary value of Anijima (see *Tentacle*, no. 6, pp. 20-21). The Director of the Environment Agency in the Japanese central government has repeatedly spoken to the press about his disagreement with the construction on Anijima and the necessity to move it to another island. WWF Japan has conducted a detailed study on the Anijima natural environments and declared the necessity of specific protection of the Ogasawaran ecosystem that now only remains on Anijima. A joint committee of the Tokyo and Dai-ni Tokyo Bar Associations investigated outrages suspected behind the construction project. They gained clear evidence of human-rights infringements such as frequent threats and harassment to force airport opponents in Ogasawara to sign up for the Anijima airport. The Bar Associations proclaimed disagreements with the Anijima airport project and demanded the construction be undertaken on another island.

On the other hand, TMG repeated counter claims to the press, asserting that Anijima is the only appropriate location for the airport. A large pier was completed on Anijima in

Clearly, now is a crucial moment to raise international voices and pressures on TMG. It could be the last chance to persuade TMG to change its plan and move the construction site off Anijima before construction starts. Interestingly, the central government in Japan is not apparently against the Environment Agency or us opposing the Anijima airport construction. Ordinarily in Japan, because of the strongly centralized power structure, independent actions of the Environment Agency for environmental protection tend to be suppressed within the central government, which almost always ends up supporting the promotion of land development by particular local governments. But this time, TMG, enforcing Anijima airport construction, has been isolated with little support from the central government. Sounds positive? Not so simple unfortunately.

Since the Bush administration's success in negotiating for manipulation of the Japanese international economy, the Japanese government has been under pressure from the US to spend several hundred billion dollars for public affairs over a 10 year period. The easiest way to make up such a gigantic expenditure is to build new airports. Thus, enormous budgets are currently to be spent every year by the Ministry of Transportation for "public affairs", in reality just for new airports, highways, etc. Six years ago, the central government decided to build an airport in Ogasawara, but it has not agreed with its construction on Anijima. That is why it is now crucial to send letters, especially from the western world, to demand reconsideration of alternative sites for the airport. The reason we believe in the power of your letters is that Japanese politics is amusingly sensitive to its reputation in western countries. Please write to both:

Prime Minister Ryutaro Hashimoto
2-3-1 Nagata-cho, Chiyoda-ku, Tokyo 100, Japan.

Tokyo Governor Yukio Aoshima
Shinjuku, Tokyo 163-01, Japan.
e-mail: shb00924@niftyserve.or.jp
or: tokyogov@pcvan.or.jp

Note: Letters are unlikely to be acknowledged by the governments. Thus send a copy to the address below to ensure their attention:

Ogasawara Natural Environment Study Group
c/o Prof. Yoshikazu Shimizu
Dept. Natural Sciences, Komazawa University,
Komazawa, Setagaya-ku, Tokyo 154, Japan.

2. Survival of the Ogasawara biota on Anijima

The primary forests of the Ogasawara Islands remain intact (or nearly so) only on Anijima, whereas the original flora has gone on other major islands (Fig. 2). The major reason for the survival of the original ecosystem on Anijima is that there has been exceptionally little cultivation by humans and thus no goats or pigs have been introduced.

The recent terrestrial molluscan fauna (Table 1), which was not described in detail in the last issue of *Tentacle*, also demonstrates how intact the Ogasawaran ecosystem has remained on Anijima.

Table 1. Summary of the Recent (not fossil) land snail fauna of the Ogasawara archipelago, and of the island of Anijima itself. Living species defined as having been confirmed by field work since the 1970s.

1. Entire Ogasawara	
Total species known:	108
Indigenous species:	87
(in 12 families, 32 genera)	
Endemic species:	82
(in 10 families, 27 genera)	
Living endemic species:	53
Endemic genera:	7
(in 6 families)	
Living endemic genera:	5
(in 5 families)	
2. Anijima	
Total species known:	40
Species indigenous to Ogasawara:	34
(in 8 families, 15 genera)	
Species endemic to Ogasawara:	34
(in 8 families, 15 genera)	
Living genera endemic to Ogasawara:	5
Living Ogasawaran endemic species:	32
Living Ogasawaran endemic species only living on Anijima:	13

The endemism of land snails is 94% in Ogasawara. Indigenous species found on Anijima are 100% endemic. Of 82 endemic species, 29 are extinct, and the rest are endangered generally in Ogasawara. In contrast, on Anijima, the area of which is just 11% of the entire archipelago, 32 Ogasawaran endemic species have been confirmed alive.

Species of the endemic genera that have been thought to be extinct in Ogasawara (Fig. 3), such as *Hirasea* (Hericarionidae; Figs. 4 & 5) and *Mandarina* (Camaenidae), are currently abundant on Anijima. Diversity of the endemic archaeogastropod genus *Ogasawarana* (Helicinidae) on Anijima is truly fascinating; nine species are surviving well on this tiny island (8 km²), while only two or three of them are barely surviving on any other island. Out of 53 living endemic species in Ogasawara, 13 only live on Anijima, mostly in abundance.

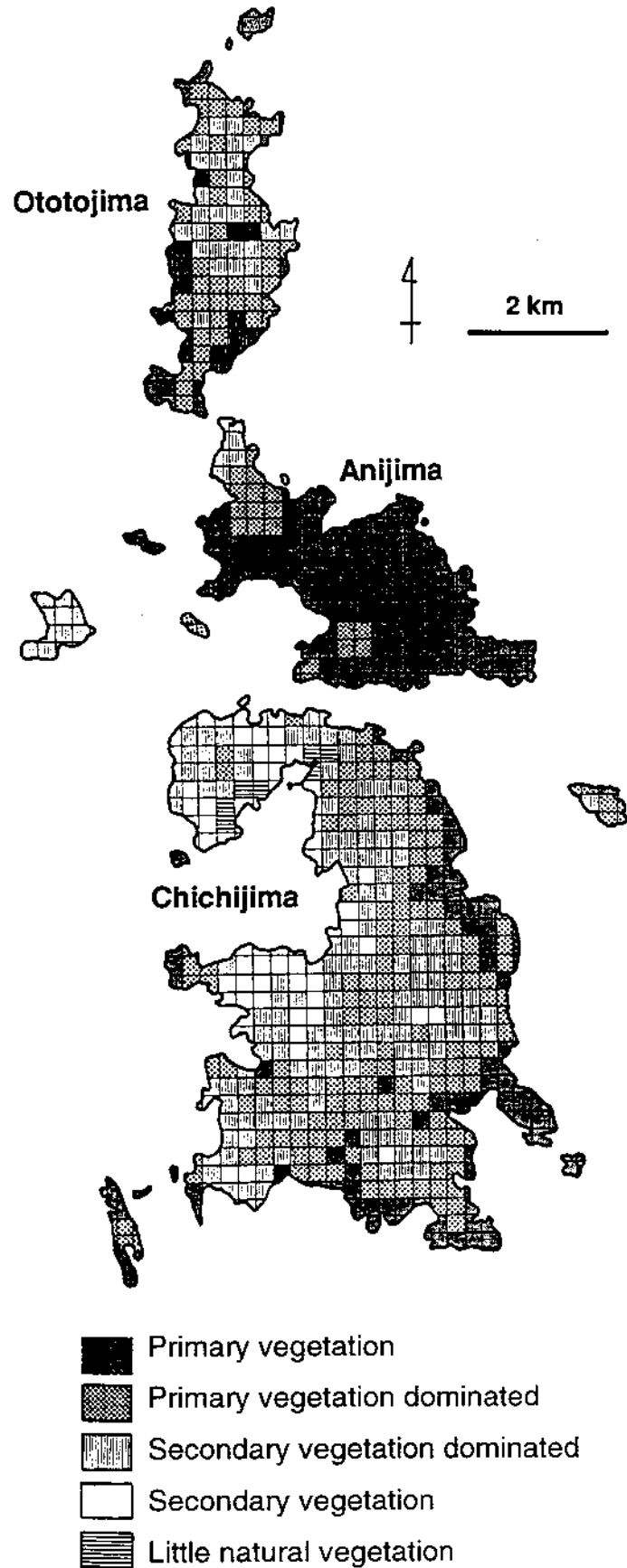


Fig. 2. Vegetation distribution in the Chichijima Islands.

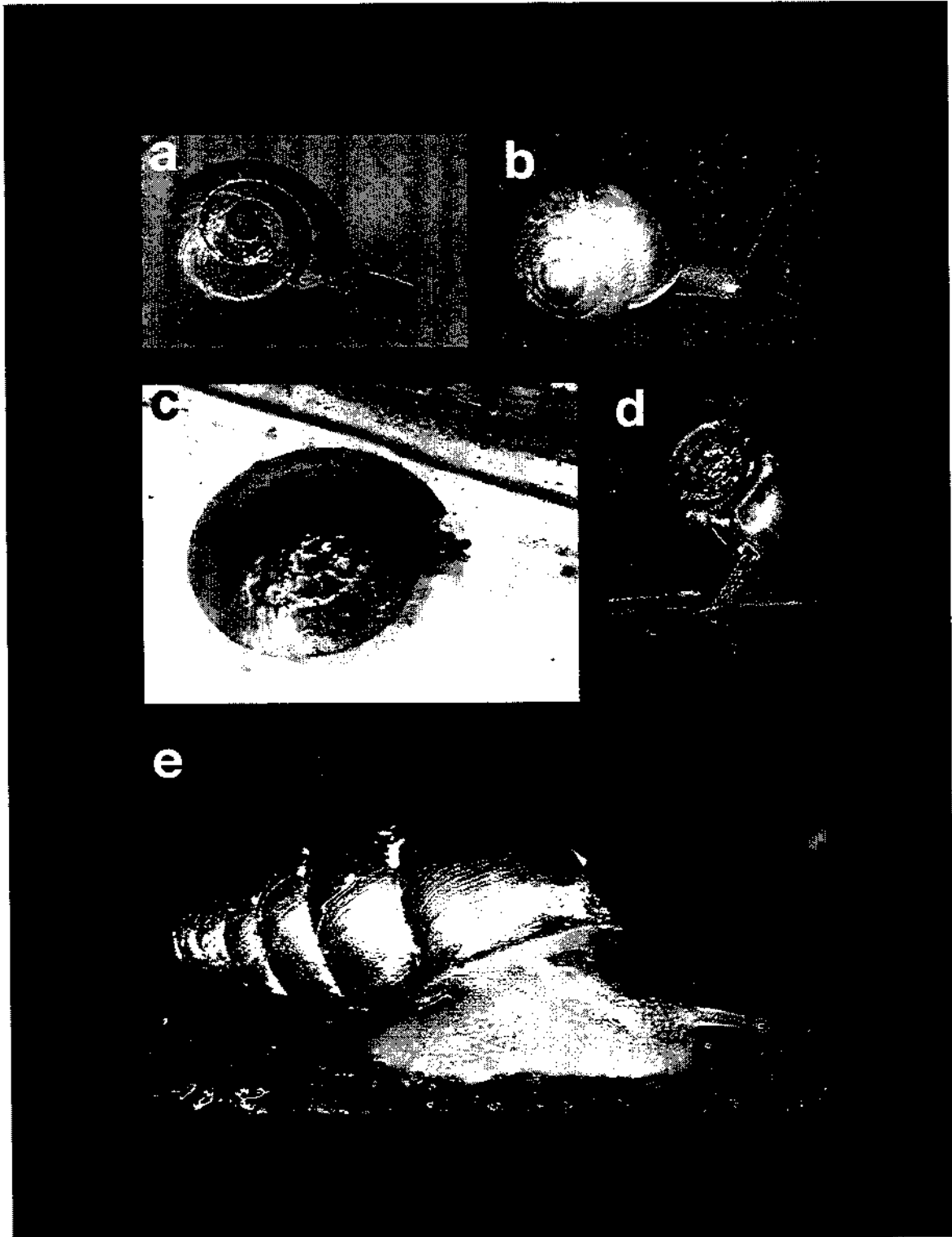


Fig. 3. Snails of endemic genera in Ogasawara. a: *Ogasawaran nitida* (4 mm); b: *Mandarina* sp. (24 mm); c: *Hirasea opeculina* (shell diameter 5 mm); d: *Hirasea diplomphalus* (2 mm); e: *Boninea chichijimana* (5 mm, shell height 10 mm).

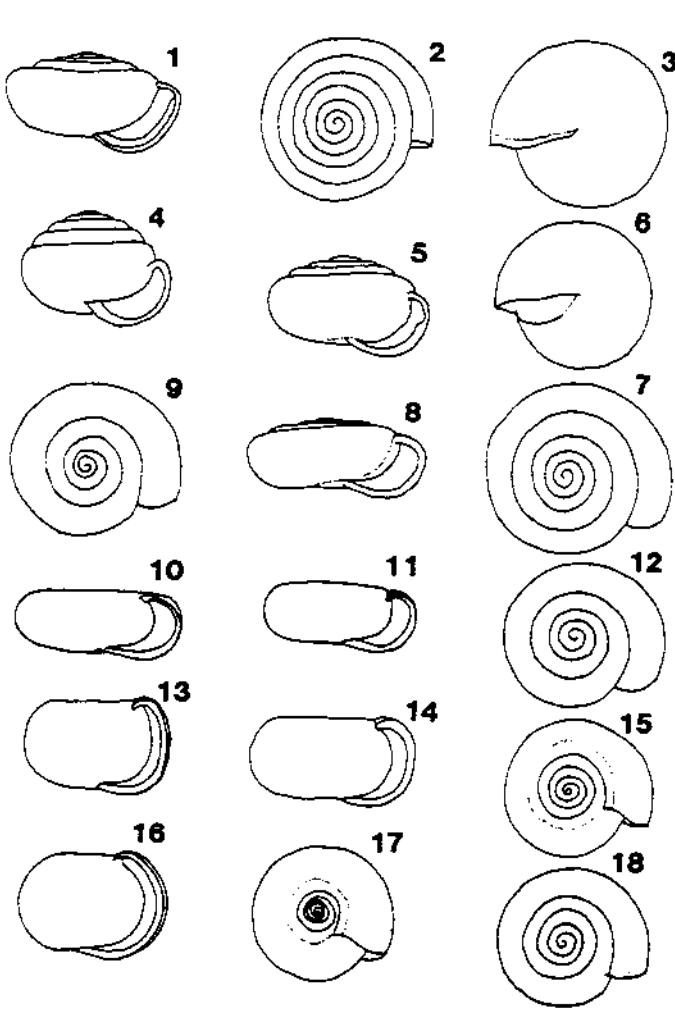


Fig. 4. Divergence of *Hirasea* I (from Hirase, 1907a, b, c). 1-3: *Hirasea sinuosa*; 4: *H. eutheca*; 5, 6: *H. insignis*; 7, 8: *H. hypolia*; 9, 10: *H. biconcava*; 11, 12: *H. planulata*; 13-15: *H. diplomphalus diplomphalus*; 16, 17: *H. diplomphalus profundispira*; 18: *H. diplomphalus latispira*.

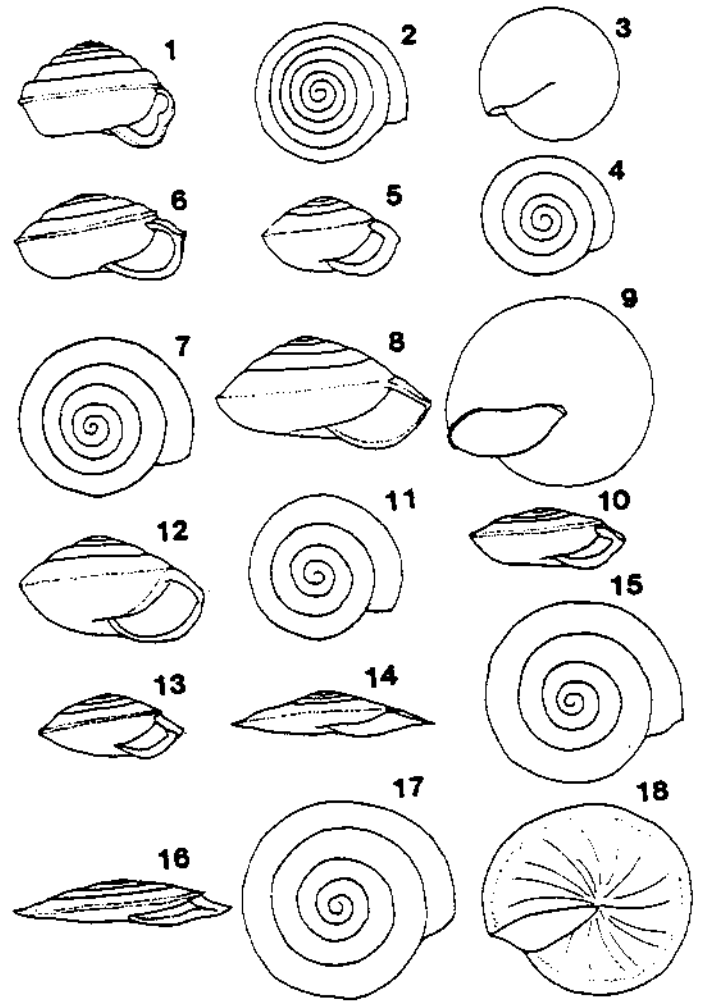


Fig. 5. Divergence of *Hirasea* II (from Hirase, 1907a, b, c). 1-3: *Hirasea goniobasis*; 4, 5: *H. chichijimana*; 6, 7: *H. nesiotica*; 8, 9: *H. major*; 10, 11: *H. acutissima acutissima*; 12: *H. nesiotica liobasis*; 13: *H. acutissima acuta*; 14, 15: *H. operculina*; 16-18: *H. opeculina mirabilis*.

Nevertheless, the airport construction site on Anijima, chosen out of four candidates, is exactly located on the most intact forests in Ogasawara (Fig. 6). The currently planned 1800 m runway itself will directly destroy about 10% of the island area. Such a long runway has been predetermined for jets, such as the B737 with 126 seats, unnecessarily big for a 2400 resident community in Ogasawara, plus 2000 tourists present at any one time throughout the year. Because of this unrealistic scale and purpose, which ignores residents' demands simply for an airport to serve their needs adequately, nearly half the voters in Ogasawara are opposing the Anijima airport project. Anyone who sees these figures could not help concluding that "What TMG wants is the complete ecological destruction of Ogasawara. The airport must be just an excuse to achieve it".

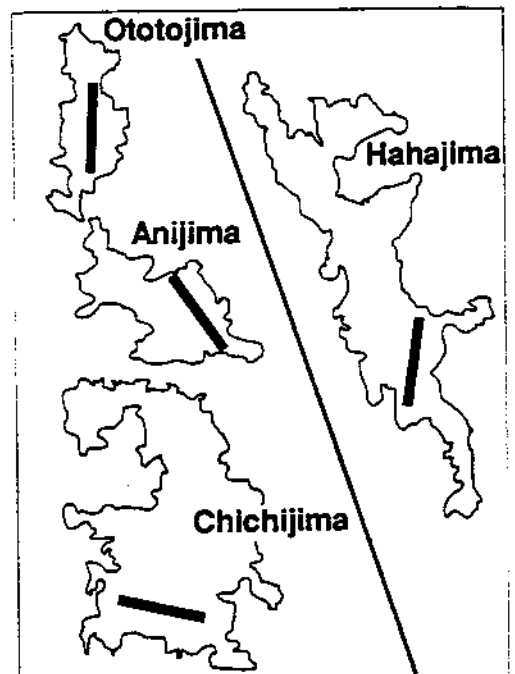


Fig. 6. The four candidate locations that TMG has selected for an airport with a predetermined 1800 m runway.

Tell your friends that Charles Darwin, in the 1st edition of the *Origin* (1859) pointed out the special features of the Ogasawara (Bonin) Islands (page 383). Then tell them about this scandal.

- Hirase, Y. 1907a. Explanatory diagrams of Japanese molluscs (1). *Conchological Magazine* 6:17-20. [in Japanese]
 Hirase, Y. 1907b. Explanatory diagrams of Japanese molluscs (2). *Conchological Magazine* 7:18-20. [in Japanese]
 Hirase, Y. 1907c. Explanatory diagrams of Japanese molluscs (3). *Conchological Magazine* 8:17-22. [in Japanese]

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MARINE MATTERS

Tropical Marine Mollusc Programme (TMMP)

The *Proceedings of the fifth workshop of the Tropical Marine Mollusc Programme (TMMP)*, edited by Jorgen Hylleberg and others, were published in 1995 as *Phuket Marine Biological Center Special Publication* No. 15. The workshop, the fifth in a series that began in 1991, took place in Indonesia at Sam Ratalungi University, Manado, and Hasanuddin University, Ujung Pandang, 12-23 September 1994.

Numerous papers and abstracts cover a wide range of topics, from basic taxonomy and morphology, through reproduction and development, to aquaculture, shell trade and conservation. Of particular relevance to conservation are:

- Chantrapornsyi, S. Green turbo (*Turbo marmoratus* Linnaeus), an endangered species in Thailand. pp. 39-40.
T. marmoratus is heavily exploited, selling for US\$80 per kg. Although widely distributed, population sizes are small despite establishment of marine parks and prohibition of shell export.
 Bussarawit, S. The market value of rare and common molluscs, Phuket Island, Thailand. pp. 35-38.
 Prices paid per shell for 225 species of molluscs are summarised, and range from US\$0.10 for common species to US\$4000.00 for rare and endangered species.
 Dwiono, S.A.P. *et al.* Protection of top shell (*Trochus niloticus*) at Banda and Lease Islands. p. 225.
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Note that some of these details have changed since the previous issue of *Tentacle*.

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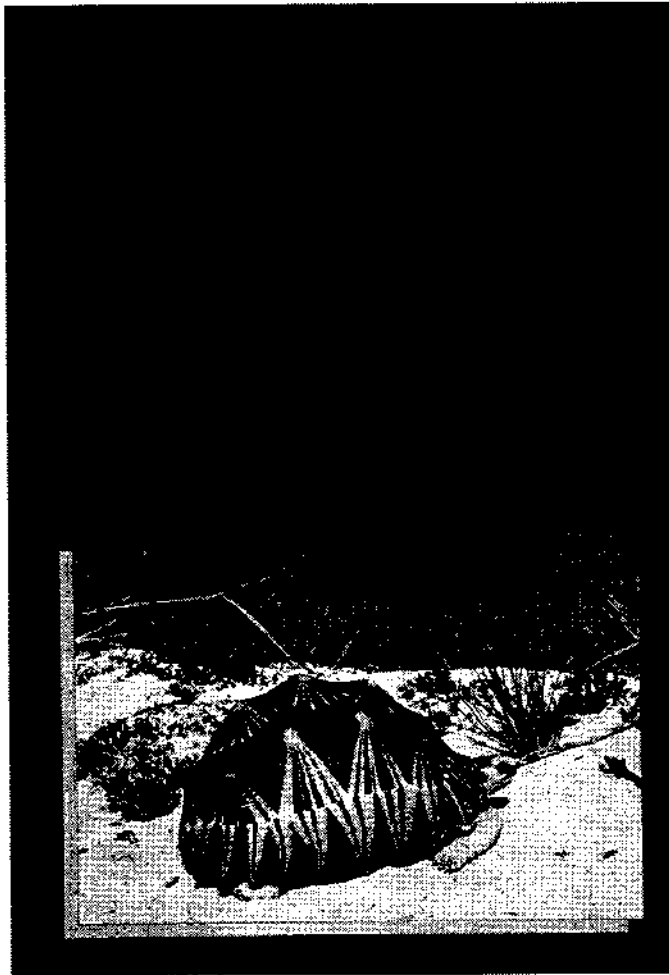
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APPENDIX - 1996 IUCN RED LIST - GASTROPODA



The following lists and information have been taken from the World Conservation Monitoring Centre's (WCMC) website:

http://www.wcmc.org.uk:80/species/animals/animal_redlist.html

Comments, amendments [we know there are errors and blunders !] and suggestions should be directed to Mary Seddon (seddonm@cardiff.ac.uk), not to WCMC.

IUCN Red List Categories

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

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

EXTINCT IN THE WILD (EW) A taxon 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. A taxon 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) A taxon 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) A taxon 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) A taxon 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) A taxon 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).

DATA DEFICIENT (DD) A taxon 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. A taxon 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) A taxon is Not Evaluated when it has not yet been assessed against the criteria.

EXTINCT

ARCHAEOGASTROPODA

LOTTIDAE

Lottia alveus

USA

NACELLIDAE

Collisella edmitchelli

USA

BASOMMATOPHORA

PLANORBIDAE

Miratesta celebensis

Indonesia

MESOGASTROPODA

ASSIMINEIDAE

Omphalotropis plicosa

Mauritius

CYCLOPHORIDAE

Cyclophorus horridulum

Mayotte

Cyclosurus mariei

Mayotte

HYDROBIIDAE

Angrobia dulvertonensis

Australia

Beddomeia tumida

Australia

Belgrandiella intermedia

Austria

Bythinella intermedia

Austria

Lithoglyphus umbilicata

USA

Littoridina gaudichaudii

Ecuador

Ohridohauftenia drimica

Yugoslavia

<i>Posticobia norfolkensis</i> Norfolk Island	<i>Auriculella expansa</i> USA	<i>Carelia lirata</i> USA	<i>Mautodontha consobrina</i> French Polynesia
LITTORINIDAE	<i>Auriculella uniplicata</i> USA	<i>Carelia lymani</i> USA	<i>Mautodontha maupiensis</i> French Polynesia
<i>Littoraria flammea</i> China	<i>Lamellidea monodonta</i> Japan	<i>Carelia mirabilis</i> USA	<i>Mautodontha parvidens</i> French Polynesia
NEOCYCLOTIDAE	<i>Lamellidea nakadai</i> Japan	<i>Carelia necra</i> USA	<i>Mautodontha punctiperforata</i> French Polynesia
<i>Amphicyclotulus guadeloupensis</i> Guadeloupe	<i>Newcombia philippiana</i> USA	<i>Carelia olivacea</i> USA	<i>Mautodontha saintjohni</i> French Polynesia
<i>Incerticyclus cinereus</i> Martinique	<i>Partulina crassa</i> USA	<i>Carelia paradoxa</i> USA	<i>Mautodontha subtilis</i> French Polynesia
<i>Incerticyclus martinicensis</i> Martinique	<i>Partulina montagui</i> USA	<i>Carelia periscelis</i> USA	<i>Mautodontha unilamellata</i> Cook Islands
PLEUROCERIDAE	<i>Perdicella fulgurans</i> USA	<i>Carelia pilsbryi</i> USA	<i>Sinployea canalis</i> Cook Islands
<i>Anculosa formanii</i> USA	<i>Perdicella maniensis</i> USA	<i>Carelia sinclairi</i> USA	<i>Sinployea decorticata</i> Cook Islands
<i>Elimia hartmanniana</i> USA	<i>Perdicella zebra</i> USA	<i>Carelia tenebrosa</i> USA	<i>Sinployea harveyensis</i> Cook Islands
<i>Leptoxis anthonyix</i> USA	<i>Perdicella zebrina</i> USA	<i>Carelia turricula</i> USA	<i>Sinployea otareae</i> Cook Islands
POMATIASIDAE	<i>Tomelasmias capricorni</i> Australia	ARIOPHANTIDAE	<i>Sinployea planospira</i> Cook Islands
<i>Tropidophora desmazuresi</i> Mauritius	AMASTRIDAE	<i>Vitrinula chaunax</i> Japan	<i>Sinployea proxima</i> Cook Islands
<i>Tropidophora semilineata</i> Mayotte	<i>Amastra albolabris</i> USA	<i>Vitrinula chichijimana</i> Japan	<i>Sinployea rudis</i> Cook Islands
POMATIOPSIDAE	<i>Amastra comea</i> USA	<i>Vitrinula hahajimana</i> Japan	<i>Sinployea tenuicostata</i> Cook Islands
<i>Tomicha cawstoni</i> South Africa	<i>Amastra crassilabrum</i> USA	BULIMULIDAE	<i>Sinployea youngi</i> Cook Islands
STYLOMMATOPHORA	<i>Amastra elongata</i> USA	<i>Tomigenus gibberulus digerus</i> Brazil	<i>Taipidon anceyana</i> French Polynesia
ACHATINELLIDAE	<i>Amastra forbesi</i> USA	<i>Tomigenus turbinatus biolocus</i> Brazil	<i>Taipidon marquesana</i> French Polynesia
<i>Achatinella abbreviata</i> USA	<i>Amastra pellucida</i> USA	CAMAENIDAE	<i>Taipidon octolamellata</i> French Polynesia
<i>Achatinella apexfulva vittata</i> USA	<i>Amastra porcus</i> USA	<i>Pleurodonte desidens</i> Martinique	<i>Thaumatodon multilamellata</i> Cook Islands
<i>Achatinella buddii</i> USA	<i>Amastra reticulata</i> USA	CERASTUIDAE	DISCIDAE
<i>Achatinella bulimoides rosea</i> USA	<i>Amastra subrostrata</i> USA	<i>Rhachis comorensis</i> Mayotte	<i>Discus guertnianus</i> Portugal
<i>Achatinella caesia</i> USA	<i>Amastra subroror</i> USA	<i>Rhachis sanguineus</i> Mauritius	ENDODONTIDAE
<i>Achatinella casta</i> USA	<i>Amastra tenuispira</i> USA	CHAROPIDAE	<i>Hirasea planulata</i> Japan
<i>Achatinella decora</i> USA	<i>Amastra umbilicata</i> USA	<i>Helenoconcha leptalea</i> St Helena	<i>Mautodontha zebrina</i> Cook Islands
<i>Achatinella dimorpha</i> USA	<i>Carelia anceophila</i> USA	<i>Helenoconcha minutissima</i> St Helena	<i>Pseudocampylaea diana</i> St Helena
<i>Achatinella elegans</i> USA	<i>Carelia bicolor</i> USA	<i>Helenoconcha polyodon</i> St Helena	<i>Pseudocampylaea laetissima</i> St Helena
<i>Achatinella juddii</i> USA	<i>Carelia cochlea</i> USA	<i>Helenoconcha pseustes</i> St Helena	<i>Pseudocampylaea persoluta</i> St Helena
<i>Achatinella juncea</i> USA	<i>Carelia cumingiana</i> USA	<i>Helenoconcha sexdentata</i> St Helena	<i>Pseudocampylaea spurca</i> St Helena
<i>Achatinella lehuiensis</i> USA	<i>Carelia dolei</i> USA	<i>Helenoconcha bilamellata</i> St Helena	EUCONULIDAE
<i>Achatinella livida</i> USA	<i>Carelia evelynae</i> USA	<i>Helenodiscus vernoni</i> St Helena	<i>Caldwellia philyrina</i> Mauritius
<i>Achatinella papyracea</i> USA	<i>Carelia glossema</i> USA	<i>Libera subcavernula</i> Cook Islands	<i>Colparion madgei</i> Mauritius
<i>Achatinella spaldingi</i> USA	<i>Carelia hyattiana</i> USA	<i>Libera tumuloides</i> Cook Islands	<i>Ctenoglypta newtoni</i> Mauritius
<i>Achatinella thaanumi</i> USA	<i>Carelia kalaiauensis</i> USA	<i>Mautodontha acuticosta</i> French Polynesia	<i>Dupontia proletaria</i> Mauritius, Reunion
<i>Achatinella valida</i> USA	<i>Carelia knudseni</i> USA	<i>Mautodontha consimilis</i> French Polynesia	<i>Pachystyla rufozonata</i> Mauritius

HELICARIONIDAE

Advena campbelli
Norfolk Island
Diastole matafaoi
American Samoa
Erepta nevillei
Mauritius
Harmogenanina linophora
Mauritius, Reunion
Harmogenanina subdetecta
Reunion
Nancibella quintalia
Norfolk Island
Panulena perrugosa
Norfolk Island
Quintalia flosculus
Norfolk Island
Quintalia stoddartii
Norfolk Island

HELICIDAE

Pseudocampylaea lowei
Portugal

HYGROMIIDAE

Trochoidea picardi
Israel

MEGALOBULIMIDAE

Megalolulimus cardosoi
Brazil

OLEACINIDAE

Oleacina guadeloupensis
Guadeloupe

ORTHALICIDAE

Leucocharis loyaltiensis
New Caledonia
Leucocharis porphyrocheila
New Caledonia
Piacostylus bivanicosus etheridgei
Australia
Piacostylus cuniculinsulae
Australia

PARTULIDAE

Partula affinis
French Polynesia
Partula approximata
French Polynesia
Partula arguta
French Polynesia
Partula atilis
French Polynesia
Partula attenuata
French Polynesia
Partula aurantia
French Polynesia
Partula auriculata
French Polynesia
Partula bilineata
French Polynesia
Partula callifera
French Polynesia
Partula candida
French Polynesia
Partula castanea
French Polynesia
Partula cedista
French Polynesia

Partula citrina
French Polynesia
Partula compacta
French Polynesia
Partula crassilabris
French Polynesia
Partula cuneata
French Polynesia
Partula cytherea
French Polynesia
Partula dolichostoma
French Polynesia
Partula dolorosa
French Polynesia
Partula eremita
French Polynesia
Partula exigua
French Polynesia
Partula formosa
French Polynesia
Partula fusea
French Polynesia
Partula imperforata
French Polynesia
Partula jackieburchi
French Polynesia
Partula leptochila
French Polynesia
Partula levilineata
French Polynesia
Partula levistriata
French Polynesia
Partula lutea
French Polynesia
Partula microstoma
French Polynesia
Partula nodosa
French Polynesia
Partula planilabrum
French Polynesia
Partula producta
French Polynesia
Partula protea
French Polynesia
Partula protracta
French Polynesia
Partula radiata
French Polynesia
Partula raiaensis
French Polynesia
Partula remota
French Polynesia
Partula robusta
French Polynesia
Partula rustica
French Polynesia
Partula sagitta
French Polynesia
Partula salifana
Guam
Partula suturalis
French Polynesia
Partula taeniata
French Polynesia
Partula thalia
French Polynesia
Partula turgida
French Polynesia
Partula umbilicata
French Polynesia

Partula variabilis
French Polynesia
Partula vittata
French Polynesia

PUPILLIDAE

Gastrocopta chichijimana
Japan
Gastrocopta ogasawarana
Japan
Leiostyla lamellosa
Portugal
Lyropupa perlonga
USA
Nesopupa turtoni
St Helena
Pupilla obliquicosta
St Helena

STREPTAXIDAE

Gibbus lyonetianus
Mauritius
Gonidomus newtoni
Mauritius
Gonospira nevillei
Mauritius
Gulella mayottensis
Mayotte
Gulella thomasetti
Seychelles

SUBULINIDAE

Chilonopsis blofeldi
St Helena
Chilonopsis exulatus
St Helena
Chilonopsis helena
St Helena
Chilonopsis melanoides
St Helena
Chilonopsis nonpareil
St Helena
Chilonopsis subplicatus
St Helena
Chilonopsis subtruncatus
St Helena
Chilonopsis turtoni
St Helena

VERTIGINIDAE

Campolaemus perexilis
St Helena

EXTINCT IN THE WILD

STYLOMMATOPHORA

PARTULIDAE
Partula dentifera
French Polynesia
Partula faba
French Polynesia
Partula garretti
French Polynesia
Partula hebe
French Polynesia
Partula labrusca
French Polynesia
Partula mirabilis
French Polynesia

Partula mooreana
French Polynesia
Partula suturalis vexillum
French Polynesia
Partula taeniata simulans
French Polynesia
Partula tohiveana
French Polynesia
Partula tristis
French Polynesia

CRITICALLY
ENDANGERED

ARCHAEOGASTROPODA
HELICINIDAE
Ogasawarana chichijimana
Japan
Ogasawarana habeii
Japan
Ogasawarana metamorpha
Japan
Ogasawarana rex
Japan
Ogasawarana yoshiwarana
Japan

NERITIDAE

Neritina tiassalensis
Cote d'Ivoire

TURBINIIDAE

Astraea heliotropium
New Zealand

BASOMMATOPHORA

LYMNAEIDAE

Lantzia carinata
Reunion
Stagnicola utahensis
USA

PLANORBIDAE

Amphigyra alabamensis
USA
Ancylastrum cumingianus
Australia
Biomphalaria barthi
Ethiopia
Ceratophallus socotrensis
Yemen
Gyraulus cockburni
Yemen
Neoplanorbis carinatus
USA
Neoplanorbis smithi
USA
Neoplanorbis tantillus
USA
Neoplanorbis umbilicatus
USA

SIPHONARIIDAE

Siphonaria compressa
South Africa

MESOGASTROPODA

AMPULLARIDAE

Lanistes neritoides
Congo

HYDROBIIDAE	<i>Leptoxis compacta</i>	<i>Achatinella stewartii</i>	<i>Opanara perahuensis</i>
<i>Angrobia grampianensis</i>	USA	USA	French Polynesia
Australia	<i>Leptoxis formanii</i>	<i>Achatinella swiftii</i>	<i>Orangia maituatensis</i>
<i>Belgrandiella austriana</i>	USA	USA	French Polynesia
Austria	<i>Leptoxis formosa</i>	<i>Achatinella taeniolata</i>	<i>Radioconus goeldi</i>
<i>Belgrandiella ganslmayri</i>	USA	USA	Brazil
Austria	<i>Leptoxis ligata</i>	<i>Achatinella turgida</i>	<i>Rhysococoncha variumbilicata</i>
<i>Belgrandiella mimula</i>	USA	USA	French Polynesia
Austria	<i>Leptoxis lirata</i>	<i>Achatinella viridans</i>	<i>Ruatara koarana</i>
<i>Belgrandiella parreyssi</i>	USA	USA	French Polynesia
Austria	<i>Leptoxis melanoides</i>	<i>Achatinella vulpina</i>	CLAUSILIIDAE
<i>Belgrandiella pelerei</i>	USA	USA	<i>Lampedusa melitensis</i>
Austria	<i>Leptoxis occultata</i>	Gulickia alexandri	Malta
<i>Belgrandiella styriaca</i>	USA	USA	DRAPARNAUDIIDAE
Austria	<i>Leptoxis showalterii</i>	<i>Partulina confusa</i>	<i>Draparnaudia anniae</i>
<i>Belgrandiella wawrai</i>	USA	USA	New Caledonia
Austria	<i>Leptoxis torrefacta</i>	<i>Partulina dubia</i>	<i>Draparnaudia subnecata</i>
<i>Bythinella bicarinata</i>	USA	USA	New Caledonia
France	<i>Leptoxis vittata</i>	AMASTRIDAE	ENDODONTIDAE
<i>Bythiospeum cisterciensorum</i>	USA	<i>Amastra cylindrica</i>	<i>Cookeconcha</i> sp.
Austria	POMATIOPSISIDAE	USA	USA
<i>Clappia cahabensis</i>	<i>Fenouilla kreitneri</i>	<i>Amastra micans</i>	<i>Endodonta</i> sp.
USA	China	USA	USA
<i>Coahuilix hubbsi</i>	<i>Tomicha natalensis</i>	<i>Amastra rubens</i>	ENIDAE
Mexico	South Africa	USA	<i>Euchondrus ramonensis</i>
<i>Hemistoma whiteleggei</i>	VIVIPARIDAE	<i>Amastra spirizona</i>	Israel
Australia	<i>Bellamyia liberiana</i>	USA	<i>Pene galilaea</i>
<i>Jardinella colmani</i>	Liberia	<i>Armsia petasus</i>	Israel
Australia	STYLOMMATOPHORA	<i>Laminella sanguinea</i>	USA
PLEUROCERIDAE	ACHATINELLIDAE	USA	EUCONULIDAE
<i>Elimia ampla</i>	<i>Achatinella apexfulva</i>	USA	<i>Trochochlamys ogasawarana</i>
USA	USA	<i>Tropidoptera heliciformis</i>	Japan
<i>Elimia annettae</i>	<i>Achatinella bellula</i>	BRADYBAENIDAE	FERUSSACIIDAE
USA	USA	<i>Helicostyla smargadina</i>	<i>Cecilioides eulima</i>
<i>Elimia brevis</i>	<i>Achatinella bulimoides</i>	Philippines	Portugal
USA	USA	BULIMULIDAE	GEOMITRIDAE
<i>Elimia clausa</i>	<i>Achatinella byronii</i>	<i>Napaeus isletae</i>	<i>Discula lyelliana</i>
USA	USA	Spain	Portugal
<i>Elimia fusiformis</i>	<i>Achatinella cestus</i>	CERIONIDAE	<i>Discula testudinalis</i>
USA	USA	<i>Cerion nanus</i>	Portugal
<i>Elimia impressa</i>	<i>Achatinella concavospira</i>	Cayman Islands	<i>Discula tetrica</i>
USA	USA	CHAROPIDAE	Portugal
<i>Elimia jonesi</i>	<i>Achatinella curta</i>	<i>Kondoconcha othnius</i>	<i>Geomitra delphinuloides</i>
USA	USA	French Polynesia	Portugal
<i>Elimia laeta</i>	<i>Achatinella decipiens</i>	<i>Mautodontha boraborensis</i>	HELICARIONIDAE
USA	USA	French Polynesia	<i>Erepta stylodon</i>
<i>Elimia pitsbryi</i>	<i>Achatinella fulgens</i>	<i>Mautodontha ceuthma</i>	Mauritius
USA	USA	French Polynesia	<i>Harmogenanina implicata</i>
<i>Elimia pupaeformis</i>	<i>Achatinella leuconrhaphae</i>	<i>Opanara altiapica</i>	Mauritius
USA	USA	French Polynesia	<i>Thapsia buraensis</i>
<i>Elimia vanuxemiana</i>	<i>Achatinella liia</i>	<i>Opanara areaensis</i>	Kenya
USA	USA	French Polynesia	<i>Zingis radiolata</i>
<i>Elimia varians</i>	<i>Achatinella lorata</i>	<i>Opanara bitridentata</i>	Kenya
USA	USA	French Polynesia	HELICIDAE
<i>Gyrotoma excisa</i>	<i>Achatinella mustelina</i>	<i>Opanara caliculata</i>	<i>Helix ceratina</i>
USA	USA	French Polynesia	France
<i>Gyrotoma lewisii</i>	<i>Achatinella phaeozona</i>	<i>Opanara depasoapicata</i>	<i>Hemicycla saulcyi</i>
USA	USA	French Polynesia	Spain
<i>Gyrotoma pagoda</i>	<i>Achatinella pulcherrima</i>	<i>Opanara duplicitentata</i>	<i>Leptaxis vetusa</i>
USA	USA	French Polynesia	Portugal
<i>Gyrotoma pumila</i>	<i>Achatinella pupukanioe</i>	<i>Opanara fosbergi</i>	
USA	USA	French Polynesia	
<i>Gyrotoma pyramidata</i>	<i>Achatinella sowerbyana</i>	<i>Opanara megomphala</i>	
USA	USA	French Polynesia	
<i>Gyrotoma walkeri</i>			
USA			
<i>Leptoxis clipeata</i>			
USA			

- HELICODISCIDAE**
Zilchogyra paulistana
 Brazil
- HELMINTHOGLYPTIDAE**
Helminthoglypta walkeriana
 USA
Micrarionta feralis
 USA
- HYGROMIIDAE**
Trochoidea pseudojacosta
 Israel
- MEGALOBULIMIDAE**
Megalobulimus grandis
 Brazil
Megalobulimus proclivis
 Brazil
- OREOHELICIDAE**
Radiocentrum avalonense
 USA
- ORTHALICIDAE**
Leuchocharis pancheri
 New Caledonia
Placostylus bivaricosus
 Australia
- PARTULIDAE**
Partula calypso
 Palau
Partula clara
 French Polynesia
Partula emersoni
 Federated States of Micronesia
Partula filosa
 French Polynesia
Partula gibba
 Guam, Northern Marianas
Partula guamensis
 Federated States of Micronesia
Partula hyalina
 French Polynesia
Partula langfordi
 Northern Marianas
Partula leucothoe
 Palau
Partula martensiana
 Federated States of Micronesia
Partula otaheitana
 French Polynesia
Partula radiolata
 Guam
Partula rosea
 French Polynesia
Partula thetis
 Palau
Partula varia
 French Polynesia
- PUPILLIDAE**
Leiostyla abbreviata
 Portugal
Leiostyla cassida
 Portugal
Leiostyla gibba
 Portugal
Leiostyla heterodon
 Portugal
- Leiostyla simulator*
 Portugal
- RHYTIDIDAE**
Rhytida clarki
 New Zealand
Rhytida oconnori
 New Zealand
- STREPTAXIDAE**
Gonospira duponti
 Mauritius
Gulella taitensis
 Kenya
- STROPHOCHEILIDAE**
Gonyostomus gonyostomus
 Brazil
Hirinaba curytibana
 Brazil
- SUCCINEIDAE**
Oxyloma kanabense
 USA
- ENDANGERED**
- ARCHAEOGASTROPODA**
- HELICINIDAE**
Helicina rostrata
 Guatemala, Nicaragua
- BASOMMATOPHORA**
- ANCYLIDAE**
Ancylus ashangiensis
 Ethiopia
- PLANORBIDAE**
Afroyrus rodriguezensis
 Mauritius
Afroyrus starmuehlineri
 Madagascar
Bulinus succinoides
 Malawi
Glyptophysa petiti
 New Caledonia
- MESOGASTROPODA**
- AMPULLARIDAE**
Lanistes alexandri
 Tanzania
Lanistes farleri
 Tanzania
Lanistes nasutus
 Malawi, Mozambique
Lanistes nyssanus
 Malawi, Mozambique
Lanistes solidus
 Malawi, Mozambique
Lanistes stuhimanni
 Tanzania
- ASSIMINEIDAE**
Omphalotropis hieroglyphica
 Mauritius
- CYCLOPHORIDAE**
Adelopoma stollii
 Guatemala, Nicaragua
- Maizania hildebrandti thikensis*
 Kenya
- HYDROBIIDAE**
Antrobia culveri
 USA
Assimineia pecos
 USA
Beddomeia capensis
 Australia
Beddomeia fallax
 Australia
Beddomeia minima
 Australia
Bythiospeum geyeri
 Austria
Bythiospeum noricum
 Austria
Bythiospeum pfeifferi
 Austria
Bythiospeum reisalpense
 Austria
Bythiospeum tschapecki
 Austria
Fonscochlea billakalina
 Australia
Graziana klazenfurtensis
 Austria
Hauftenia kerschneri
 Austria
Hauftenia wienwaldensis
 Austria
Hemistoma beaumonti
 Australia
Hemistoma pusillior
 Australia
Heterocyclus perroquini
 New Caledonia
Heterocyclus petiti
 New Caledonia
Iglica kleinzellensis
 Austria
Jardinella acuminata
 Australia
Jardinella jesswiseae
 Australia
Jardinella pallida
 Australia
Lobaunia danubialis
 Austria
Trochidrobia inflata
 Australia
- PLEUROCERIDAE**
Io fluvialis
 USA
- POMATIASIDAE**
Tropidophora articulata
 Mauritius
Tropidophora deburghiae
 Madagascar
- POMATIOPSISIDAE**
Tomicha rogersi
 South Africa
Tricula montana
 India
- THIARIDAE**
Anceya giraudi
 Tanzania, Zaire
Anceya terebriformis
 Tanzania, Zaire
Bathanalia howesi
 Tanzania, Zaire
Bathanalia straeleni
 Tanzania, Zaire
Bridouxiana giraudi
 Tanzania, Zaire
Bridouxiana leucoraphe
 Tanzania, Zaire
Bridouxiana ponsonbyi
 Tanzania, Zaire
Bridouxiana praeclara
 Tanzania, Zaire
Bridouxiana rotundata
 Tanzania, Zaire
Bridouxiana smithiana
 Tanzania, Zaire
Chytra kirki
 Tanzania, Zaire
Hirthis globosa
 Tanzania, Zaire
Hirthis littorina
 Tanzania, Zaire
Lavigera grandis
 Tanzania, Zaire
Lavigera nassa (agg.)
 Tanzania, Zaire
Limnotrochus thomsoni
 Tanzania, Zaire
Martelia tanganyicensis
 Tanzania, Zaire
Mysorelloides multisulcata
 Tanzania, Zaire
Paludomus ajanensis
 Seychelles
Paramelania damoni
 Tanzania, Zaire
Paramelania iridescens
 Tanzania, Zaire
Reymondia horei
 Tanzania, Zaire
Reymondia pyramidalis
 Tanzania, Zaire
Reymondia tanganyicensis
 Tanzania, Zaire
Spekia zonata
 Tanzania, Zaire
Stanleya neritinoidea
 Tanzania, Zaire
Stormsia minima
 Tanzania, Zaire
Symnolopsis gracilis
 Tanzania, Zaire
Symnolopsis lacustris
 Tanzania, Zaire
Symnolopsis minuta
 Tanzania, Zaire
Tanganyicia rufifilosa
 Tanzania, Zaire
Tiphobia horei
 Tanzania, Zaire
- VIVIPARIDAE**
Bellamyia constricta
 Kenya, Tanzania, Uganda
Bellamyia contracta
 Zaire

- Bellamyia costulata*
Kenya, Tanzania, Uganda
- Bellamyia crawshayi*
Zaire, Zambia
- Bellamyia ecclesi*
Malawi, Mozambique
- Bellamyia jeffreysi*
Malawi, Mozambique
- Bellamyia jucunda*
Kenya, Tanzania, Uganda
- Bellamyia leopoldvillensis*
Zaire
- Bellamyia monardi*
Angola, Namibia
- Bellamyia mweruensis*
Zaire, Zambia
- Bellamyia pagodiformis*
Zaire, Zambia
- Bellamyia phthinotropis*
Kenya, Tanzania, Uganda
- Bellamyia robertsoni*
Malawi, Mozambique
- Bellamyia rubicunda*
Uganda, Zaire
- Bellamyia trochearis*
Kenya, Tanzania, Uganda
- Neothauma tanganyicense*
Tanzania, Zaire
- Notopaia sublineata*
Australia
- STYLOMMATOPHORA
- ACAVIDAE
- Ampelita (Xystera) fulgurata*
Madagascar
- Ampelita (Eurystyla) julii*
Madagascar
- ACHATINELLIDAE
- Newcombia canaliculata*
USA
- Newcombia cumingi*
USA
- Newcombia lirata*
USA
- Newcombia perkinsi*
USA
- Newcombia pfeifferi*
USA
- Newcombia sulcata*
USA
- Partulina mighelsiana*
USA
- Partulina perdix*
USA
- Partulina physa*
USA
- Partulina proxima*
USA
- Partulina redfieldi*
USA
- Partulina semicarinata*
USA
- Partulina splendida*
USA
- Partulina tappaniana*
USA
- Partulina tessellata*
USA
- Partulina variabilis*
USA
- Perdicella helena*
USA
- AMASTRIDAE
- Leptachatina lepida*
USA
- BULIMULIDAE
- Boninena callistoderma*
Japan
- Boninena hiraseana*
Japan
- Boninena ogasawarae*
Japan
- Bothriembryon perobesus*
Australia
- Bothriembryon praececlus*
Australia
- CAMAENIDAE
- Amplirhagada astuta*
Australia
- Amplirhagada questroana*
Australia
- Cristilabrum bubulum*
Australia
- Cristilabrum buryillum*
Australia
- Cristilabrum grossum*
Australia
- Cristilabrum solitulum*
Australia
- Cupedora evandaleana*
Australia
- Damochlora millepunctata*
Australia
- Glyptorhagada silveri*
Australia
- Kimboraga exanimus*
Australia
- Meridolum comeovirens*
Australia
- Mouldingia orientalis*
Australia
- Thersites mitchellae*
Australia
- CHAROPIDAE
- Orangia cookei*
French Polynesia
- Orangia sporadica*
French Polynesia
- Ptychodon schuppi*
Brazil
- Radioconus riochcoensis*
Brazil
- Radiodiscus amdenus*
Brazil
- COCHLICOPIDAE
- Cryptazeca kobelti*
Spain
- ENDODONTIDAE
- Hirasea acutissima*
Japan
- Hirasea chichijimana*
Japan
- Hirasea diplomphalus*
Japan
- Hirasea insignis*
Japan
- Hirasea operculina*
Japan
- Thaumatodon hystricelloides*
Western Samoa
- EUCONULIDAE
- Ctenophila caldwelli*
Mauritius
- Ctenophila setiliris*
Reunion
- Dancea rodriguezensis*
Mauritius
- Dupontia perlucida*
Mauritius
- Hacrochlamys lineolatus*
Japan
- Lamprocystis hahajimana*
Japan
- Thapsia snelli*
Mauritius
- GEOMITRIDAE
- Discula bulweri*
Portugal
- Discula tabellata*
Portugal
- Geomitra moniziana*
Portugal
- Geomitra tiarella*
Portugal
- HELICARIONIDAE
- Advena charon*
Norfolk Island
- Dolapex amicus*
Norfolk Island
- Erepta odontina*
Mauritius
- Lutilodix imitatrix*
Norfolk Island
- Mathewsoconcha belli*
Norfolk Island
- HELICIDAE
- Helix (Pelasga) texta*
Israel
- Leptaxis caldeirarum*
Portugal
- Leptaxis wollastoni*
Portugal
- HELMINTHOGLYPTIDAE
- Helminthoglypta callistoderma*
USA
- MEGALOBULIMIDAE
- Megalobulimus fragilion*
Brazil
- Megalobulimus lopesi*
Brazil
- Megalobulimus parafragilior*
Brazil
- PARMACELLIDAE
- Parmacella tenerifensis*
Spain
- PARTULIDAE
- Eua zebrina*
American Samoa
- Samoaana annectens*
French Polynesia
- Samoaana attenuata*
French Polynesia
- Samoaana conica*
American Samoa
- Samoaana diaphana*
French Polynesia
- Samoaana fragilis*
Guam
- Samoaana solitaria*
French Polynesia
- Samoaana thurstoni*
American Samoa
- RHYTIDIDAE
- Occirhenea georgiana*
Australia
- Victaphanta compacta*
Australia
- STREPTAXIDAE
- Gonospira deshayesi*
Reunion
- Gonospira uvula*
Reunion
- Gulella antelmeana*
Mauritius
- Microstrophia modesta*
Mauritius
- Tayloria urguesensis*
subangulata
Kenya
- SUBULINIDAE
- Euonyma curtissima*
Kenya
- Subuliniscus arambourgi*
Kenya
- SUCCINEIDAE
- Succinea piratarum*
Guam
- Succinea quadrasi*
Guam
- VERTIGINIDAE
- Truncatellina arcyensis*
France
- VITRINIDAE
- Insulivitrina reticulata*
Spain
- ZONITIDAE
- Trochomorpha apia*
American Samoa
- Zonitoides jaccetanicus*
Spain
- VULNERABLE
- ARCHAEOGASTROPODA
- HYDROCENIDAE
- Georissa laseroni*
Australia

<i>Monterissa gowerensis</i> Australia	<i>Renea pailona</i> France	<i>Beddomeia hullii</i> Australia	<i>Bythiospeum garnieri</i> France
BASOMMATOPHORA	<i>Renea singularis</i> France	<i>Beddomeia inflata</i> Australia	<i>Bythiospeum quenstedti</i> Germany
ACROLOXIDAE	AMPULLARIDAE	<i>Beddomeia kershawi</i> Australia	<i>Bythiospeum sandbergeri</i> Germany
<i>Acroloxus coloradensis</i> USA	<i>Lanistes bicarinatus</i> Zaire	<i>Beddomeia kessneri</i> Australia	<i>Cincinnatia helicogyra</i> USA
ANCYLIDAE	<i>Lanistes intortus</i> Zaire	<i>Beddomeia krybetes</i> Australia	<i>Cincinnatia mica</i> USA
<i>Ferrissia mcneili</i> USA	<i>Lanistes neavei</i> Zaire, Zambia	<i>Beddomeia launcestonensis</i> Australia	<i>Cincinnatia monroensis</i> USA
<i>Rhodacme elatior</i> USA	<i>Pila speciosa</i> Ethiopia, Kenya, Somalia	<i>Beddomeia lodderae</i> Australia	<i>Cincinnatia parva</i> USA
<i>Rhodacme filosa</i> USA	ASSIMINEIDAE	<i>Beddomeia mesibovi</i> Australia	<i>Cincinnatia ponderosa</i> USA
CARYCHIIDAE	<i>Austroassiminea lethae</i> Australia	<i>Beddomeia petterdi</i> Australia	<i>Cincinnatia vanhyningi</i> USA
<i>Zospeum biscagaiense</i> Spain	CYCLOPHORIDAE	<i>Beddomeia phasianella</i> Australia	<i>Cincinnatia wekiwae</i> USA
GLACIDORBIDAE	<i>Ditropis whitei</i> Australia	<i>Beddomeia protuberata</i> Australia	<i>Cochliopa texana</i> USA
<i>Glacidorbis occidentalis</i> Australia	HYDROBIIDAE	<i>Beddomeia ronaldi</i> Australia	<i>Cochliopina milleri</i> Mexico
LYMNAEIDAE	<i>Alzoniella hartwigschueti</i> Austria	<i>Beddomeia salmonis</i> Australia	<i>Durangonella coahuilae</i> Mexico
<i>Stagnicola bonnevillensis</i> USA	<i>Angrobia anodonta</i> Australia	<i>Beddomeia tasmanica</i> Australia	<i>Fissuria bovi</i> France
PHYSIDAE	<i>Angrobia dyeriana</i> Australia	<i>Beddomeia topsiae</i> Australia	<i>Fonscochlea accepta</i> Australia
<i>Physella microstriata</i> USA	<i>Angrobia petterdi</i> Australia	<i>Beddomeia trochiformis</i> Australia	<i>Fonscochlea aquatica</i> Australia
<i>Physella spelunca</i> USA	<i>Antrorbis breweri</i> USA	<i>Beddomeia tumerae</i> Australia	<i>Fonscochlea conica</i> Australia
<i>Physella utahensis</i> USA	<i>Aphaostracon asthenes</i> USA	<i>Beddomeia waterhouseae</i> Australia	<i>Fontigens turritella</i> USA
<i>Physella zionis</i> USA	<i>Aphaostracon monas</i> USA	<i>Beddomeia wilmotensis</i> Australia	<i>Hauffenia</i> sp. Slovakia
PLANORBIDAE	<i>Aphaostracon pycnum</i> USA	<i>Beddomeia wiseae</i> Australia	<i>Hemistoma flexicolumella</i> Australia
<i>Biomphalaria tchadiensis</i> Chad	<i>Aphaostracon xynoelictum</i> USA	<i>Beddomeia zeehanensis</i> Australia	<i>Hemistoma minutissima</i> Australia
<i>Bulinus camerunensis</i> Cameroon	<i>Arganiella exilis</i> France	<i>Belgrandiella alticola</i> Slovakia	<i>Hydrobia scamandri</i> France
<i>Bulinus nyassanus</i> Malawi	<i>Assiminea infirma</i> USA	<i>Belgrandiella bojnicensis</i> Slovakia	<i>Jardinella carnarvonensis</i> Australia
<i>Bulinus transversalis</i> Kenya, Uganda	<i>Beddomeia angulata</i> Australia	<i>Belgrandiella fuchsi</i> Austria	<i>Jardinella coreena</i> Australia
<i>Gyraulus mauritanus</i> Mauritius	<i>Beddomeia averni</i> Australia	<i>Belgrandiella pyrenaica</i> France	<i>Jardinella corrugata</i> Australia
<i>Pianorbella magnifica</i> USA	<i>Beddomeia bellii</i> Australia	<i>Belgrandiella slovenica</i> Slovakia	<i>Jardinella edgbastonensis</i> Australia
<i>Pianorbella multivolvis</i> USA	<i>Beddomeia bowryensis</i> Australia	<i>Bythinella badensis</i> Germany	<i>Jardinella eulo</i> Australia
MESOGASTROPODA	<i>Beddomeia briansmithi</i> Australia	<i>Bythinella bavanca</i> Germany	<i>Jardinella exigua</i> Australia
ACICULIDAE	<i>Beddomeia camensis</i> Australia	<i>Bythinella compressa</i> Germany	<i>Jardinella isolata</i> Australia
<i>Acicula norisi</i> Gibraltar	<i>Beddomeia forthensis</i> Australia	<i>Bythinella cylindrica</i> Austria	<i>Jardinella zeidlerorum</i> Australia
<i>Acicula palaestinensis</i> Israel	<i>Beddomeia franklandensis</i> Australia	<i>Bythinella dunkeri</i> Belgium, Germany	<i>Lepyrium showalteri</i> USA
<i>Platyla foliniana</i> France	<i>Beddomeia fromensis</i> Australia	<i>Bythinella padiraci</i> France	<i>Lithhabitella elliptica</i> France
<i>Platyla lusitanica</i> Portugal	<i>Beddomeia fultoni</i> Australia	<i>Bythinella vindis</i> Belgium, France	<i>Mexipyrgus churinceanus</i> carranzae
<i>Renea bourguignatiana</i> France, Italy	<i>Beddomeia gibba</i> Australia	<i>Bythiospeum acicula</i> Germany	<i>Mexipyrgus churinceanus</i> churinceanus
<i>Renea gormonti</i> France	<i>Beddomeia hallae</i> Australia	<i>Bythiospeum articense</i> France	<i>Mexico</i>
<i>Renea moutoni</i> France			

<i>Mussonena campbelli</i> Australia	<i>Cralopa colliveri</i> Australia	<i>Liardetia boninensis</i> Japan	<i>Tubuaia fosbergi</i> Pitcairn Islands
<i>Ningbingia australis</i> Australia	<i>Dupucharopa millestriata</i> Australia	<i>Plegma caelatura</i> Reunion	HELICIDAE
<i>Ningbingia bulla</i> Australia	<i>Geminoropa scindocataracta</i> Australia	FERUSSACIIDAE	<i>Helix obruta</i> Portugal
<i>Ningbingia dentiens</i> Australia	<i>Hedleyoconcha ailaketae</i> Australia	<i>Amphorella iridescens</i> Portugal	<i>Hemicycla pouchet</i> Spain
<i>Ningbingia laurina</i> Australia	<i>Norfolcioconch iota</i> Norfolk Island	<i>Amphorella melampoides</i> Portugal	<i>Idiomela subplicata</i> Portugal
<i>Ningbingia octava</i> Australia	<i>Norfolcioconch norfolkensis</i> Norfolk Island	<i>Amphorella producta</i> Portugal	<i>Lampadia webbiana</i> Portugal
<i>Ningbingia res</i> Australia	<i>Oreomava otwayensis</i> Australia	<i>Ceciloides connollyi</i> Gibraltar	<i>Lemniscia michaudi</i> Portugal
<i>Offachloritis dryanderensis</i> Australia	<i>Penescosta mathewsi</i> Norfolk Island	<i>Cylichnida ovuliformis</i> Portugal	<i>Leptaxis erubescens portosancti</i> Portugal
<i>Ordrachia elegans</i> Australia	<i>Penescosta sororcula</i> Norfolk Island	<i>Sculptiferussacia clausiliaeformis</i> Spain	<i>Leptaxis furva</i> Portugal
<i>Pleuroxia hinsbyi</i> Australia	<i>Pernagera gatiffi</i> Australia	GEOMITRIDAE	<i>Leptaxis terceirana</i> Portugal
<i>Prototrachia sedula</i> Australia	<i>Pilsbrycharopa tumida</i> Australia	<i>Actinella anaglyptica</i> Portugal	<i>Spirorbula latens</i> Portugal
<i>Rhagada gibbensis</i> Australia	<i>Piulula praetumida</i> Reunion	<i>Actinella effugiens</i> Portugal	<i>Theba arinagae</i> Spain
<i>Rhagada harti</i> Australia	<i>Radiodiscus compactus</i> Brazil	<i>Caseolus calculus</i> Portugal	HELMINTHOGLYPTIDAE
<i>Semotrachia euzyga</i> Australia	<i>Rhysococoncha atanuiensis</i> French Polynesia	<i>Caseolus subcalliferus</i> Portugal	<i>Eremarionta immaculata</i> USA
<i>Sinumelon bednalli</i> Australia	<i>Ruataro oparica</i> French Polynesia	<i>Discula bicarinata</i> Portugal	<i>Eremarionta millepalmarum</i> USA
<i>Torresitrachia thedana</i> Australia	<i>Sinployea pitcaimensis</i> Pitcairn Islands	<i>Discula cheiranthicola</i> Portugal	<i>Helminthoglypta allynsmithi</i> USA
<i>Turgenitubulus aslini</i> Australia	CLAUSILIIDAE	<i>Discula echinulata</i> Portugal	<i>Helminthoglypta coelata</i> USA
<i>Turgenitubulus costus</i> Australia	<i>Boettgeria obesuscula</i> Portugal	<i>Discula leacockiana</i> Portugal	<i>Micrarionta facta</i> USA
<i>Turgenitubulus depressus</i> Australia	<i>Bofilliella subarcuata</i> France, Spain	<i>Discula oxytropis</i> Portugal	<i>Micrarionta opuntia</i> USA
<i>Turgenitubulus foramenus</i> Australia	<i>Lamnifera pauli</i> France, Spain	<i>Discula tectiformis</i> Portugal	<i>Xerarionta intercisca</i> USA
<i>Turgenitubulus opiranus</i> Australia	<i>Lampedusa imitratix</i> Malta	<i>Discula turricula</i> Portugal	<i>Xerarionta redimita</i> USA
<i>Turgenitubulus pagodula</i> Australia	COCHLICOPIDAE	<i>Disculella spirulina</i> Portugal	<i>Xerarionta tryoni</i> USA
<i>Turgenitubulus tanmurrana</i> Australia	<i>Cryptazeca elongata</i> Spain	HELICARIONIDAE	HYGROMIIDAE
<i>Vidumelon wattii</i> Australia	<i>Cryptazeca monodonta</i> France, Spain	<i>Buffetia retinaculum</i> Norfolk Island	<i>Candidula setubalensis</i> Portugal
<i>Westraltrachia alterna</i> Australia	<i>Cryptazeca spelaea</i> Spain	<i>Diastole tenuistriata</i> Pitcairn Islands	<i>Helicella bierzona</i> Spain
<i>Westraltrachia inopinata</i> Australia	<i>Cryptazeca subcylindrica</i> France	<i>Harmogenanina argentea</i> Reunion	<i>Helicella mariae</i> Spain
<i>Westraltrachia lievreana</i> Australia	DISCIDAE	<i>Helicaron leopardina</i> Australia	<i>Helicella stiparum</i> Spain
<i>Westraltrachia porcata</i> Australia	<i>Discus marmorensis</i> USA	<i>Helicaron porrectus</i> Australia	<i>Hygromia golasi</i> Andorra
<i>Westraltrachia recta</i> Australia	EUCONULIDAE	<i>Helicaron rubicundus</i> Australia	<i>Obelus despreauxii</i> Spain
<i>Westraltrachia subtila</i> Australia	<i>Caldwellia imperfecta</i> Mauritius, Reunion	<i>Iredaleoconcha caporaphe</i> Norfolk Island	<i>Pyrenaearia daanidentata</i> Spain
<i>Westraltrachia turbinata</i> Australia	<i>Ctenophila vorticella</i> Reunion	<i>Kaliella hongkongensis</i> Hong Kong	<i>Pyrenaearia molae</i> Spain
CARYODIDAE	<i>Dupontia levis</i> Mauritius	<i>Philonesia filiceti</i> Pitcairn Islands	<i>Suboestophora jeresae</i> Spain
<i>Anoglypta launcestonensis</i> Australia	<i>Dupontia nitella</i> Mauritius, Reunion	<i>Philonesia pitcaimensis</i> Pitcairn Islands	<i>Trochoidea gharlapsi</i> Malta
CHAROPIDAE	<i>Dupontia poweri</i> Mauritius	<i>Pittoconcha concinna</i> Norfolk Island	<i>Trochoidea molinae</i> Spain
<i>Allocharopa erskinensis</i> Australia	<i>Elasmias cemicum</i> Mauritius, Reunion	<i>Theskelomensor creon</i> Australia	<i>Trochoidea zaharensis</i> Spain

- Tyrreniella josephi*
Italy
- MEGOMPHICIDAE**
Ammonitella yatesii
USA
- OREOHELICIDAE**
Oreohelix jugalis
USA
Oreohelix vortex
USA
Oreohelix waltoni
USA
- ORTHALICIDAE**
Bulimulus akamatus
Ecuador
Bulimulus alethorhytidus
Ecuador
Bulimulus amastroides
Ecuador
Bulimulus blombergi
Ecuador
Bulimulus calvus
Ecuador
Bulimulus cavagnaroi
Ecuador
Bulimulus darwini
Ecuador
Bulimulus eos
Ecuador
Bulimulus eschariferus
Ecuador
Bulimulus hirsutus
Ecuador
Bulimulus jacobi
Ecuador
Bulimulus lycodus
Ecuador
Bulimulus nesioticus
Ecuador
Bulimulus nux
Ecuador
Bulimulus ochsneri
Ecuador
Bulimulus reibischi
Ecuador
Bulimulus rugiferus
Ecuador
Bulimulus saeronius
Ecuador
Bulimulus sculpturatus
Ecuador
Bulimulus tanneri
Ecuador
Bulimulus unifasciatus
Ecuador
Bulimulus ustulatus
Ecuador
Bulimulus wolffi
Ecuador
Placostylus ambagiosus
New Zealand
Placostylus eddystonensis
New Caledonia
Placostylus fibratus
New Caledonia
Placostylus porphyrostomus
New Caledonia
- POLYGYRIDAE**
Cryptomastix magnidentata
USA
- PUNCTIDAE**
Christianoconcha quintalia
Norfolk Island
- PUPILLIDAE**
Gastrocopta boninensis
Japan
Lauria fanalensis
Portugal
Leiostyla callathiscus
Portugal
Leiostyla cheiligona
Portugal
Leiostyla concinna
Portugal
Leiostyla comeocostata
Portugal
Leiostyla degenerata
Portugal
Leiostyla ferraria
Portugal
Leiostyla filicum
Portugal
Leiostyla laevigata
Portugal
Leiostyla monticola
Portugal
Leiostyla relevata
Portugal
Leiostyla vermiculosa
Portugal
Nesopupa madgei
Mauritius, Reunion
Ptychalaeta dedecora
Japan
- RHYTIDIDAE**
Tasmaphena lamproides
Australia
- STREPTAXIDAE**
Gonidomus sulcatus
Mauritius
Gonospira cylindrella
Reunion
Gonospira holostoma
Mauritius
Gonospira madgei
Mauritius
Gonospira striaticostus
Mauritius
Gonospira teres
Mauritius
Gonospira turgidula
Reunion
Microstrophia nana
Mauritius
- STROPHOCHEILIDAE**
Gonyostomus insularis
Brazil
- SUCCINEIDAE**
Boninosuccinea ogasawarae
Japan
Boninosuccinea punctulispira
Japan
- VALLONIIDAE**
Spelaeodiscus tatricus
Slovakia
- ZONITIDAE**
Oxychilus agostinhoi
Portugal
Oxychilus (Mediterranea) amaltheae
Greece
Oxychilus lineolatus
Portugal
Vitrea pseudotrolli
France, Italy
- LOWER RISK:
CONSERVATION
DEPENDENT**
- MESOGASTROPODA
CYCLOPHORIDAE**
Craspedoma hespericum
Portugal
Craspedoma lyonnnetianum
Portugal
Craspedoma trochoideum
Portugal
- STYLOMMATOPHORA
BULIMULIDAE**
Napaeus nanodes
Spain
- GEOMITRIDAE**
Caseolus leptostictus
Portugal
Lemniscia calva
Portugal
- HELICIDAE**
Hemicycla adansonii
Spain
Hemicycla inutilis
Spain
- HYGROMIIDAE**
Canariella leprosa
Spain
Canariella pthonera
Spain
- PUPILLIDAE**
Leiostyla laurinea
Portugal
- VERTIGINIDAE**
Pupisoma arcuata
Federated States of Micronesia
Vertigo angustior
Armenia, Austria, Azerbaijan,
Belarus, Belgium, Czech
Republic, Denmark, Estonia,
Finland, France, Georgia,
Germany, Hungary, Ireland, Italy,
Liechtenstein, Lithuania,
Netherlands, Norway, Poland,
Romania, Russia, Slovakia,
Sweden, Switzerland, Ukraine,
United Kingdom
- Vertigo genesii*
Finland, Germany, Norway,
Poland, Romania, Russia,
Sweden, Switzerland, United
Kingdom
Vertigo geyeri
Austria, Czech Republic,
Denmark, Finland, Germany,
Ireland, Latvia, Lithuania, Norway,
Poland, Slovakia, Sweden,
Switzerland, United Kingdom
Vertigo moulinsiana
Algeria, Austria, Azerbaijan,
Belarus, Belgium, Czech
Republic, Denmark, Estonia,
Finland, France, Georgia,
Germany, Hungary, Ireland, Italy,
Lithuania, Morocco, Netherlands,
Norway, Poland, Romania,
Russia, Slovakia, Spain, Sweden,
Switzerland, Ukraine
- LOWER RISK: NEAR
THREATENED**
- ARCHAEOGASTROPODA
NERITIDAE**
Neritilia manoeli
Angola, Cameroon, Sao Tome &
Principe
- BASOMMATOPHORA
ANCYLIDAE**
Ancylus regularis
Ethiopia
Simulator consetti
Australia
- PLANORBIDAE**
Biomphalaria angulosa
Malawi, Tanzania, Zambia
Biomphalaria salinarum
Angola, Namibia
Bulinus barthi
Kenya, Tanzania
Bulinus browni
Kenya
Bulinus canescens
Angola, Zaire, Zambia
Bulinus cernicus
Mauritius
Bulinus crystallinus
Angola, Gabon
Bulinus hexaploideus
Ethiopia
Bulinus octaploideus
Ethiopia
- MESOGASTROPODA
AMPULLARIDAE**
Lanistes ciliatus
Kenya
Lanistes elliptus
Malawi, Mozambique, Zaire
Pila occidentalis
Angola, Namibia, Zambia
- HYDROBIIDAE**
Bythinella carinulata
France

- Bythinella pupoides*
France, Switzerland
- Bythinella vesontiana*
France
- Bythiospeum eiseri*
Austria
- Fainiowskia neglectissimum*
Poland, Slovakia
- Fluviopupa gracilis*
Australia
- Fluviopupa ramsayi*
Australia
- Fonscochlea zeidlerii*
Australia
- Hemistoma gemma*
Australia
- Moitessieria lineolata*
France
- Moitessieria rayi*
France
- Paladilhia hungarica*
Hungary
- Potamopyrgus oscitans*
Australia
- Trochidrobia punicea*
Australia
- Victodrobia victoriensis*
Australia
- RANELLIDAE**
Cymatium parthenopaeum
Italy
- THIARIDAE**
Cleopatra grandidieri
Madagascar
- Melanatria fluminea*
Madagascar
- Melanatria madagascarensis*
Madagascar
- VIVIPARIDAE**
Viviparus acerosus
Austria, Bulgaria, Germany,
Hungary, Romania, Slovakia
- NEOGASTROPODA**
- BUCCINIDAE**
Ranella olearia
Italy
- Ranella parthenopaeum*
Italy
- MURICIDAE**
Latiaxis babelis
Malta
- STYLOMMATOPHORA**
- AGRIOLIMACIDAE**
Deroceras vascoana
France, Spain
- CAMAENIDAE**
Amphidromus cognatus
Australia
- Amplirhagada montalivetensis*
Australia
- Austrochloritis ascensa*
Australia
- Austrochloritis pusilla*
Australia
- Baccalena squamulosa*
Australia
- Baudinella baudinensis*
Australia
- Cooperconcha centralis*
Australia
- Craterodiscus pricei*
Australia
- Cristilabrum spectaculum*
Australia
- Cupedora broughami*
Australia
- Cupedora luteofusca*
Australia
- Cupedora marcidum*
Australia
- Cupedora sutilosa*
Australia
- Cupedora tomsetti*
Australia
- Glyptorhagada janaslina*
Australia
- Glyptorhagada wilkawillina*
umbilicata
Australia
- Granulomelon grandituberculatum*
Australia
- Jacksonena delicata*
Australia
- Jacksonena rudis*
Australia
- Lacustrelax minor*
Australia
- Lacustrelax yerelinana*
Australia
- Meliobba shafferyi*
Australia
- Meridolum marshalli*
Australia
- Mesodontrachia desmonda*
Australia
- Mesodontrachia fitzroyana*
Australia
- Ordtrachia australis*
Australia
- Ordtrachia septentrionalis*
Australia
- Papuexul bidwilli*
Australia
- Pleuroxia arcigerens*
Australia
- Pleuroxia italowiana*
Australia
- Posorites turneri*
Australia
- Semotrachia sublevata*
Australia
- Semotrachia winneckeana*
Australia
- Setobaudinia victoriana*
Australia
- Sphaerospira macleayi*
Australia
- Sphaerospira rockhamptonensis*
Australia
- Sphaerospira whartoni*
Australia
- Torresitrachia funium*
Australia
- CHAROPIIDAE**
Allocharopa okeana
Australia
- Allocharopa tarravillensis*
Australia
- Piliomena aemula*
Australia
- Roblinella agnewi*
Australia
- Setomedea nudicostata*
Australia
- CHONDRINIDAE**
Solatopupa psarolena
France, Italy
- CLAUSILIIDAE**
Alopius bielzii clathrata
Slovakia
- Charpentieria diodon*
Italy, Switzerland
- Macrogaster lineolata euzeriana*
France
- Muticaria macrostoma*
Malta
- COCHLICOPIDAE**
Cryptazeca vasconica
Spain
- DISCIDAE**
Discus scutula
Spain
- GEOMITRIDAE**
Actinella actinophora
Portugal
- Actinella carinofausta*
Portugal
- Actinella fausta*
Portugal
- Actinella giramica*
Portugal
- Actinella obserata*
Portugal
- Actinella robusta*
Portugal
- Spirorbula obtecta*
Portugal
- Spirorbula squalida*
Portugal
- HELICIDAE**
Aliognathus graellsianus
Spain
- Chilostoma cingulellum*
Poland, Slovakia
- Chilostoma rossmaessleri*
Poland, Slovakia
- Codringtonia acacriana*
Greece
- Codringtonia codringtonii*
Greece
- Cylindrus obtusus*
Austria
- Helix godetiana*
Greece
- Hemicycla berkeleyi*
Spain
- Hemicycla mascaensis*
Spain
- Iberus qualtieranus*
Spain
- Pseudocampylaea portosanctana*
Portugal
- HELICODISCIDAE**
Helicodiscus diadema
USA
- Helicodiscus hexodon*
USA
- HELMINTHOGLYPTIDAE**
Eremarionta morongoana
USA
- Helminthoglypta mohaveana*
USA
- Sonorella allynsmithi*
USA
- Sonorella christenseni*
USA
- Sonorella eremita*
USA
- Sonorella grahamensis*
USA
- Sonorella macrophallus*
USA
- Sonorella metcalfi*
USA
- Sonorella todseni*
USA
- HYGROMIIDAE**
Atenia quadrani
Spain
- Cryptosaccus asturiensis*
Spain
- Helicella gasulli*
Spain
- Helicella orzai*
Spain
- Helicella striatitala*
Spain
- Helicella zaratei*
Spain
- Helicella zujarensis*
Spain
- Helicopsis conopsis*
Morocco
- Montserratina bofiliana*
Montserrat, Spain
- Oestophora ortizi*
Spain
- Plentusia vendia*
Spain
- Pyrenaeana cotiellae*
Spain
- Pyrenaearia navasi*
Spain
- Pyrenaearia oberthueri*
Spain
- Pyrenaearia organiaca*
Spain
- Pyrenaearia parva*
Spain
- Pyrenaearia poncebensis*
Spain
- Pyrenaearia velascoi*
Spain
- Suboestophora altamirai*
Spain

- Suboestophora hispanica*
Spain
- Trochoidea betulonensis*
Spain
- Trochoidea claudinae*
Spain
- Trochoidea jimenezensis*
Spain
- Trochoidea montserratensis*
Spain
- Xerosecta adolfi*
Spain
- LIMACIDAE**
Malacolimax wiktoriae
Spain
- ORCULIDAE**
Orcula fuchsi
Austria
- PAPILLODERMIDAE**
Papilloderma altonagai
Spain
- POLYGYRIDAE**
Ashmunella pasonis
USA
- Mesodon clenchi*
USA
- Polygyra hippocrepis*
USA
- Polygyra peregrina*
USA
- PUPILLIDAE**
Gylottrachela catharina
Australia
- Pupilla ficulnea*
Australia
- Sterkia clementina*
USA
- RHYTIDIDAE**
Paryphanta busbyi
New Zealand
- Powelliphanta marchantii*
New Zealand
- Victaphanta atramentaria*
Australia
- STREPTAXIDAE**
Gonospira bourguignati
Reunion
- SUBULINIDAE**
Beckianum sinistrum
Costa Rica, Nicaragua
- Leptinaria strebeliana*
Nicaragua
- SUCCINEIDAE**
Catinella arenaria
Belgium, France, Germany, Ireland, Netherlands, Norway, Poland, Slovakia, Sweden, Switzerland, United Kingdom
- Succinea sanctaehelenae*
St Helena
- VALLONIIDAE**
Pupisoma sp. 1
Nicaragua
- Vallonia declivis*
Austria, France, Germany, Poland, Slovakia, Switzerland
- VERTIGINIDAE**
Vertigo alabamensis
USA
- Vertigo arthuri*
USA
- Vertigo hebardei*
USA
- Vertigo hubrichti*
USA
- Vertigo occulta*
USA
- Vertigo ovata*
USA
- VITRINIDAE**
Insulivitrina machadoi
Spain
- Insulivitrina mascaensis*
Spain
- Insulivitrina tuberculata*
Spain
- ZONITIDAE**
Oxychilus basajauna
Spain
- Paravitrea clappi*
USA
- Trochomorpha melvillensis*
Australia
- Zonites anaphiensis*
Greece
- DATA DEFICIENT**
- ARCHAEOGASTROPODA**
- HELICINIDAE**
Ogasawarana arata
Japan
- Ogasawarana capsula*
Japan
- Ogasawarana comes*
Japan
- Ogasawarana discrepans*
Japan
- Ogasawarana hirasei*
Japan
- Ogasawarana microtheca*
Japan
- Ogasawarana nitida*
Japan
- Ogasawarana ogasawarana*
Japan
- Ogasawarana optima*
Japan
- Pleuropoma zigzac ponapense*
Federated States of Micronesia
- Pleuropoma zigzac zigzac*
Federated States of Micronesia
- Sturanyella carolinarum*
Federated States of Micronesia
- Sturanyella epicharis*
Federated States of Micronesia
- HYDROCENIDAE**
Georissa biangulata
Guam
- Georissa elegans*
Guam
- Georissa laevigata*
Guam
- Georissa rufula*
Federated States of Micronesia
- NERITIDAE**
Neritilla hawaiiensis
USA
- Neritina cristata*
Cameroon, Cote d'Ivoire, Gabon, Sierra Leone
- Neritina manoeli*
Sao Tome & Principe
- Neritina natalensis*
Kenya, Mozambique, Somalia, South Africa, Tanzania
- Theodoxus maresi*
Algeria, Morocco
- Theodoxus numidicus*
Algeria, Morocco
- Theodoxus transversalis*
Austria, Bulgaria, Germany, Hungary, Moldova, Romania, Slovakia, Ukraine, Yugoslavia
- SKENEIDAE**
Teinsotoma fernandesi
Sao Tome & Principe
- Teinsotoma funiculatum*
Sao Tome & Principe
- BASOMMATOPHORA**
- GLACIDORBIDAE**
Glacidorbis pawpela
Australia
- Glacidorbis pedderi*
Australia
- LYMNAEIDAE**
Myxas glutinosa
Austria, Belarus, Belgium, Czech Republic, Estonia, Finland, Germany, Kazakhstan, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Russia, Sweden, Ukraine, United Kingdom
- PHYSIDAE**
Physella natricina
USA
- PLANORBIDAE**
Camptoceras hirasei
Japan
- Camptoceras rezvoji*
Japan
- MESOGASTROPODA**
- ACICULIDAE**
Acicula hausdorfi
Greece
- Platyla maaseni*
Yugoslavia
- Platyla microspira*
Italy, Romania
- Platyla orthostoma*
Bulgaria
- Platyla peloponnesica*
Greece
- AMPULLARIDAE**
Lanistes graueri
Zaire
- ASSIMINEIDAE**
Assimineea palauensis
Palau
- Conacmella vagans*
Japan
- Heteropoma fulva*
Guam
- Heteropoma glabratum*
Guam
- Heteropoma pyramis*
Guam
- Heteropoma quadrasi*
Guam
- Heteropoma tuberculatum*
Guam
- Heteropoma turratum*
Guam
- Kubaryia pilikia*
Palau
- Omphalotropis albocarinata*
Norfolk Island
- Omphalotropis carolinensis*
Federated States of Micronesia
- Omphalotropis cheynei*
Palau
- Omphalotropis cookei*
Guam, Northern Marianas
- Omphalotropis elegans*
Guam
- Omphalotropis elongatula*
Guam
- Omphalotropis erosa*
Guam
- Omphalotropis fragilis*
Federated States of Micronesia
- Omphalotropis gracilis*
Guam
- Omphalotropis guamensis*
Guam
- Omphalotropis howeinsulae*
Australia
- Omphalotropis laevigata*
Guam
- Omphalotropis laticosta*
Guam
- Omphalotropis latilabris*
Guam
- Omphalotropis mutica*
Palau
- Omphalotropis ochthogyra*
Guam
- Omphalotropis picta*
Guam
- Omphalotropis pilosa*
Guam
- Omphalotropis quadrasi*
Guam
- Omphalotropis semicostata*
Guam
- Omphalotropis striatipila*
Palau

- Omphalotropis submaritima*
Guam
- Omphalotropis suteri*
Norfolk Island
- Omphalotropis suturalis*
Guam
- Omphalotropis tumidula*
Federated States of Micronesia
- Paludinella semperi*
Marshall Islands, Palau
- Ponapella pihapiha*
Federated States of Micronesia
- QuadrasIELLA clathrata*
Guam
- QuadrasIELLA mucronata*
Guam
- Thaanumella angulosa*
Federated States of Micronesia
- Thaanumella cookei*
Federated States of Micronesia
- Wrayanna soluta*
Federated States of Micronesia
- BATILLARIDAE**
- Batillaria mutata*
Ecuador
- CYCLOPHORIDAE**
- Cyathopoma nishinoi*
Japan
- Japonia hispida*
Japan
- Japonia shigetai*
Japan
- Japonia striatula*
Japan
- Nobuea kurodai*
Japan
- DIPLOMMATINIDAE**
- Diplommatina alata*
Palau
- Diplommatina aurea*
Palau
- Diplommatina circumstomata*
Japan
- Diplommatina crassilabris*
Palau
- Diplommatina gibboni*
Palau
- Diplommatina inflatula*
Palau
- Diplommatina lamellata*
Palau
- Diplommatina lateralis*
Japan
- Diplommatina lutea*
Palau
- Diplommatina pyramis*
Palau
- Diplommatina ringens*
Palau
- Hungerfordia peleuwensis*
Palau
- Palaina albata*
Palau
- Palaina dimorpha*
Palau
- Palaina dohmi*
Palau
- Palaina doliolum*
Federated States of Micronesia
- Palaina kubaryi*
Federated States of Micronesia
- Palaina moussoni*
Palau
- Palaina ovatula*
Federated States of Micronesia
- Palaina patula*
Palau
- Palaina platycheilus*
Palau
- Palaina pupa*
Palau
- Palaina pusilla*
Palau
- Palaina rubella*
Palau
- Palaina scalarina*
Federated States of Micronesia
- Palaina strigata*
Palau
- Palaina striolata*
Palau
- Palaina taeniolata*
Guam
- Palaina wilsoni*
Palau
- Palaina xiphidium*
Federated States of Micronesia
- Pseudopalaina polymorpha*
Palau
- HYDROBIIDAE**
- Avenionia brevis*
Belgium, France, Germany,
Netherlands
- Belgrandiella komenskyi*
Czech Republic
- Bythiospeum alpinum*
Switzerland
- Cochliopina compacta*
Mexico
- Fluminicola avernalis*
USA
- Fluminicola columbiana*
USA
- Fluminicola merriami*
USA
- Fontigens holsingeri*
USA
- Hauftenia minuta*
France, Switzerland
- Iglica gratulabunda*
Austria
- Neohoratia minuta*
Switzerland
- Paludinella conica*
Guam, Northern Marianas
- Paludinella minima*
Japan
- Paludinella vitrea*
Palau
- Phrantela richardsoni*
Australia
- Pseudamnicola melitensis*
Malta
- Pyrgulopsis agarhecta*
USA
- Pyrgulopsis bacchus*
USA
- Pyrgulopsis bernardina*
USA
- Pyrgulopsis bruneauensis*
USA
- Pyrgulopsis castor*
USA
- Pyrgulopsis chupaderae*
USA
- Pyrgulopsis conica*
USA
- Pyrgulopsis crystalis*
USA
- Pyrgulopsis davisii*
USA
- Pyrgulopsis erythropoma*
USA
- Pyrgulopsis fairbanksensis*
USA
- Pyrgulopsis gilae*
USA
- Pyrgulopsis glandulosa*
USA
- Pyrgulopsis idahoensis*
USA
- Pyrgulopsis isolata*
USA
- Pyrgulopsis metcalfi*
USA
- Pyrgulopsis micrococcus*
USA
- Pyrgulopsis montezumensis*
USA
- Pyrgulopsis morrisoni*
USA
- Pyrgulopsis nanus*
USA
- Pyrgulopsis olivacea*
USA
- Pyrgulopsis ozarkensis*
USA
- Pyrgulopsis pachyta*
USA
- Pyrgulopsis pecosensis*
USA
- Pyrgulopsis pisteri*
USA
- Pyrgulopsis robusta*
USA
- Pyrgulopsis roswellensis*
USA
- Pyrgulopsis simplex*
USA
- Pyrgulopsis sola*
USA
- Pyrgulopsis thermalis*
USA
- Pyrgulopsis thompsoni*
USA
- Pyrgulopsis trivialis*
USA
- Somatogyrus amnicoloides*
USA
- Somatogyrus aureus*
USA
- Somatogyrus biangulatus*
USA
- Somatogyrus constrictus*
USA
- Somatogyrus coosaensis*
USA
- Somatogyrus crassilabris*
USA
- Somatogyrus crassus*
USA
- Somatogyrus currierianus*
USA
- Somatogyrus decipiens*
USA
- Somatogyrus excavatus*
USA
- Somatogyrus hendersoni*
USA
- Somatogyrus hinkleyi*
USA
- Somatogyrus humerosus*
USA
- Somatogyrus nanus*
USA
- Somatogyrus obtusus*
USA
- Somatogyrus parvulus*
USA
- Somatogyrus pilsbryanus*
USA
- Somatogyrus pygmaeus*
USA
- Somatogyrus quadratus*
USA
- Somatogyrus sargenti*
USA
- Somatogyrus strengi*
USA
- Somatogyrus tenax*
USA
- Somatogyrus tennesseensis*
USA
- Somatogyrus wheeleri*
USA
- Tryonia adamantina*
USA
- Tryonia alamosae*
USA
- Tryonia angulata*
USA
- Tryonia brunei*
USA
- Tryonia cheatumi*
USA
- Tryonia clathrata*
USA
- Tryonia elata*
USA
- Tryonia enicae*
USA
- Tryonia gilae*
USA
- Tryonia imitator*
USA
- Tryonia kosteri*
USA
- Tryonia quitobaquitae*
USA
- Tryonia variegata*
USA
- LIAREIDAE**
- Cytora hirsutissima*
New Zealand

- MELANOPOSIDAE
Fagotia esperi
Austria, Belarus, Hungary,
Moldova, Slovakia, Ukraine
- PLEUROCERIDAE
Elimia cahawbensis
USA
Elimia gerhardtii
USA
Elimia variata
USA
- POMATIASIDAE
Chondropoma callipeplum
Nicaragua
Tropidophora carinata
Mauritius, Reunion
Tropidophora michaudi
Mauritius
- POTERIIDAE
Kondoraphe kiyokoae
Federated States of Micronesia
Ostodes brazieri
Federated States of Micronesia
Paramiella incisa
Federated States of Micronesia
Paramiella kondoi
Federated States of Micronesia
- PUPINIDAE
Pupina brenchleyi
Federated States of Micronesia
Pupina complanata
Federated States of Micronesia,
Marshall Islands
Pupina difficilis
Palau
- STROMBIDAE
Lambis violacea
Mauritius
- TRUNCATELLIDAE
Taheitia alata
Guam
Taheitia lamellicosta
Guam
Taheitia mariannarum
Guam
Taheitia parvula
Guam
Truncatella guerini
Japan
- VALVATIDAE
Valvata utahensis
USA
- VIVIPARIDAE
Tulotoma magnifica
USA
- NEOGASTROPODA
BUCCINIDAE
Paradoxa confirmata
Sao Tome & Principe
Paradoxa thomensis
Sao Tome & Principe
- CONIDAE
Conus kohni
Ecuador
- MARGINELLIDAE
Cysticus gutta
Sao Tome & Principe
Cysticus josephinae
Sao Tome & Principe
Gibberula cucullata
Sao Tome & Principe
Gibberula modica
Sao Tome & Principe
Gibberula puntillum
Sao Tome & Principe
Granulina parilis
Sao Tome & Principe
Marginella chalmersi
Sao Tome & Principe
Marginella gemma
Sao Tome & Principe
Marginella liparozona
Sao Tome & Principe
Marginella melvilli
Sao Tome & Principe
Volvarina insulana
Sao Tome & Principe
- MURICIDAE
Muricopsis mariangelae
Sao Tome & Principe
Muricopsis matildae
Sao Tome & Principe
Muricopsis principensis
Sao Tome & Principe
Neorapana grandis
Ecuador
- TURRIDAE
Agathothoma finalis
Sao Tome & Principe
Crassispira sacerdotalis
Sao Tome & Principe
Scaevatula amancicoi
Sao Tome & Principe
Scaevatula pellisserpentis
Sao Tome & Principe
- STYLOMMATOPHORA
ACHATINELLIDAE
Auriculella ambusta
USA
Auriculella castanea
USA
Auriculella crassula
USA
Auriculella malleata
USA
Auriculella perpusilla
USA
Auriculella pulchra
USA
Auriculella tenella
USA
Elasmias jaurffreti
Mauritius
Elasmias quadrasi
Guam, Northern Marianas
Lamelliidea microstoma
Guam, Northern Marianas
- Lamelliidea subcylindrica*
Guam, Northern Marianas
Partulina dolei
USA
Partulina dwightii
USA
Partulina fusoidea
USA
Partulina kaaeana
USA
Partulina nattii
USA
Partulina porcellana
USA
Partulina taipina
USA
Partulina terebra
USA
Partulina ustulata
USA
Partulina virgulata
USA
Perdicella carinella
USA
Perdicella kuhnsi
USA
Perdicella ornata
USA
Tomatellinops ponapensis
Federated States of Micronesia
- ACHATINIDAE
Achatina vignoniana
Gabon
Archachatina knorri
Liberia
- ALYCAEIDAE
Awalycaeus akiratadai
Japan
Chamalycaeus expanstoma
Japan
Chamalycaeus itonis
nakashimai
Japan
Chamalycaeus miyazakii
Japan
Chamalycaeus takahashii
Japan
Chamalycaeus yanoshigehumii
Japan
Cipangochalax placeonovitas
Japan
Cipangocharax okamurai
Japan
- ARIONIDAE
Arion obesoductus
Austria
Arion simrothi
Germany
Arion vejderskyi
Czech Republic
Binneya notabilis
USA
- BRADYBAENIDAE
Aegista inexpectata
Japan
Aegista intonsa
Japan
- Euhadra murayamai*
Japan
Euhadra nachicola
Japan
Euhadra sadoensis
Japan
Euhadra scaevola mikawa
Japan
Paraegista apoiensis
Japan
- CAMAENIDAE
Amplirhagada herbertena
Australia
Cristigibba wesselensis
Australia
Eximiorhagada asperrima
Australia
Mandarina anijimana
Japan
Mandarina aureola
Japan
Mandarina chichijimana
Japan
Mandarina exoptata
Japan
Mandanna hahajimana
Japan
Mandanna hirasei
Japan
Mandanna luhuana
Japan
Mandanna mandarina
Japan
Mandanna polita
Japan
Mandanna ponderosa
Japan
Mandanna suenoae
Japan
Noctepuna muensis
Australia
Papustyla pulcherrima
Papua New Guinea
- CHAROPIDAE
Bischoffena bischoffensis
Australia
Coenocharopa yessabahensis
Australia
Cralopa kaputarensis
Australia
Dipnelix pertriosa
Australia
Discocharopa mimosa
Australia
Himeroconcha fusca
Guam
Himeroconcha lamlanensis
Guam
Himeroconcha quadrasi
Guam
Himeroconcha rotula
Guam
Jokajdon callizonus
Federated States of Micronesia
Jokajdon tumidulus
Federated States of Micronesia
Kubaryellus kubaryi
Federated States of Micronesia

<i>Ladronellum mariannarum</i> Guam	<i>Discus macclintocki</i> USA	<i>Tengchiena euroxestus</i> Australia	<i>Helminthoglypta stiversiana</i> <i>miwoka</i> USA
<i>Letomola barrenensis</i> Australia	ENDODONTIDAE	FERUSSACIIDAE	<i>Helminthoglypta stiversiana</i> <i>williamsi</i> USA
<i>Letomola contortus</i> Australia	<i>Aaadonta angaurana</i> Palau	<i>Cecilioides nyctelia</i> Portugal	<i>Micrarionta gabbi</i> USA
<i>Ngairaea murphyi</i> Australia	<i>Aaadonta constricta</i> Palau	GEOMITRIDAE	<i>Monadenia fidelis minor</i> USA
<i>Oreokera cumulus</i> Australia	<i>Aaadonta fuscozonata</i> Palau	<i>Actinella laciniosa</i> Portugal	<i>Monadenia fidelis pronotis</i> USA
<i>Oreokera nimbus</i> Australia	<i>Aaadonta irregularis</i> Palau	<i>Lemniscia galeata</i> Portugal	<i>Monadenia mormonum buttoni</i> USA
<i>Oreomava canfluviatilus</i> Australia	<i>Aaadonta kintochi</i> Palau	HELICARIONIDAE	<i>Monadenia mormonum hirsuta</i> USA
<i>Palikirus cosmetus</i> Federated States of Micronesia	<i>Aaadonta pelewana</i> Palau	<i>Atrichotoxon usambarene</i> Tanzania	<i>Monadenia troglodytes</i> USA
<i>Palikirus ponapicus</i> Federated States of Micronesia	<i>Hirasea biconcava</i> Japan	<i>Elisolimax rufescens</i> Tanzania	<i>Monadenia yosemitensis</i> <i>yosemitensis</i> USA
<i>Palline micramyla</i> Federated States of Micronesia	<i>Hirasea eutheca</i> Japan	<i>Harmogenanina detecta</i> Reunion	
<i>Palline notera</i> Palau	<i>Hirasea goniobasis</i> Japan	<i>Leptichnus bernardi</i> Tanzania	HYGROMIIDAE
<i>Planilaoma luckmanii</i> Australia	<i>Hirasea hypolia</i> Japan	<i>Sitala mazumbaiensis</i> Tanzania	<i>Halolimnohelix conradti</i> Tanzania
<i>Radiodiscus coppingers</i> Argentina, Brazil, Chile	<i>Hirasea major</i> Japan	<i>Thapsia grandis</i> Tanzania	<i>Petasina subtecta</i> Austria
<i>Radiodiscus iheringi</i> Argentina, Brazil, Uruguay	<i>Hirasea mirabilis</i> Japan	<i>Thapsia microsculpta</i> Tanzania	<i>Trichia biconica</i> Switzerland
<i>Rhophodon kempseyensis</i> Australia	<i>Hirasea nesiotica</i> Japan	<i>Thapsia usambarensis</i> Tanzania	<i>Trichia caelata</i> Switzerland
<i>Rhophodon problematica</i> Australia	<i>Hirasea profundispira</i> Japan	<i>Trichotoxon martensi</i> Tanzania	<i>Trichia grammicola</i> Germany
<i>Roimontis tolotomensis</i> Federated States of Micronesia	<i>Hirasea sinuosa</i> Japan	<i>Trochozonites usambarensis</i> Tanzania	<i>Tnchia oreinos</i> Austria
<i>Russatus nigrescens</i> Federated States of Micronesia	<i>Hirasiella clara</i> Japan	HELICIDAE	LIMACIDAE
<i>Semperdon kororensis</i> Palau	ENIDAE	<i>Chilostoma zieglerei</i> Austria	<i>Deroceras fatrense</i> Slovakia
<i>Semperdon rotanus</i> Guam, Northern Marianas	<i>Luchuena hachijoensis</i> Japan	<i>Codringtonia codringtonia</i> Greece	MILACIDAE
<i>Semperdon uncatus</i> Palau	EUCONULIDAE	<i>Tacheocampylaea raspaili</i> France	<i>Tandonia nigra</i> Switzerland
<i>Semperdon xyleborus</i> Palau	<i>Dendrotrochus ponapensis</i> Federated States of Micronesia	<i>Tacheocampylaea tacheoides</i> Italy	OLEACINIDAE
<i>Sinployea kusaieana</i> Federated States of Micronesia	<i>Kusaiea frivola</i> Federated States of Micronesia	HELMINTHOGLYPTIDAE	<i>Streptostyla turgidula</i> Costa Rica, Guatemala, Nicaragua
<i>Trochogyra leptotera</i> Argentina, Brazil, Chile, Paraguay, Uruguay	<i>Lamprocystis denticulata</i> Guam, Northern Marianas	<i>Eremarionta indioensis</i> <i>cathedralis</i> USA	<i>Streptostyla wani</i> Nicaragua
<i>Trukcharopa trukana</i> Federated States of Micronesia	<i>Lamprocystis fastigata</i> Guam, Northern Marianas	<i>Eremarionta rowelli bakerensis</i> USA	
CLAUSILIIDAE	<i>Lamprocystis hornbosteli</i> Northern Marianas	<i>Eremarionta rowelli mccoiana</i> USA	ORCULIDAE
<i>Neophaedusa spelaeonis</i> Japan	<i>Lamprocystis misella</i> Guam	<i>Helminthoglypta arrosa</i> <i>pomoensis</i> USA	<i>Orcula austriaca</i> Austria
COCHLICOPIDAE	<i>Liardetia tenuisculpta</i> Federated States of Micronesia	<i>Helminthoglypta expansilabris</i> <i>mattolensis</i> USA	<i>Orcula pseudodolium</i> Austria
<i>Hypnophila remyi</i> France	<i>Palaua babelthuapi</i> Palau	<i>Helminthoglypta nickliniana</i> <i>awania</i> USA	OREOHELICIDAE
COELIAXIDAE	<i>Palaua margaritacea</i> Palau	<i>Helminthoglypta nickliniana</i> <i>bridgesi</i> USA	<i>Oreohelix idahoensis idahoensis</i> USA
<i>Pyrgina umbilicata</i> Sao Tome & Principe	<i>Palaua minor</i> Palau	<i>Helminthoglypta nickliniana</i> <i>contracosta</i> USA	<i>Oreohelix strigosa goniogyra</i> USA
<i>Thomea newtoni</i> Sao Tome & Principe	<i>Palaua ngarduaisi</i> Palau	<i>Helminthoglypta nickliniana</i> <i>consors</i> USA	ORTHALICIDAE
DISCIDAE	<i>Palaua straminea</i> Palau	<i>Helminthoglypta sequoicola</i> <i>consors</i> USA	<i>Bulimulus adelphus</i> Ecuador
<i>Anguispira picta</i> USA	<i>Palaua wilsoni</i> Palau		<i>Orthalicus reses</i> USA
<i>Discus engonata</i> Spain	<i>Ryssota pachystoma</i> Federated States of Micronesia		

PARTULIDAE	<i>Nesopupa baldwini</i>	<i>Paryphanta lignaria</i>	<i>Tayloria hyalinoides</i>
<i>Samoana abbreviata</i>	USA	New Zealand	Tanzania
American Samoa	<i>Nesopupa bishopi</i>	<i>Paryphanta rossiana</i>	STROBILOPSIDAE
POLYGYRIDAE	USA	New Zealand	<i>Strobilops</i> sp. 1
<i>Mesodon archeri</i>	<i>Nesopupa dispersa</i>	<i>Paryphanta traversi</i>	Nicaragua
USA	USA	New Zealand	
<i>Mesodon clarki nantahala</i>	<i>Nesopupa dubitabilis</i>	SAGDIDAE	SUBULINIDAE
USA	USA	<i>Xenodiscula taintori</i>	<i>Hypolysia connollyana</i>
<i>Mesodon clausus trossulus</i>	Palau	Guatemala, Nicaragua	Tanzania
USA	<i>Nesopupa forbesi</i>		<i>Hypolysia usambarica</i>
<i>Mesodon jonesianus</i>	USA	STREPTAXIDAE	Tanzania
USA	<i>Nesopupa infrequens</i>	<i>Edentulina usambarensis</i>	<i>Opeas nothapalinus crenatum</i>
<i>Mesodon magazinensis</i>	USA	Tanzania	Tanzania
USA	<i>Nesopupa kauaiensis</i>	<i>Gonaxis usambarensis</i>	<i>Pseudoglessula acutissima</i>
<i>Polygyriscus virginianus</i>	USA	Tanzania	Tanzania
USA	<i>Nesopupa limatula</i>	<i>Gonaxis vosseleri</i>	<i>Pseudoglessula conradti</i>
<i>Stenotrema hubrichti</i>	USA	Tanzania	Tanzania
USA	<i>Nesopupa litoralis</i>	<i>Gulella alleni</i>	<i>Pseudoglessula leroyi fasciata</i>
<i>Stenotrema feai cheatumi</i>	USA	Tanzania	Tanzania
USA	<i>Nesopupa newcombi</i>	<i>Gulella amaniensis</i>	<i>Subulina usambarica</i>
<i>Stenotrema pilsbryi</i>	USA	Tanzania	Tanzania
USA	<i>Nesopupa oahuensis</i>	<i>Gulella bomolensis</i>	
<i>Triodopsis occidentalis</i>	USA	Tanzania	SUCCINEIDAE
USA	<i>Nesopupa plicifera</i>	<i>Gulella conradti reductidentata</i>	<i>Succinea chittenangoensis</i>
<i>Triodopsis platysayoides</i>	USA	Tanzania	USA
USA	<i>Nesopupa quadrasi</i>	<i>Gulella cuspidata</i>	<i>Succinea guamensis</i>
<i>Vespericola karokorum</i>	Guam	Tanzania	Guam
USA	<i>Nesopupa rodriguezensis</i>	<i>Gulella foliifera</i>	<i>Succinea philippinica</i>
	Mauritius	Tanzania	Palau
PUNCTIDAE	<i>Nesopupa singularis</i>	<i>Gulella gouldi globulosa</i>	THYROPHORELLIDAE
<i>Pasmaditta jungermanniae</i>	USA	Tanzania	<i>Thyrophorella thomensis</i>
Australia	<i>Nesopupa subcentralis</i>	<i>Gulella greenwayi</i>	Sao Tome & Principe
	USA	Tanzania	
PUPILLIDAE	<i>Nesopupa thaanumi</i>	<i>Gulella grossa</i>	VALLONIIDAE
<i>Leiostyla fuscidula</i>	USA	Tanzania	<i>Acanthinula spinifera</i>
Portugal	<i>Nesopupa waiianensis</i>	<i>Gulella gwendolinae mkusiensis</i>	Spain
<i>Lyropupa anceyana</i>	USA	Tanzania	<i>Vallonia allamanica</i>
USA	<i>Nesopupa wesleyana</i>	<i>Gulella inconspicua</i>	Germany
<i>Lyropupa clathratula</i>	USA	Tanzania	<i>Vallonia enniensis</i>
USA	<i>Pronesopupa acanthinula</i>	<i>Gulella intrusa</i>	Austria, Belgium, Czech
<i>Lyropupa hawaiiensis</i>	USA	Tanzania	Republic, France, Germany,
USA	<i>Pronesopupa boettgeri</i>	<i>Gulella lornae lornae</i>	Greece, Hungary, Italy, Poland,
<i>Lyropupa lyrata</i>	USA	Tanzania	Romania, Russia, Slovakia,
USA	<i>Pronesopupa frondicella</i>	<i>Gulella lornae major</i>	Spain, Switzerland, Ukraine
<i>Lyropupa microthauma</i>	USA	Tanzania	<i>Vallonia suevica</i>
USA	<i>Pronesopupa hystericella</i>	<i>Gulella ludwigi</i>	Germany
<i>Lyropupa mirabilis</i>	USA	Tanzania	
USA	<i>Pronesopupa incerta</i>	<i>Gulella ndamanyiluensis</i>	VERTIGINIDAE
<i>Lyropupa prisca</i>	USA	Tanzania	<i>Nesopupa ponapica</i>
USA	<i>Pronesopupa lymaniana</i>	<i>Gulella paucidens</i>	Federated States of Micronesia
<i>Lyropupa rhabdota</i>	USA	Tanzania	<i>Truncatellina atomus</i>
USA	<i>Pronesopupa molokaiensis</i>	<i>Gulella subhyalina addita</i>	Spain
<i>Lyropupa scabra</i>	USA	Tanzania	<i>Vertigo paradoxa</i>
USA	<i>Pronesopupa orycta</i>	<i>Gulella translucida</i>	Canada, USA
<i>Lyropupa spaldingi</i>	USA	Tanzania	
USA	<i>Pronesopupa sericata</i>	<i>Gulella unidentata</i>	ZONITIDAE
<i>Lyropupa sparna</i>	USA	Tanzania	<i>Brazieria entomostoma</i>
USA	<i>Pupoidopsis hawaiiensis</i>	<i>Gulella usagarica msambaa</i>	Federated States of Micronesia
<i>Lyropupa striatula</i>	USA	Tanzania	<i>Brazieria erasa</i>
USA		<i>Gulella usagarica satura</i>	Federated States of Micronesia
<i>Lyropupa thaanumi</i>	RHYTIDIDAE	Tanzania	<i>Brazieria lutaria</i>
USA	<i>Delos oualanensis</i>	<i>Gulella usambarica</i>	Federated States of Micronesia
<i>Lyropupa truncata</i>	Federated States of Micronesia	Tanzania	<i>Brazieria minuscula</i>
USA	<i>Ougapia spaldingi</i>	<i>Ptychotrema usambarensis</i>	Federated States of Micronesia
<i>Nesopupa alloia</i>	Australia	Tanzania	<i>Brazieria obesa</i>
USA	<i>Paryphanta gilliesi</i>	<i>Tayloria amaniensis</i>	Federated States of Micronesia
<i>Nesopupa anceyana</i>	New Zealand	Tanzania	<i>Brazieria velata</i>
USA	<i>Paryphanta hochstetteri</i>	<i>Tayloria angustistriata</i>	Federated States of Micronesia
<i>Nesopupa bacca</i>	New Zealand	Tanzania	
USA			

<i>Glyphyalinia pecki</i>	<i>Trochomorpha approximata</i>	<i>Trochomorpha kuesteri</i>	<i>Videna pagodula</i>
USA	Federated States of Micronesia	Federated States of Micronesia	Palau
<i>Hongolua kondorum</i>	<i>Trochomorpha carolinae</i>	<i>Trochomorpha nigritella</i>	<i>Videna pumiia</i>
Federated States of Micronesia	Federated States of Micronesia	Federated States of Micronesia	Palau
<i>Kondoa kondorum</i>	<i>Trochomorpha conoides</i>	<i>Videna electra</i>	<i>Vitrea inae</i>
Federated States of Micronesia	Federated States of Micronesia	Palau	Spain
<i>Retinella stabilei</i>	<i>Trochomorpha contigua</i>	<i>Videna oleacina</i>	<i>Vitrea striata</i>
Italy	Federated States of Micronesia	Palau	Spain