



Newsletter of the Freshwater Mollusk Conservation Society
Volume 15 – Number 3 **September 2013**

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Once More on a Big Stage !

FMCS will have an obvious presence during the November 2013 Society for Environmental Toxicology and Chemistry (SETAC) meeting in Nashville, Tennessee. Our society will sponsor two short courses, a poster session, and a special session during this meeting – all focused on the ecotoxicology of freshwater mussels and snails.

On Sunday, November 17, FMCS members will present two related short courses on freshwater mollusk ecotoxicology:

- **Part I:** Introduction of Freshwater Mollusks and Overview of Their Role and Laboratory Toxicity Testing Methods. **PT08** (Sunday morning), and

- **Part II:** Use of Laboratory and Field Toxicity Data to Develop Conservation Strategies for Freshwater Mollusks. **PT12** (Sunday afternoon).

Part I will provide an overview of life stages, reproduction, feeding, and the ecological role of freshwater mussels and snails; methods for culturing and propagating them; the conservation significance of freshwater mollusks relevant to numbers and distribution of protected taxa, consideration for conservation actions, and sensitivity to pollutants; and methods for conducting laboratory toxicity tests with freshwater mussels and snails. (Instructors: Chris Barnhart, Ning Wang, Robert Bringolf, and John Besser)

Part II will provide overviews of the use of freshwater mussel and snail toxicity data, derivation of benchmarks, and risk assessment; use of freshwater mussel data in conservation planning; and assessing effects on freshwater mollusk populations including monitoring and mortality incident investigation, in situ testing, contaminant accumulation studies, and biomarker studies. (Instructors: Chris Ingersoll, Tom Augspurger, Greg Cope, Robert Bringolf, Chris Barnhart, Jo Hinck, Janet Clayton, and Patty Morrison)

People can choose to register for and attend one or both of these half-day courses even if they are not registering for the actual SETAC meeting.

On Monday, November 18, FMCS members Ning Wang (U.S. Geological Survey) and W. Gregory Cope (North Carolina State University) will serve as co-chairs for an Aquatic Toxicology and Ecology Special Platform and Poster Session entitled: **Use of Freshwater Mollusk Toxicity Data for Improved Conservation of Water and Sediment Quality**. These special sessions will highlight some of the environmental and conservation challenges associated with freshwater mussels and snails. About 20 poster presentations (available for viewing all day) are expected to be included. The eight platform presentations (to be given during the afternoon oral session) will review:

- Methods for conducting toxicity tests with freshwater mollusks;
- Relative species sensitivity of freshwater mollusks to select toxicants via water, sediment, or diet in laboratory or field studies;
- Pollutant case studies with freshwater mollusks;
- Use of biomarkers to establish causes of toxicant effects on freshwater mollusks; and
- Use of mollusk water and sediment toxicity data to develop improved conservation strategies for freshwater mollusks.

Details about these poster and platform presentations will be included in the online meeting program at <http://nashville.setac.org> (available in September 2013).

To register for the Nashville SETAC meeting and/or the short courses, go to <http://nashville.setac.org/node/22>. Early registration (with discounted pricing) ends September 10.

Society News

2013 Summer FMCS Board Meeting Thursday, July 11th, 2013, via Conference Call

Call to Order and Roll Call

Attendees:

Patty Morrison (President)	Susan Oetker
Heidi Dunn (Treasurer)	John Jenkinson
Caryn Vaughn (Past President)	Dave Berg
Teresa Newton (President Elect)	Cathrine Gatenby
Greg Cope	Leroy Koch
Braven Beaty	Greg Zimmerman (Secretary) – present for only first 5 minutes
Chris Owen	Ryan Schwegman (taking notes for Greg Zimmerman)
Art Bogan	
Steven McMurray	

President Morrison described the new format we are trying for Board meetings. She suggested holding two teleconference calls (telecons) annually -- with only ½ of the committees (6) reporting in detail at each -- and one in-person meeting annually, at the Symposium or Workshop. Chairs of the committees not specifically on the agenda are asked to participate for decision making purposes, but are not required to give updates unless some action is needed by the Board. This will, hopefully, cut down on the time needed for the telecons. At the annual, in-person, meetings, all committee reports are due, but (to save time) if no Board action is being sought, the committee updates can be submitted in advance as written reports.

Approval of March 10, 2013, Board Meeting Minutes (see June 2013 *Ellipsaria*)
Minutes approved.

Treasurer's Report – Heidi Dunn

As of June 30, 2013

Income of	\$99,675.04
2013 Auction	7,160.00
Interest	69.04
Memberships	15,440.00
Tshirts, hats, books etc	585.00
2013 symposium	76,061.00
2012 workshop	360.00
 Total expenses were	 \$84,383.31
Regional meetings	200.00
Symposium awards	3383.89
Credit card/pay pal fees	3094.66
2013 Symposium expenses	74,904.76
2014 Workshop expenses	2800.00
 Net income through June 30, 2013	 \$15,291.73
Balance in the bank June 30, 2013	\$126,836.92

Secretary’s Report – Greg Zimmerman

We have 710 contacts in the database, 566 of which are active members (an increase from last report). Inactive member numbers are not surprising as students graduate and do not renew memberships as they move on to other fields (see table below, updated August 20, 2013).

Level	Total	Active	Renewal overdue	Lapsed	Pending	
					New	Renewal
Author-Non Member	<u>19</u>	<u>19</u>	-	-	-	-
Contributing	<u>7</u>	<u>7</u>	<u>1</u>	-	-	-
Lifetime	<u>10</u>	<u>10</u>	-	-	-	-
Paper Registr Members	-	-	-	-	-	-
Regular	<u>521</u>	<u>408</u>	<u>251</u>	<u>110</u>	<u>1</u>	<u>2</u>
Student	<u>153</u>	<u>122</u>	<u>69</u>	<u>28</u>	<u>2</u>	<u>1</u>
Total	<u>710</u>	<u>566</u>	<u>321</u>	<u>138</u>	<u>3</u>	<u>3</u>

April 2014 Workshop Update, Portland, Maine – Teresa Newton/ Mary McCann

Theme linking dam removals, mussels, and regulatory considerations. Currently lining up speakers that will present. Conference call to discuss workshop scheduled for 7/12/13. Plan on opening registration in Dec/ Jan. Greg Zimmerman to provide FMCS contact list. [More information about this Workshop is on page 6]

2015 Symposium Update, St. Louis – Heidi Dunn/ Steve McMurray

Theme relating big rivers and landscape ecology. Event to be scheduled Sunday through Friday. Looking into locations that would cut travel expenses, possibly St. Charles. Working on writing up an agreement with the Upper Mississippi River Conservation committee for the joint meeting terms.

SETAC Meeting – Greg Cope.

The 2013 meeting of the Society of Environmental Toxicology and Chemistry (SETAC) North America will be held 17-21 November in Nashville, TN. FMCS is sponsoring a special session, poster session and two short courses. [See Cover Story (page 1) for more details and link]

Mussel Symposium at AFS Workshop – Jeremy Tiemann and Steve McMurray

A mussel mini-symposium will be held on September 11th at the American Fisheries Society (AFS) meeting in Little Rock, Arkansas.

Information Exchange

Walkerana – Greg Cope (for Tom Watters)

Scanning of back issues has been completed, and all back issues of *Walkerana* are now available online. [See Announcement on page 8 for more details.] The next issue of *Walkerana* is due out in September 2013.

Ellipsaria – John Jenkinson

Three suggestions for possible improvements to our newsletter came out of the March 2013 Member Survey. [Details about these suggestions are presented in the article on page 8]

Environmental Quality and Affairs – Braven Beaty

Comments on a U.S. Fish and Wildlife Service proposed listings of mussels have been sent. Looking into ways to use the FMCS contact list to target members that reside in the Upper Ohio River for comments on an ORSANCO proposal to delay implementation of mixing zone eliminations for discharges of sewage and industrial waste.

Genetics – Dave Berg

Planning has begun for a 2016 Genetics Workshop for March 7-9, 2014, to be held at NCTC in Shepherdstown, West Virginia, with sessions held in the labs. Planning for an attendance of approximately 100-125. [See article on page 7]

Mussel Status and Distribution – Arthur Bogan

Work on the **Freshwater Mussel Atlas** is in progress. Art gave background on the project to date, and discussed plans to host the data at his museum until FMCS can take it over. Committee is requesting \$15,000 to establish base maps, input and manage locality data over a 2-year period. The consensus was to have Art re-submit the proposal with more detail on dates, deliverables, potential users, format, and needs. We should all encourage members to volunteer as species contributors for the Atlas project. [See Second Call for contributors on page 9 and Parting Shot on page 37]

Development of a Mussel ID App – Susan Oetker. The Board approved a request for an additional \$5,000 in FMCS funding to finish the development of this app, target date is Spring 2014. This makes a total of \$10,000 of FMCS support for the project. The App would ultimately have a purchasing fee that would fund the cost of updates and maintenance.

Propagation, Restoration, and Introduction – Christopher Owen

- Rachel Mair has stepped down as a co-chair; the new co-chair is Dan Hua.
- Working on completing a spreadsheet that outlines propagation facilities and what species they are working on.
- Proposing to hold a workshop that would include topics such as: propagation methods, conservation/implications and restoration. Board voted to hold this propagation workshop at the 2015 Symposium.
- Continuing to develop a propagation reporting database and “best practices” guidelines/white papers.

Old Business**Ad hoc Committee on Revising the National Strategy** – Catherine Gatenby.

Need people to help with writing specific sections, especially the gastropods, and finalizing the strategies under each issue and goal. The target will be to publish by the end of this year. Perhaps in *BioScience*.

Committee on Scientific and Common Names – Art Bogan.

This committee has submitted a written description of a proposal, with recommendations for the structure of this long-term function [See full report on page 7]. The committee plans to use Williams, et al. update (soon to be published) as a base list for mussels, and Johnson, et al. (2013) [Abstract on page 10] as a base list for gastropods. The committee will meet annually to review and update the lists of names, and they will be published on the FMCS website.

FMCS-AFS partnership – Jeremy Tiemann will be sending his coordination report to the American Fisheries Society by early August.

FMCS Procedures Manual update – Steve McMurray and Greg Cope
Officers and committee chairs are contributing to a Procedures Manual to help guide future work of the Society.

New Business

Committee and Co-Chairs need to be updated on both the web site and journals.

Future Funding of Projects by FMCS – the Board discussed the idea of setting aside a target amount of funding as a safety net for Society needs and, then, letting committees know that some discretionary money will be available to support projects. The Ex Comm will discuss and make recommendations about this by the Spring 2014 Board meeting.

Next telecom meeting will be in November 2013. Patty will send out a Doodle Poll to schedule it. At that meeting, the other committees will give their reports and discuss any action items needed.

Motion to adjourn. Motion carried.

**2014 FMCS Workshop
“Mussel Studies and Regulatory Process Associated with Dam Removals”**

The next FMCS Workshop will be held in next spring (April 21-22, 2014) in beautiful coastal Maine

In recent years there has been increasing interest and success in the removal of a number of large and small dams. Dams are often associated with negatively affecting mussel populations, so the expectation is that dam removal will improve aquatic habitat and freshwater mollusk communities in the affected reaches. In some cases where reservoirs are small or riverine, freshwater mussels may be abundant and the removal and restoration of the stream also may affect existing resident mussel communities. When considering dam removal, it is important to have a good understanding of the state and federal regulatory process involved. Some states have developed a regulatory permitting process specific to dam removals, or have guidelines on both pre- and post-dam removal environmental studies, including mussel studies.

The intent of this workshop is to provide a “lessons learned” from past studies and removal efforts and to help guide efforts for future dam removals, especially in regard to the protection and restoration of mussel populations. For example, mussel studies associated with two mainstem Penobscot River dam removal projects will be presented and a site visit to the removal locations will be offered.

Contact Mary McCann (207-239-3873 mary.mccann@hdrinc.com) or Alan Christian (617-287-6639; alan.christian@umb.edu) if you have information on mollusk studies associated with a dam removal that you would like to share during this Workshop.

Holiday Inn by the Bay, located in Portland, Maine, will be the venue for this Workshop. The hotel is in walking distance of the Portland’s Old Port area and working waterfront. The hotel also provides free parking and free shuttle service to and from the Portland airport. Portland is a vibrant community and is known for its many local breweries and eateries -- and for lobster and other seafood, of course! Plan on joining us in Portland next April 21 and 22.

Planning Started for FMCS Genetics Workshop in 2016

The Genetics Committee has committed to sponsoring a Genetics Workshop in 2016. This workshop is tentatively scheduled for March 7-10, 2016, at the National Conservation Training Center (NCTC) in Shephardstown, West Virginia. Curt Elderkin is leading the planning effort. This workshop will update the 2004 Genetics Workshop that was also held at NCTC. It will be designed to familiarize attendees with:

- 1) the biological principles underlying common genetic methods;
- 2) the use of genetic tools to understand the ecology and evolution of freshwater mollusks; and
- 3) the application of genetic tools to inform conservation and management of imperiled taxa.

We hope to provide attendees with "hands on" laboratories that illustrate the application of genetic data to answer questions regarding biodiversity, systematics, and conservation of freshwater mollusks. A poster session will also allow the presentation of current freshwater mollusk research that utilizes genetic tools. More information will be provided as the planning proceeds.

Report and Recommendations from the *Ad Hoc* Committee on Scientific and Common Names

During a portion of the Gastropod Status and Distribution Committee meeting at the March 2013 Symposium, a discussion started regarding whether it would be of value to the society to maintain a list of North American freshwater mollusk common and scientific names on the FMCS website. Additional sidebar discussions occurred throughout the remainder of that symposium.

The Turgeon *et al.* lists (1988, 1998) have proven to be invaluable tools to non-systematists (e.g., ecologists, physiologists, and others) who focus more on what an animal does, not what it is named. Updated lists of gastropod and freshwater mussel names are particularly useful to state and federal natural resource agencies, not-for-profit conservation groups, and academia. Maintaining consensus names also is an important outreach function. These lists are not just used by freshwater conservationists in the U.S. and Canada but also by freshwater researchers around the world, particularly in museums. Other disciplines / professional societies have had common and scientific names committees for decades, and a standardized list providing some stability for names has served those communities extremely well.

The reasons FMCS should consider posting a consensus list of common and scientific names are because: 1) it is highly unlikely AFS will publish another edition of the Names of Mollusks, 2) the 2nd edition of Turgeon *et al.* is now 15 years old with many names now outdated, and 3) FMCS is the Society with members that are qualified to assemble and assess the problems with the taxonomy of these lists.

Recommendations:

The *Ad Hoc* Committee recommends that both the Gastropod Status and Distribution Committee and the Mussel Status and Distribution Committee establish separate subcommittees charged with reviewing proposed name changes and maintaining consensus lists of aquatic gastropods and freshwater mussels on the FMCS website.

Each subcommittee should be composed of FMCS members, and members should serve on only one of these subcommittees. Subcommittees should have an odd number of members with a non-voting (except to break deadlock) chair person. The subcommittees should be charged with:

- 1) Establishing a process for reviewing proposed name changes (scientific and common)
- 2) Establishing organizational criteria for the subcommittees (e.g., number of members, length of term, frequency of committee meetings)
- 3) Maintaining a consensus list of names on the FMCS website, and
- 4) Periodically printing the lists as an FMCS special publication

These lists are intended to capture and distill the published record into a consensus list of currently-recognized names with annotations of optional names also listed (where cogent and well supported). Starting points for the gastropod and mussel name lists will be the published conservation status paper of Johnson *et al.* (gastropods – June 2013 issue of *Fisheries*) and the soon to be published Williams *et al.* paper (freshwater mussels).

Ad Hoc Committee members: Art Bogan, John Harris, Jeremy Tiemann, and Nathan Whelan

***Ellipsaria* Addresses FMCS Member Survey Suggestions**

John Jenkinson, *Ellipsaria* Editor

The comments and suggestions made about *Ellipsaria* during the March 2013 Member Survey prompted a discussion of three issues related to the newsletter during the July 11 Board teleconference. As Editor, I informed the Board that, starting with Volume 16, Number 1 (March, 2014), *Ellipsaria* will limit authors to two contributed articles per issue. This change will reduce the number of limited-interest articles in each issue and, hopefully, will encourage a wider variety of FMCS members to use this outlet for their informal communications about aquatic mollusks and their habitats.

During a discussion about the suggestion that all issues of *Ellipsaria* and *Walkerana* be made available to anyone (with no members-only delay), the Board restated their position that immediate access to these publications should be one of the benefits associated with being a dues-paying member of the Society. New issues of *Ellipsaria* and *Walkerana* will continue to be available only to FMCS members for the first six months after they are posted on our web site. All older issues of both publications are now available to anyone (member or not) on our web site.

The final Survey suggestion discussed by the Board was an encouragement to make sure that *Ellipsaria* and *Walkerana* are posted in a way that their articles can be found by Google Scholar. The editors of *Walkerana* indicated this topic had been discussed when that publication went on-line and *Walkerana* should be compatible with Google Scholar. Another Board member said they had found a recent *Walkerana* article using Google Scholar. Apparently, this suggestion already has been successfully addressed.

Once again, thanks to everyone who participated in the March Member Survey, especially in the part concerning your newsletter. If you have any additional comments or suggestions about *Ellipsaria*, please feel invited to send them to me (jjjenkinson@hotmail.com).

Announcements

Open Access for All Back Issues of *Walkerana*

The Co-Editors of the Society Journal, *Walkerana—The Journal of the Freshwater Mollusk Conservation Society*, are pleased to announce that **all** back issues of *Walkerana* are now

available as open access articles (that is: available to everyone) on the journal part of our web site: http://www.molluskconservation.org/Walkerana_BackIssues.html.

All issues and articles in Volumes 1 through 14 previously published by the University of Michigan are now available as searchable PDF files. Because the articles are fully searchable files, the PDF files are relatively large and may take several moments to download. Volume 15, the first published under the authority of FMCS, is also posted there as open access.

As a benefit of FMCS membership, only those members in good standing are permitted to view the current issue of our journal. The current issue can be found at http://www.molluskconservation.org/Walkerana_CurrentCont.html and is accessed with the member's e-mail and password. After a 6-month embargo period, the current issue is then transferred to the Back Issue web page and is open access to everyone.

The on-line availability of the *Walkerana* back issues is due to the hard work, dedication, and volunteer effort of FMCS member Shane Hanlon. Shane, who works for the U.S. Fish and Wildlife Service in the Abingdon, Virginia, Field Office, graciously offered to scan each one of the issues into PDF format so that everyone could benefit from the information contained in them. Please join us in thanking Shane for his service to the Society!

Greg Cope, Wendell Haag, and Tom Watters

Second Call - Request for Contributors - Second Call North American Freshwater Mussel Atlas

We still need more volunteers to provide species accounts for the North American Freshwater Mussel Atlas to be published as a digital document by the FMCS. Instructions for Authors, template files, and the current list of assigned authors are posted on the FMCS website at <http://molluskconservation.org/MUSSELS/Mussel Atlas.html>. At this time ~33% (122 of 365) of the taxa proposed for accounts have at least a single author assigned. First draft species accounts will be due by April 22, 2014 (Earth Day) which also coincides with the last day of the 2014 FMCS Workshop in Portland, ME. Final species accounts will be due the week of the 2015 FMCS Symposium which coincides with the 25th anniversary of the society.

Volunteers should email their species requests to both co-chairs of this Committee: John Harris (omibob1@gmail.com) and Arthur Bogan (arthur.bogan@naturalsciences.org). A corresponding co-author will be designated by the Co-chairs.

The Unio Listserv is Moving

In order to resolve issues with joining the existing Unio list, the listserv is moving to: <https://www.fws.gov/lists/listinfo/unio>. The new list will be supported by the U.S. Fish and Wildlife Service using a new listserv platform to make it easier to join and manage your membership. There is no moderation on the listserv, so joining is simple; just visit the web page (above) and enter your email information. When you successfully join, you will receive email confirmation.

The old listserv will be discontinued on October 4, 2013. If you know of people who won't see this announcement and who can contribute to the list or those who have been unable to join in the past few years, please let them know about the change.

Recent Publication

Conservation Status of Freshwater Gastropods of Canada and the United States

Paul D. Johnson, Arthur E. Bogan, Kenneth M. Brown, Noel M. Burkhead, James R. Cordeiro, Jeffrey T. Garner, Paul D. Hartfield, Dwayne A. W. Lepitzki, Gerry L. Mackie, Eva Pip, Thomas A. Tarpley, Jeremy S. Tiemann, Nathan V. Whelan, and Ellen E. Strong

Fisheries, 38(6):247-282 Published online: 14 Jun 2013

ABSTRACT

This is the first American Fisheries Society conservation assessment of freshwater gastropods (snails) from Canada and the United States by the Gastropod Subcommittee (Endangered Species Committee). This review covers 703 species representing 16 families and 93 genera, of which 67 species are considered extinct, or possibly extinct, 278 are endangered, 102 are threatened, 73 are vulnerable, 157 are currently stable, and 26 species have uncertain taxonomic status. Of the entire fauna, 74% of gastropods are imperiled (vulnerable, threatened, endangered) or extinct, which exceeds imperilment levels in fishes (39%) and crayfishes (48%) but is similar to that of mussels (72%). Comparison of modern to background extinction rates reveals that gastropods have the highest modern extinction rate yet observed, 9,539 times greater than background rates. Gastropods are highly susceptible to habitat loss and degradation, particularly narrow endemics restricted to a single spring or short stream reaches. Compilation of this review was hampered by a paucity of current distributional information and taxonomic uncertainties. Although research on several fronts including basic biology, physiology, conservation strategies, life history, and ecology are needed, systematics and curation of museum collections and databases coupled with comprehensive status surveys (geographic limits, threat identification) are priorities.

Regional Meetings

FMCS Regional Mollusk Meeting Assistance Award Program

As described in the December 2012 issue of *Ellipsaria*, the FMCS has established a Regional Mollusk Meeting Assistance Award Program to facilitate regional mollusk meetings that address local and regional concerns with freshwater mollusk conservation and management. Our interest in assisting with these meetings is to achieve a common goal of bringing people together who work with freshwater mollusks to exchange information on how to conserve and protect this faunal group. These meetings are often attended by a variety of individuals, including agency personnel, academia, private citizens, scientists, and others, some of whom may not be FMCS members. Therefore, a secondary goal of this program is to increase the awareness of, and membership in, FMCS among individuals in these groups who are not yet members. Support is provided via a cash award of \$100 to the regional mollusk meeting group to help defray the costs (e.g., meeting room rental, speaker travel, break refreshments) associated with hosting their meeting. It is anticipated that about 15-20 awards will be made in a given calendar year.

The complete program description and application form may be obtained from the Awards Committee website at http://www.molluskconservation.org/Mservices_awards.html. One copy

of the completed application must be received by the Chair of the Awards Committee at least two months prior to the Regional Mollusk Meeting to allow for application and payment processing.

OVUM 2013 -- October 12, 2013

The 7th annual Ohio (River) Valley Unified Malacologist (OVUM) meeting will be held at the Museum of Biological Diversity of THE Ohio State University on Saturday, October 12, 2013. The Museum address is 1315 Kinnear Road, Columbus, Ohio 43212; telephone 614-292-6170. Directions can be found at: www.biosci.ohio-state.edu/~molluscs/OSUM2/ then click on Google Map under the address. We will convene at 9:00 AM. Light refreshments will be available from 8:30-9:00 AM before the meeting starts. Lunch is on your own.

This one-day meeting is free and open to professionals, amateurs, and students who are interested in any aspect of molluscan biology. OVUM has no dues, officers, abstract requirements, or publications. Participants are encouraged to prepare fifteen-minute presentations covering any topic related to mollusks. We will have a PC with PowerPoint 2010. For information or to present, please contact Tom Watters at watters.1@osu.edu.

IMPORTANT. Please RSVP to Tom Watters at watters.1@osu.edu. ALL visitors must purchase a parking pass so we can pay for our new football coach. **We will purchase these passes for you but we must have an idea of how many to get.** Please let Tom know you are coming and if you are car-pooling. The cost of parking passes has been offset by a generous donation from the Freshwater Mollusk Conservation Society.

The collection of mollusks at the Museum will be available for viewing during lunch and after the presentations are concluded. We look forward to seeing you in Cowtown in October! Go Bucks!

Upcoming Meetings

November 17 – 21, 2013 -- Society of Environmental Toxicology and Chemistry (SETAC) 34th North American Annual Meeting, Gaylord Opryland, Nashville, Tennessee, USA Theme: *Harmonizing Science Across Disciplines* <http://www.setac.org/?page=SETACMeetings>

March 29 -- April 2, 2014 -- National Shellfisheries Association Annual Meeting, Hyatt Regency Jacksonville Riverfront Hotel, Jacksonville, Florida, Theme: [yet to be announced] <http://www.shellfish.org/annual-meeting>.

April 21 – 22, 2014 – FMCS Workshop, Holiday Inn by the Bay, Portland, Maine, USA Theme: *Mussel Studies and Regulatory Process Associated with Dam Removals*.

May 18 – 23, 2014 -- The first ever, Joint Aquatic Science Meeting (JASM), Portland, Oregon. This meeting will bring together four societies: Society for Freshwater Science, Association for the Sciences of Limnology and Oceanography, Society of Wetland Scientists, and Phycological Society of America. Theme: *Bridging Genes to Ecosystems: Aquatic Science in a time of Rapid Change*. <http://www.freshwater-science.org/Annual-Meeting/2014-Portland---JASM.aspx>

June 23 – 27, 2014 -- Mollusca 2014: The Meeting of the Americas - Joint meeting of the Western Society of Malacologists, the Sociedad Mexicana de Malacología y Conquiliología, the American Malacological Society, and the Asociación Latinoamericana de Malacología. Library Complex Amoxcalli in the Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico City, Mexico. <http://www.malacological.org/meetings.html>

July 13 – 17, 2014 – Society for Conservation Biology North American Conference, Missoula, Montana, USA. <http://www.conbio.org/conferences/section-meetings>

Spring 2015 – FMCS Symposium, St. Louis (area), Missouri. Theme: Big Rivers and Landscape Ecology

March 7 – 10, 2016 – FMCS Genetics Workshop, National Conservation Training Center Shephardstown, West Virginia.



We haven't needed a fan very much this summer in Southwest Virginia...



... but the one year old fanshells (*Cyprogenia stegaria*) at the Aquatic Wildlife Conservation Center in Marion, Virginia, have loved the weather. Submitted by Megan Bradley, VAWCC.

Book Review

Mites of Freshwater Mollusks by Dale W. Edwards and Malcolm F. Vidrine. 2013. Published by Malcolm F. Vidrine, 1932 Fournierat Road, Eunice, Louisiana. ISBN (paper) 978-0-615-83471-9. 8 color plates, 336 pages. Price \$50.00

Mites of Freshwater Mollusks is comprised of nine chapters and seven appendices. The forward was written by Ron Dimock. This is a long-overdue volume introducing this interesting group of freshwater mites. Chapters cover: the introduction, mites, their molluscan hosts, mite biogeography, mussel and mite interactions, co-evolution, mite phylogenetic relationships, and conclusions with a view to the future. Appendices account for half of the volume and include a taxonomic list of water mites with their higher classification; higher classification of mussels, gastropods, and sponges; diagnoses of mite genera and subgenera; list of mite host species-species associations; assemblages of mites/mollusks from selected locations; and methods used to construct phylogenetic trees for mollusk mites. There is finally an extensive list of acknowledgments. An in-depth bibliography introduces the student to the historical literature. The volume is completed with a detailed and comprehensive index.

Unionicolid mites spend part of their life cycle (from eggs to larvae and as adults) in freshwater mussels, some freshwater gastropods, and freshwater sponges. Their life cycle includes a larval stage on midges (Chironomidae). Unionicolid mite subgenera are typically restricted to a particular unionoid family but are absent from the Margaritiferidae and *Gonidea*. Three mite subgenera are found in freshwater gastropods. Edwards and Vidrine devote a chapter to the history of the classification and systematics of these animals, providing alternative hypotheses for classification and evolution.

Some of the questions faced in constructing a phylogeny of unionicolid mites and how the evolution of their hosts influence their evolution and biogeography are explored. Appendix 6 provides the characters used in their morphological phylogenetic work. Edwards and Vidrine explore six rules that apply to parasites and co-evolution with their hosts. Preliminary phylogenetic trees for unionicolid mites are presented based on analyses of morphological characters. Work has begun on developing a mite phylogeny based on gene sequences but is limited by access to properly preserved samples from the different subgenera. One lab is exploring mite mitochondrial gene order based on complete mitochondrial DNA sequences. The next step would be to compare the mite phylogeny with a stable phylogeny for the unionoid freshwater bivalves. A stable family level phylogeny is still being pursued. The authors of this volume have outlined a series of mite research questions for the future. They raise questions about the elimination of these animals due to habitat modifications and the role of pesticides both on the mites and their chironomid hosts. One question that comes to mind when dealing with mite communities is what is the impact of transplanting mussels from one river to another for conservation?

This volume provides much to consider in terms of research questions, co-evolution, phylogeny, conservation, and extirpation of an understudied fauna. The authors have provided all of the history, ideas, and basic taxonomy required for a new student entering this field of research. Edwards and Vidrine provide questions at the end of chapters, but many more arise while reading the volume. It is my opinion that this volume should be on the shelf of anyone working on freshwater mollusks, next to the recent volume, *North American Freshwater Mussels*, by Wendell R. Haag.

Arthur E. Bogan, North Carolina Museum of Natural Sciences, 11 West Jones Street, Raleigh, NC 27601. 919-707-8863, 919-715-2294, Arthur.bogan@naturalsciences.org

Contributed Articles

The following articles have been contributed by FMCS members and others interested in freshwater mollusks. These contributions are incorporated into Ellipsaria without peer review and with minimal editing. The opinions expressed are those of the authors.

Conservation Biology of Freshwater Mussels Course Held for the Second Time at the National Conservation Training Center (NCTC)

Twenty three students from various parts of the country traveled to Shepherdstown, West Virginia, for the second class in Conservation of Freshwater Mussels held at NCTC June 17-21, 2013. The course was taught by Chris Barnhart, Heidi Dunn, Megan Bradley, and Robert Anderson with leadership by Matthew Patterson.

The backgrounds and experience of the students were varied, with some being very experienced in different aspects of mussel biology and culture, and some being novices. The pace and content of the course was such that all students were kept engaged and interested. A mix of class, laboratory, and field work was well distributed throughout the weeklong course. The classroom exercises were very helpful to gaining an understanding and appreciation for the complexities of conducting thorough surveys for mussels. Because of recent rains, the Potomac River was running too high for the class to hold the field exercise in the same place as the previous class, so we went to Licking Creek. Nonetheless the area where the class held the exercise provided an exciting find in that a student (Charlie Morgan) located a green floater during our mussel survey exercise.

Thanks to Matthew and the instructors for providing a very valuable learning experience to those of us who attended the second installment of this great course. Even as one of two attendees from the Pacific Northwest -- an area that is relatively depauperate in freshwater mussel species -- I highly recommend this to others interested in mussel conservation.

Submitted by **Joe Bartoszek**. The findings and conclusions in this article are those of the author and do not necessarily represent the views of the U.S. Fish and Wildlife Service.



Gregg Shirk and James Boase measuring mussels during one of the laboratory exercises for the course.

Pleurobema sintoxia Early Life History

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Although distributed widely throughout the central and upper Mississippi River watershed the round pigtoe, *Pleurobema sintoxia*, is rare in several states and needs management attention. Conservation efforts for this species include improving understanding of its life history requirements. During 2013, we followed standard methods (Hove *et al.*, 2011) to study the brooding period and suitable glochidia hosts of the round pigtoe.

When flow conditions permitted, we studied the brooding period of *Pleurobema sintoxia* living in the St. Croix River, Chisago County, Minnesota. Between May 14 and August 12, we collected approximately 20 round pigtoes every two weeks and studied the location and color of the marsupial gills. Using temperature data from a nearby USGS gaging station (station no. 05340500 at St. Croix Falls, Wisconsin), we found *Pleurobema sintoxia* brooded glochidia from June 6 to August 5 at 14-27 °C water temperature (Figure 1). Heath *et al.*, (2001) found brooding *P. sintoxia* in the St. Croix River from mid-May to mid-August. The apparent delay in brooding we observed could have been due to the relatively cool and wet spring in 2013. Glochidia were held in white outer gills that were 3-5 mm thick. Conglutinates were white, lanceolate shaped, frequently paired (two layers), and contained about a 1:1 ratio of glochidia and structural eggs (Figure 2).

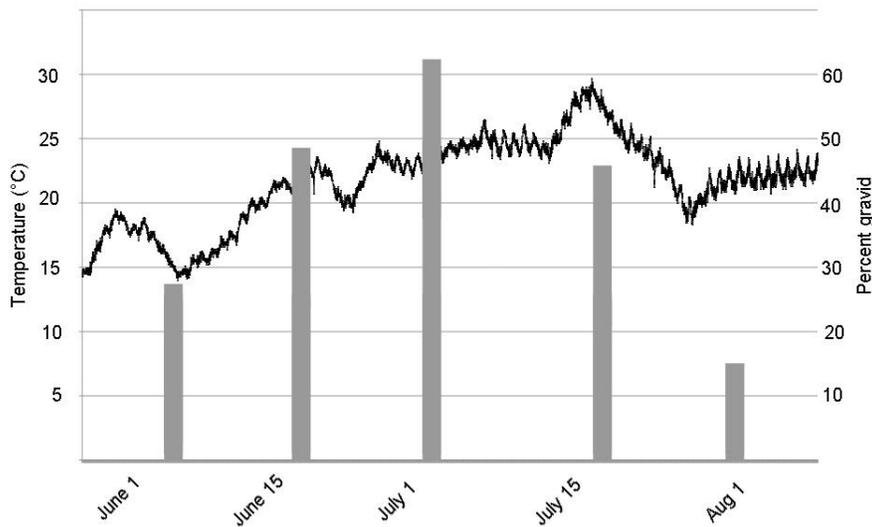


Figure 1. Percentage of gravid *Pleurobema sintoxia* (bars) and water temperature (line) in the St. Croix River during 2013. Water temperature data are from USGS gaging station no. 05340500 at St. Croix Falls, Wisconsin.

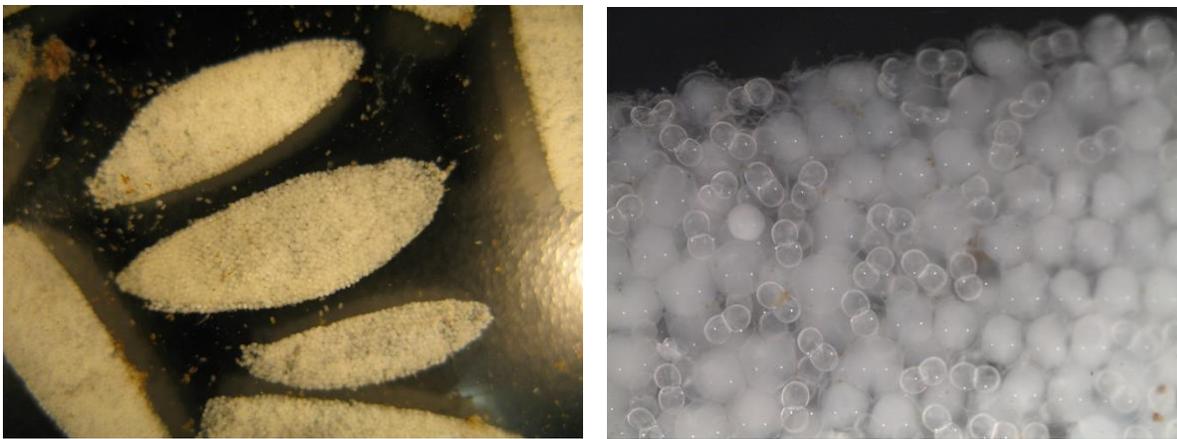


Figure 2. *Pleurobema sintoxia* conglutinates: whole conglutinates (left) and close-up of glochidia (right).

In the laboratory, we exposed 12 fish species to *P. sintoxia* glochidia and observed metamorphosis on all species except channel catfish (*Ictalurus punctatus*) (Table 1). No growth was observed among freshly excysted juveniles. Our observation that various minnows serve as suitable hosts is consistent with previous studies on this species (Watters *et al.*, 2005) and other species of *Pleurobema* (e.g., Culp *et al.*, 2009). The host suitability of white suckers (*Catostomus commersonii*) and brook stickleback (*Culaea inconstans*) deviate from this pattern and should be confirmed through natural host field studies.

Table 1. *Pleurobema sintoxia* transformation period on suitable laboratory infested fishes.

Fish species	Days to transformation	Fish species	Days to transformation
<i>Campostoma anomalum</i>	14-21	<i>Pimephales notatus</i>	14-17
<i>Cyprinella galactura</i> *	10-21	<i>Rhinichthys atratulus</i>	14-17
<i>Cyprinella lutrensis</i>	14-17	<i>Semotilus atromaculatus</i>	10-17
<i>Cyprinella venusta</i> *	14-21	<i>Catostomus commersonii</i>	10-17
<i>Luxilus cornutus</i>	10-17	<i>Ictalurus punctatus</i>	**
<i>Notropis boops</i> *	14-17	<i>Culaea inconstans</i>	17

*Fish collected in Missouri

**Metamorphosis not observed

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Scoring Age Since Death: a Flexible Hinge Ligament May be Misleading

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A long-standing problem in mussel surveys relates to assessing the importance of empty shells that are recovered, especially where live animals are rare or not obtained. This problem is pronounced where densities are predicted to be low and/or water conditions limit opportunities to collect live individuals. One example is surveys of large lakes, such as Lake Erie, because the dreissenid invasion more than 20 years ago eliminated many unionid species, and those that remain occur in much lower numbers than once were present (Schloesser and Nalepa. 1994).

One approach to assessing the return of mussels has been simple beach-combing along the Lake Erie shoreline (Crail *et al.* 2011). My laboratory continues to make periodic surveys to Port Clinton, Ohio, an area where an anecdotal discovery was of a single paired *Amblema plicata* shell in 1998. Fifteen years later, shells again occur commonly along this beach. Following a very warm year in 2012, lake levels dropped to a low of 173.8 m in January, 2013. We found empty shells of 16 species in offshore sediments that were exposed. An important question, however, is how to assign an age to those shells, the first step

to infer extant populations rather than simple evidence of past presence. Perhaps surprisingly, little has been done to test wear of dead shells.

One common approach is to score shells simply as fresh-dead, long-dead, or as subfossils, the latter two sometimes pooled as weathered dead (McGregor and Garner, 2004). Each of these categories may be assigned differently by various investigators, for example as reported by Wendeln et al., 2009: “Fresh-dead shells had intact periostracum, shiny nacre, and well defined hinge teeth; they are believed to represent animals that had been alive in the previous one to three years” (Metcalf-Smith et al. 2003). Fresh-dead is particularly straightforward where tissue may still be present within the shell (Versteedh et al. 2009). In Freshwater Mussels of Montana (mtnhp.org/reports/Mussel_Booklet.pdf), David Stagliano adds the suggestion that possessing a flexible hinge ligament that is still attached to his description of a fresh-dead individual.

A lack of intact periostracum or hinges and, usually, a dull nacre suggests a longer time since death. Metcalf-Smith et al. (2003) describe relic shells as bleached white with no periostracum remaining, and they may be missing hinges and have worn teeth and sculptures. Other shells that can be considered subfossils or relics may show mineralization of the periostracum, especially in lentic habitats where shell abrasion is less prevalent.

Here we report two observations on shell condition relevant to scoring the time since death of mussels in nature. First, is apparent in a photograph of an *Amblema plicata* shell (Figure 1) that not only has a complete hinge, but the hinge was still flexible when it was collected. That condition applied to many of the 28 paired shells of *Amblema plicata* we found imbedded in sand and still covered by 1-3 cm of water, indicating the shells probably never had been exposed to air. However, mineralization of the periostracum is obvious. Thus, depending on the scoring system being used, this shell could be considered either fresh-dead or a subfossil. One small *A. plicata* shell (4.3 cm,) also contained tissue, an intact periostracum, and numerous byssal threads, suggesting that live members of this species exist in the area (two dead *Quadrula quadrula* and 28 *Leptodea fragilis* shells also contained tissue).



Figure 1. A typical dead specimen of *Amblema plicata* pulled from the Lake Erie sand offshore at Port Clinton, Ohio. The valves were attached, the hinge was complete and flexible without breaking, despite a duration since death sufficient to lead to the clearly visible mineralization of the periostracum.

The second observation pertains to a group of *Elliptio complanata* shells that had remained continuously in water after death. These individuals were purchased for laboratory use and their mortality in a small aquarium was not individually monitored but apparently occurred over a period of a year. Thirty shells were retrieved, none containing tissue, and all 30 possessed intact, flexible hinges. Once removed from water, these hinges hardened over the next 24 to 72 hours, eventually becoming brittle, although some did not become brittle for several days. The hinge of the *Amblema plicata* in Figure 1 also became brittle after collection. Thus, time since death may affect the rapidity in which the hinge

ligament hardens, but while this time may be very short in air, it can be very long for animals continuously submerged.

Shell condition data are useful to assess species presence in a stream, but within lentic systems, and especially shells rapidly buried in mud or sand, shells may remain sufficiently protected that condition becomes a poor indicator of population presence. Understanding how quickly mineralization/fossilization occurs is another question requiring future investigation.

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Distribution of Extant Populations of *Quadrula mitchelli* (false spike)

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The False Spike, *Quadrula mitchelli* (Simpson 1896), is a rare species of mussel endemic to Central Texas and the Rio Grande drainage (Howells 2010). This species was thought to have been extinct until the discovery of several live individuals in the Guadalupe River and a fresh dead individual in the San Saba River in 2011 (Randklev et al. 2012; Randklev et al. in press). Since then, this species has been reported at several other locations within its historic range (Sowards et al. in press; Tsakiris and Randklev 2013; Mabe and Kennedy 2013). Here, we report on the current known distribution of this species.

Brazos River basin:

In 2012 and 2013, three live individuals were collected from the lower portion of the San Gabriel River, Milam County, during efforts to relocate mussels from two bridge construction projects (Figures 1A & 2). A single large individual (85 mm shell length) was collected at the first site and two smaller individuals

(26 mm, 33 mm shell length) were collected at the second site. At both locations, live individuals were found in run habitats (0.25 – 0.5 m depth) in substrate that consisted of a thin (~5 cm) layer of cobble/course gravel underlain by firm silty clay loam.

Colorado River basin:

In 2012, three live individuals (Figures 1B & 2) were collected from two localities on the lower San Saba River, San Saba County (Tsakiris and Randklev 2013; Sowards et al. in press). Gonadal fluid sampled from each specimen revealed developing oocytes, indicating that these females were capable of reproducing. All individuals were collected in coarse gravel from run habitats; water velocity at both sites was slow but not stagnant. Adjacent land use was rangeland and pecan orchards.

Near Mason, Mason County Texas, one live individual (44 mm shell length) was collected from the Llano River in August 2013 during reconnaissance surveys (Figure 1C & 2). The individual was found in a small pool in gravel/mud substrate that was protected by several large pieces of cobble. Also found was a single fresh-dead individual that appeared to have been recently stranded during a high-water flow event.

Guadalupe River basin:

Approximately 0.8 km downstream from where the original population of *Q. mitchelli* was rediscovered in the Guadalupe River (Randklev et al. 2012), additional live specimens were observed during limited timed search efforts in May 2013. Two live individuals were collected (Figures 1D & 2), one each, from riffle and run habitats in a mix of gravel and cobble substrates.

From October 2012 through May 2013, 11 live *Q. mitchelli* have been collected from a site approximately 23 river km from the original collection site (Figures 1E, F & 2). These individuals were found using timed searches with SCUBA gear during three separate sampling efforts [October 2012 (2 individuals), January 2013 (4 individuals), May 2013 (5 individuals)]. *Quadrula mitchelli* were observed in run and pool habitats over gravel/cobble and sand substrates. Total lengths ranged from 35 – 60 mm. The primary land use in the area was rangeland.

Near Victoria, Texas, Mabe and Kennedy (2013) reported live individuals of *Q. mitchelli*, including presumptive juvenile specimens. While the adult specimen illustrated in their article is consistent with live individuals collected by Randklev et al. (2012), the sub-adult specimen appears to be a misidentified Guadalupe morph of *Quadrula petrina* (Texas pimpleback). However, given the recent collection of sub-adult *Q. mitchelli* from the Guadalupe River near Gonzales, Texas, it is plausible that reproducing populations may exist near this locality, but additional surveys are needed to determine whether this is the case.

Rio Grande River basin:

Currently, no locations of living populations are known for this species in the Rio Grande river basin. Existing specimen records are subfossil or fossil material, much of it from the Pleistocene (Metcalf 1982).

Acknowledgements:

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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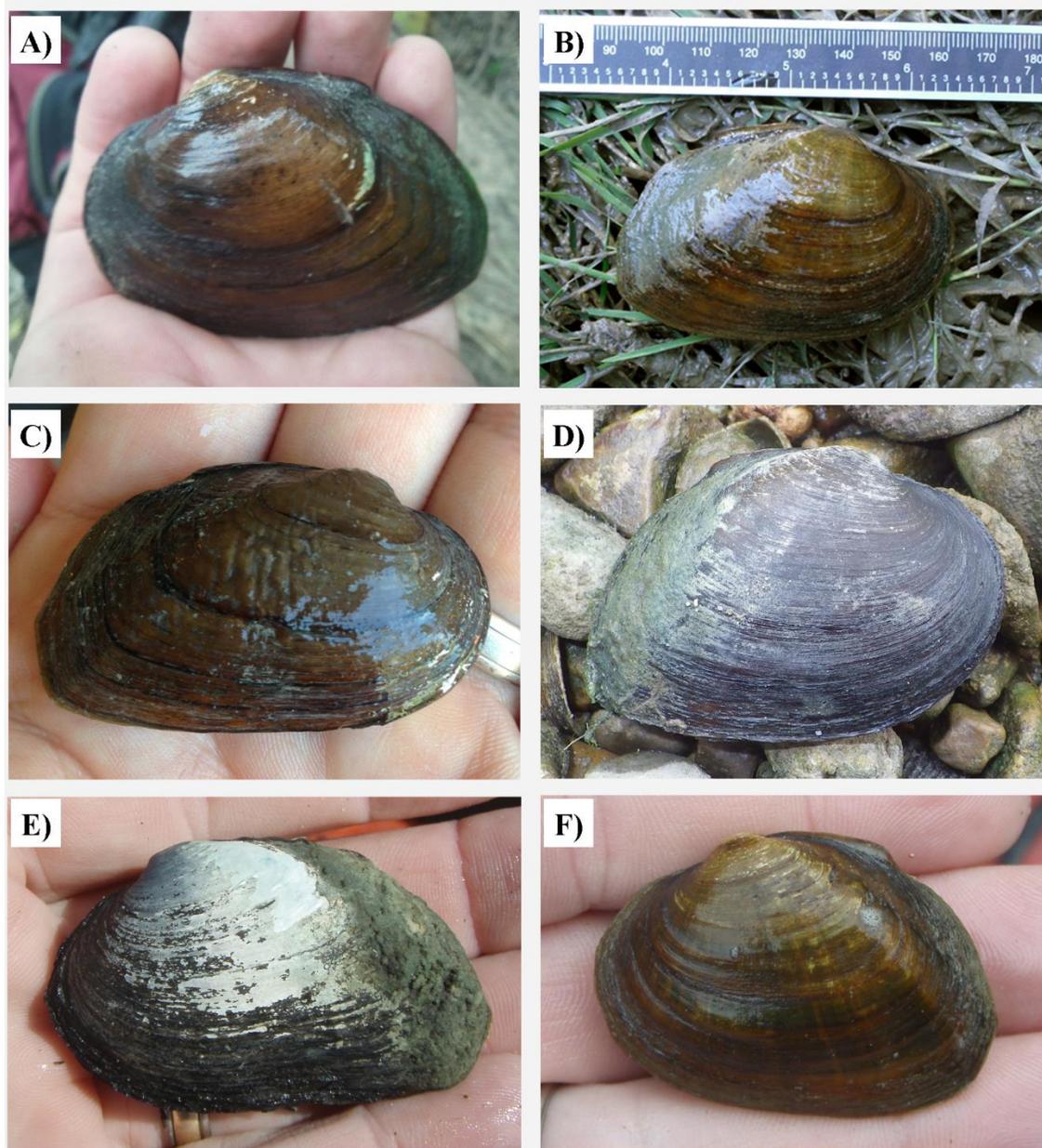


Figure 1. Live individuals of *Quadrula mitchelli* collected from the: A) San Gabriel River, Brazos River basin; B) San Saba River, Colorado River basin; C) Llano River, Colorado River basin; D) Guadalupe River, near Gonzales, Texas; and E) & F) Guadalupe River, downstream of Gonzales, Texas.

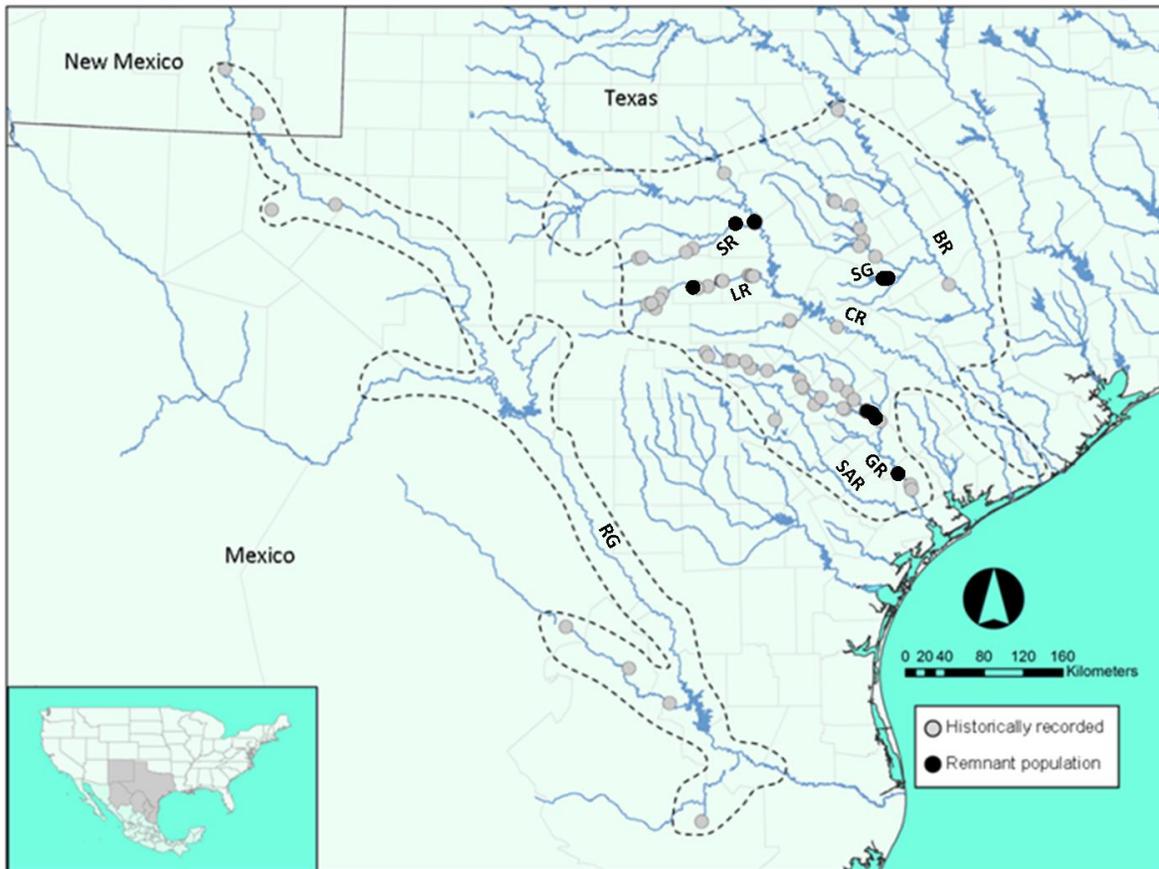


Figure 2. The distribution of remnant populations (black circles), historical localities (gray circles), and presumptive range (dashed line) of false spike (*Quadrula mitchelli*) in Texas, New Mexico, and Mexico, including the Rio Grande, Guadalupe-San Marcos, San Antonio, Colorado, and Brazos River drainages. Abbreviations: CR, Colorado River; BR, Brazos River; LR, Llano River; GR, Guadalupe River; RG, Rio Grande; SAR, San Antonio River; SG, San Gabriel River; and SR, San Saba River.

An Early Record of *Ferrissia clessiniana* from the Yarqon River near Tel Aviv, Israel

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The "Seven Mills" on the south bank of the Yarqon River near Tel Aviv, Israel, is the name of a site where flour mills driven by the water of the Yarqon River were operating until 1936. The last remaining mills were built in the 19th Century. The mills were operated by the force of the water which at that point was raised by an artificial dam in the river.

In 2001, the remains of the "Seven Mills" were excavated by Dr. Eytan Ayalon. Among others, the sediments accumulated during some 150 years present in the old water reservoir were completely removed. This opened a unique opportunity to sample some of the layers containing shells at certain points in that basin on 4 September 2001. Relatively few complete mollusc specimens were collected because of the bad preservation of the shells.

In a previous note (Mienis, 2002) I was able to report on the finds of specimens of the unionid *Leguminaia saulcyi* (Bourguignat, 1852) in those sediments. This species is now considered not living any more in the Mediterranean coastal rivers of Israel.

Only recently I finished screening the remaining sediment samples for molluscs and to my surprise found a single specimen of *Ferrissia clessiniana* (Jickeli, 1882). It was the only representative of a basommatophoran species among the gastropods in the subfossil material (Mienis & Rittner, 2013).

Although *Ferrissia clessiniana* occurred not only in the Pleistocene of Europe but also during the Early-Middle Pleistocene (0.78MA) at the site of Gesher Benot Ya'aqov in Israel (Mienis & Ashkenazi, 2011), shortly afterwards it disappeared apparently from the Levant and found a refuge in the catchment area of the Nile River in N.E. Africa.

During the glacial periods in the Pleistocene the level of the Mediterranean Sea dropped sometimes up to 130 m in the south-eastern corner of the Mediterranean Basin (Avital, *et al.*, 2004). This resulted in the development of an extremely northwards expansion of the Nile delta, even to such an extent that some of the southern coastal rivers in the Levant became connected to it. During such periods, numerous Nilotic elements of the fauna and flora succeeded in establishing viable populations in the southern Levant (Tchernov, 1988; Mienis, 2003), among these were the following aquatic molluscs: *Cleopatra bulimoides syriaca* Pallary, 1929, *Biomphalaria alexandrina* (Ehrenberg, 1831), *Bulinus truncatus* (Audouin, 1826), *Gyraulus ehrenbergi* (Beck, 1837); *Radix natalensis* (Krauss, 1848) and *Corbicula consobrina* (Cailliaud, 1823). Unfortunately, any evidence is lacking whether *Ferrissia clessiniana* was also among them.

Until recently, the first modern record of *Ferrissia clessiniana* in Israel consisted of a sample of numerous specimens collected from an aquarium in the Department of Parasitology of the Hebrew University of Jerusalem in 1952; however, recently it turned out that those might have been the offspring of a sample which had been collected by the parasitologist Prof. G. Witenberg on 22 November 1951 in Wadi Abu Lejji, an intermittent stream connected to the Yarqon River. Especially in the last quarter of the 20th century, *Ferrissia clessiniana* has been collected at numerous localities in Israel and sometimes in extremely large numbers which strengthened the opinion that we were dealing with an invasive species.

When the late Prof. Eitan Tchernov heard about the find of the Nilotic freshwater limpets in Israel, he told me that freshwater limpets (*Acroloxus* or *Ferrissia*?) were once collected by him from Papyrus *Cyperus papyrus* in the Yarqon River (Mienis, 1976). Unfortunately voucher specimens are neither present in the collection of the Hebrew University of Jerusalem nor in that of the Tel Aviv University. Therefore, we do not know whether he had found *Acroloxus lacustris* (Linnaeus, 1758), which is now extinct in Israel, or *Ferrissia clessiniana*.

However, in 1977, the first specimens were collected from the leaves of *Nuphar lutea* just west of the springs of the Yarqon River near Tel Aphek (=Antipatris). This constituted the first documented presence of a freshwater limpet in the Yarqon River proper. With the find of a subfossil specimen in a sample of the lower sediments present in the reservoirs of the "Seven Mills" on the banks of the Yarqon River near Tel Aviv, we know now that this species was probably already living in the Yarqon River well before 1936. Consequently we might not rule out the possibility that, although this species is behaving like a recent invader, it might have tried to establish itself in the Levant more than once in the past.

Acknowledgement:

I like to thank Dr. Eitan Ayalon (Museum Eretz Israel, Tel Aviv) for giving permission to sample the excavated site for the presence of freshwater molluscs.

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Additional Information Concerning the Conquest of Europe by the Invasive Chinese Pond Mussel *Sinanodonta woodiana*. 32. News from Germany, Hungary, Moldova and Poland

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Papers dealing with the presence of the invasive Chinese Pond mussel *Sinanodonta woodiana* (Lea, 1834) in Europe continue to be published. Here is some new information from Germany, Hungary, Moldova and Poland.

Germany

In an excellent paper Dämpelmann (2012) records the first records of the Chinese Pond mussel from the region of Hessen in Germany. Three populations are described from as many localities: Perfstauee (2006), Rehbachteich (2008) and Frickenhäuserweiher (2010). In addition the fish species occurring at these localities are listed. The author questions the role of *Sinanodonta woodiana* as a substitute host for the endangered European Bitterling *Rhodeus amarus*.

Hungary

Benkő-Kiss et al. (2013) have published an English version of their study on the distribution of the Chinese Pond Mussel in Lake Balaton originally written in Hungarian (Benkő-Kiss et al., 2012, see *Ellipsaria*, 15 (1):10-11), which makes it more available for the international community interested in *Sinanodonta woodiana*.

During another survey carried out in Lake Balaton, the impact of *Dreissena* infestation on native and exotic mussel species was studied (Bódis et al., 2013). According to the authors the influence of *Dreissena polymorpha*, which is itself an invasive species, might slow down the proliferation of *Sinanodonta woodiana* in the lake.

Moldova

Lake Beleu is a shallow water relict lake in the catchment area of the river Prut in Moldova. Specimens of *Sinanodonta woodiana* were found in the lake for the first time in 2008. In that year, the invasive mussel species occurred at a rate of 0.4 ex/m² or 54.7 g/ m², however one year later this had increased already respectively to 1.4 ex/ m² and 262 g/ m². In terms of biomass, the Chinese Pond mussel increased from 7% in 2008 to 74% in 2009! In other words, this invasive mussel species forms a serious competitor of the native mollusc fauna of the lake in general and its mussel fauna in particular.

Poland

During the bird migration in autumn 2010, an Oystercatcher (*Haematopus ostralegus*) was seen feeding on Chinese Pond mussels (Urbańska et al., 2013). Living specimens with a length of up to 98 mm were caught by the bird in water of up to 7 cm depth. The preferred method of extracting the animals from the shells was by stabbing and not by hammering. In drained fish ponds, foraging birds may in this way severely affect the population density of *Sinanodonta woodiana*.

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First Record of Predation on Freshwater Snails *Pomacea canaliculata* (Lamarck, 1819) by the Terrestrial Lizards *Tupinambis* (= *Salvator*) *merianae* Linnaeus, 1758 in the Southernmost Brazil region

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Until now, the “Caiman Lizard, *Dracaena guianensis* Daudin, 1802” (Figure 1) was the only lizard exclusively eater of limnic/freshwater gastropod mollusks to the family Ampullariidae known in Brazil and South America. This species can be found in the countries of Brazil (Pantanal, Amazon), Colombia, Ecuador, Peru, and the Guianas. Its body is very similar to that of a crocodile, and their jaws are heavily muscular to help aid in eating its normal prey of great apple snails (*Pomacea* spp) and, occasionally, freshwater crawfish and mussels/ clams. It also has a few adaptations that help it in its watery habitat. It has a long and flattened tail, similar to its name sake, the Caiman. The long tail helps the Caiman Lizard successfully swim and dive. It also has a clear third eyelid which is thought to act like a pair of goggles underwater.



Figure 1. Caiman lizard, *Dracaena guianensis* Daudin, 1802

On December 20, 2012 (... beginning of the austral summer), the second author had the opportunity to observe and report, for the first time, the spontaneous capture/predation of native freshwater snails Ampulariidae *Pomacea canaliculata* (Lamarck, 1819) (Figure 2) by the terrestrial lizard *Tupinambis* (= *Salvator*) *merianae* Linnaeus, 1758 (Figure 3). This observation was made on the riverside of an artificial lake located in the “Sinos River Basin” region (Oil Refinery installations – REFAP), Municipal District of Canoas, Rio Grande do Sul State/ SC, Southernmost Brazil. Apparently, the fact is common in this region, since still many shell remnants were found in the same place where the reptile was sighted feeding.

Opportunistic and synanthropic par excellence, the “teiú lizard” has strong jaws fitted with a large number of small pointed teeth. It feeds on small mammals, birds and their eggs, reptiles, amphibians, insects, worms and crustaceans. It also eats juicy fruits, leaves, and flowers. It is known as a chicken thief, because it attacks chickens and sucks their eggs with extreme greed. The “teiú lizard” also has been recognized as a predator of a terrestrial gastropod, the exotic invader African snail *Achatina* (*Lissachatina*) *fulica* (Bowdich, 1822), principally in the southern State of Santa Catarina/ SC (Agudo-Padrón et al., 2013).

Other specific vertebrate predators of freshwater snails of the genus *Pomacea* in Brazil include two bird species typically swampy (Agudo-Padrón 2012a) and the so-called “snail-eating snakes”, specializing in the exclusive consumption of terrestrial slugs and snails (Agudo-Padrón 2009, 2012b).



Figure 2. Freshwater native apple snail *Pomacea canaliculata* (Lamarck, 1819)



Figure 3. Terrestrial lizard *Tupinambis* (= *Salvator*) *merianae* Linnaeus, 1758

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About Two New Records of Freshwater Mollusks (Gastropoda: Pulmonata: Planorbidae, and Bivalvia: Unionoida: Mycetopodidae) for Santa Catarina State/ SC, Southern Brazil Region

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The following short report brings to 205 the total number of continental mollusks, terrestrial and freshwater, known from the State of Santa Catarina/ SC, Central Southern Brazil region, including 175 gastropods (136 terrestrial and 39 freshwater) and 30 limnic/ freshwater bivalves (27 natives + 3 exotic invaders): 21 Unionoida, 8 Veneroida, 1 Mytiloida (Agudo-Padrón and Lisboa 2013; Agudo-Padrón et al. 2013 a, b).

I. *Drepanotrema heloicum* (d’Orbigny, 1835)

On 19/04/2013, a one singular native freshwater snail specimen was sent to us for analysis, originating from the “Ribeirão do Bugre” (Bugre Creek), 27°41'42"S & 49°20'21"W, Vidal Ramos Municipal District, Itajaí Mirim River Basin, SC (Figure 1). The taxonomic determination of this little snail was based in the fundamental contribution of Simone (2006:103), coming to the conclusion that it belongs to the species *Drepanotrema heloicum* (d’Orbigny, 1835), representative of the Family Planorbidae. This freshwater gastropod has not been previously reported from the Santa Catarina’s State (Agudo-Padrón 2008, 2012; Agudo-Padrón et al. 2013a, b).

Originally collected by the second author of this report on 17/03/2013, the specimen finally was deposited in the scientific malacological collection of the “Museum of Sciences and Technology”, Pontifical Catholic University of Rio Grande do Sul - PUCRS, Porto Alegre/ RS (MCP 09903).



Figure 1. *Drepanotrema heloicum* (d’Orbigny, 1835) specimen (left) of the “Bugre Creek”, Itajaí Mirim River Basin, Vidal Ramos Municipal District (right – red color) in the geographical context of the Santa Catarina State/ SC. Photo: Leonardo Kleba Lisboa

II. *Anodontites elongatus* (Swainson, 1823)

On 12/06/2013, three native freshwater snail specimens (random sample) were sent to us for analysis, originating from the “São Pedro Velho” Street, Itajaí River Basin Valley, Rodeio Municipal District, SC (Figure 2), in channel of irrigated rice farming field, dividing the environment with native naiads *Diplodon delodontus* (Lamarck, 1819) (Hyriidae) and exotic clams *Corbicula largillierti* (Philippi,

1844) (Corbiculidae) – see parallel report/ contribution in this issue. The taxonomic determination of this freshwater mussel was based, again, in the fundamental contribution of Simone (2006:274-275), coming to the conclusion that belong to the species *Anodontites elongatus* (Swainson, 1823), representative of the Family Mycetopodidae (Figure 2), a naiad so far have not reported for the Santa Catarina's State (Agudo-Padrón 2008, 2012; Agudo-Padrón et al. 2013 a, b).

Originally collected by the two last authors of this report on 28/04/2013, the specimens finally were deposited in the scientific malacological collection of the “Regional University Foundation of Blumenau – FURB”, Blumenau/ SC (FURB MO184).



Figure 2. *Anodontites elongatus* (Swainson, 1823) specimens (left) of the Itajaí River Basin Valley, Rodeio Municipal District (right – red color) in the geographical context of the Santa Catarina State/ SC. Photo: Luiz Adriano Funez

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New Geographical Records of Continental Mollusks in the Central and North Atlantic Slope Sections of Santa Catarina State/ SC, Southern Brazil

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Giving continuity to the regional survey, and based on extensive literature review and the examination of samples obtained in the course of works done in the field, the present contribution incorporates the geographical records of twenty-four more forms (seven limnic/ freshwater and seventeen terrestrial – one “amphibian”) to previous systematic inventories of known continental mollusks of the Santa Catarina’s State/ SC, central portion of southern Brazil region (Agudo-Padrón 2008, 2011a, 2012b; Agudo-Padrón *et al.* 2013 a, b), including twenty two Gastropoda (fifth limnic/ freshwater, one amphibian & sixteen terrestrial) and two Bivalvia, distributed in twenty-two genera and eighteen families.

The taxonomic arrangement accompanying basically the original proposal of Agudo-Padrón (2008, 2011a, 2012b) and Agudo-Padrón *et al.* (2013b), based on the monographic contributions of Simone (2006) and Thomé *et al.* (2006). Additional information about the material deposited in museum is included. Other species occurring in the region studied in this new opportunity can be found related in Agudo-Padrón (2011b, d; 2012a) and Agudo-Padrón *et al.* (2013a).

Abbreviations:

FURB MO – Malacological Collection of “Regional University Foundation of Blumenau - FURB”, Blumenau/ SC

MCP – Malacological Collection of the “Museum of Sciences and Technology”, Pontifical Catholic University of Rio Grande do Sul - PUCRS, Porto Alegre/ RS

Florianópolis, SC:

Map 1.- Municipal District of Florianópolis (red color) in the geographical context of Santa Catarina/ SC State territory



Terrestrial forms

Charopidae *Zilchogyra cleliae* Weyrauch, 1965 -- “Estreito” Quarter, near the “Parque Bosque Pedro Medeiros”, Continental Florianópolis, 30/III/2013 (MCP 09904 = 2 specimens)

Euconulidae *Euconulus martinezi* (Hidalgo, 1869) -- “Estreito” Quarter, near the “Parque Bosque Pedro Medeiros”, Continental Florianópolis, 30/III/2013 (MCP 09900 = 10 specimens)

Vidal Ramos, SC:

Map 2.- Municipal District of Vidal Ramos (red color) in the geographical context of Santa Catarina/ SC State territory



Freshwater forms

Hydrobiidae *Potamolithus catharinae* Pilsbry, 1911 -- "Ribeirão do Bugre" (Bugre Creek), Vidal Ramos Municipal District, Itajaí Mirim River Basin, 17/03/2013 (MCP 09902 = 2 specimens) (Figure 1)



Figure 1.- *Potamolithus catharinae* Pilsbry, 1911
 Photo: Leonardo Kleba Lisboa

Terrestrial forms

Systrophiidae *Prohappia besckei* (Dunker, 1847) -- "Ribeirão do Bugre" (Bugre Creek), 27°41'42"S ; 49°20'21"W, Vidal Ramos Municipal District, Itajaí Mirim River Basin, 25/05/2013 (1 specimen) (Figure 2) ...



Figure 2.- *Prohappia besckei* (Dunker, 1847)
 Photo: Leonardo Kleba Lisboa

Rodeio, SC:

Map 3.- Municipal District of Rodeio (red color) in the geographical context of Santa Catarina/ SC State territory



Freshwater forms

GASTROPODA

Physidae *Physa acuta* -- “São Pedro Velho” Street, 28/IV/2013, in channel of irrigated rice farming field (FURB MO152 = 4 specimens)

Lymnaeidae *Lymnaea columella* (Say, 1817) -- “São Pedro Velho” Street, 28/IV/2013, in channel of irrigated rice farming field (FURB MO151 = 12 specimens) (Figure 3)



Figure 3.- *Lymnaea columella* (Say, 1817) Photo: Luís Adriano Funez

Succineidae *Omalonyx convexus* (Heyneman, 1868) -- “São Pedro Velho” Street, 28/IV/2013, in channel of irrigated rice farming field (FURB MO154 = 4 specimens) (Figure 4)



Figure 4.- *Omalonyx convexus* (Heyneman, 1868) Photo: Luís Adriano Funez

Planorbidae *Biomphalaria t. tenagophila* (d'Orbigny, 1835) -- “São Pedro Velho” Street, 28/IV/2013, in channel of irrigated rice farming field (FURB MO148 = 15 specimens) (Figure 5)



Figure 5.- *Biomphalaria t. tenagophila* (d'Orbigny, 1835) Photo: Luís Adriano Funez

Hydrobiidae *Littoridina piscium* (d'Orbigny, 1835) -- “São Pedro Velho” Street, 28/IV/2013, in channel of irrigated rice farming field (FURB MO150 = 1 specimen)

BIVALVIA

Hyriidae *Diplodon delodontus* (Lamarck, 1819) -- “São Pedro Velho” Street, 28/IV/2013, in channel of irrigated rice farming field (FURB MO147 = 1 specimen) (Figure 6)



Figure 6.- Freshwater mussel/ naiad *Diplodon delodontus* (Lamarck, 1819) Photos: Luís Adriano Funez

Corbiculidae *Corbicula largillierti* (Philippi, 1844) -- “São Pedro Velho” Street, 28/IV/2013, in channel of irrigated rice farming field (FURB MO183 = 7 specimens) (Figure 7)



Figure 7.- Exotic freshwater clam *Corbicula largillierti* (Philippi, 1844) Photos: Luís Adriano Funez

It is worth noting that is particularly fascinating the “spontaneous occurrence” of limnic bivalves in diverse anthropized areas (Agudo 2007; Agudo-Padrón 2011c, d, 2012c; Agudo-Padrón *et al* 2010), channels of irrigated rice farming field in this case.

Terrestrial forms

Veronicellidae *Angustipes erinaceus* (Colosi, 1921) -- “Barão do Rio Branco” Street, Center, in rural environment, 28/IV/2013 (FURB MO157 = 1 specimen) (Figure 8)



Figure 8.- Native slug *Angustipes erinaceus* (Colosi, 1921) Photos: Luís Adriano Funez

Succineidae *Succinea meridionalis* (d'Orbigny, 1837) -- “Barão do Rio Branco” Street, Center, in rural environment, 28/IV/2013 (FURB MO155 = 4 specimens)

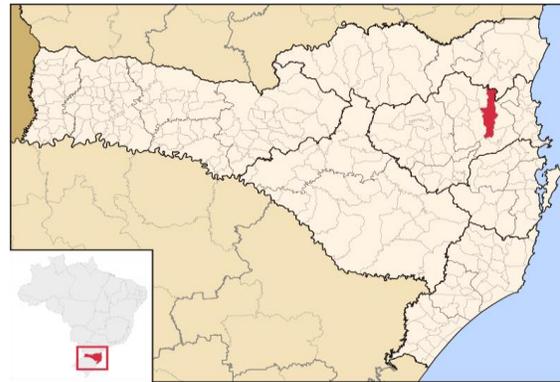
Subulinidae *Lamellaxis gracilis* (Hutton, 1834) -- “Barão do Rio Branco” Street, Center, in rural environment, 28/IV/2013 (FURB MO153 = 19 specimens)

Leptinaria monodon (C.B. Adams, 1849) – “São Pedro Velho” Street, in rural environment, 28/IV/2013 (FURB MO156 = 7 specimens)

Radybaenidae *Bradybaena similaris* (Férussac, 1821) -- “Barão do Rio Branco” Street, Center, in rural environment, 28/IV/2013 (FURB MO149 = 1 specimen)

Blumenau, SC:

Map 4.- Municipal District of Blumenau (red color) in the geographical context of Santa Catarina/ SC State territory



Terrestrial forms

Veronicellidae *Angustipes erinaceus* (Colosi, 1921) -- “Pastor Osvaldo Hesse” Street, “Ribeirão Fresco” Quarter, at edge of a forest fragment, 28/IV/2013 (FURB MO143 = 2 specimens)

Charopidae *Zilchogyra cf. cleliae* Weyrauch, 1965 -- “Pastor Osvaldo Hesse” Street, “Ribeirão Fresco” Quarter, at edge of a forest fragment, 28/IV/2013 (FURB MO146 = 4 specimens)

Amphibulimidae *Simpulopsis decussata* Pfeiffer, 1856 – “Pastor Osvaldo Hesse” Street, in rainforest environment (on palm leaves on the ground), 07/VI/2013 (FURB MO198 = 1 specimen) (Figure 9)



Figure 9.- *Simpulopsis decussata* Pfeiffer, 1856
Photo: Luís Adriano Funez

Subulinidae *Leptinaria concentrica* (Reeve, 1849) -- “Pastor Osvaldo Hesse” Street, “Ribeirão Fresco” Quarter, at edge of a forest fragment, 28/IV/2013 (FURB MO145 = 1 specimen). Previously cited from “Joinville Municipal District” in Agudo-Padrón *et al.* (2013b: 18)

Lamellaxis gracilis (Hutton, 1834) -- “Pastor Osvaldo Hesse” Street, “Ribeirão Fresco” Quarter, at edge of a forest fragment, 28/IV/2013 (FURB MO144 = 50 specimens)

Euconulidae *Pseudoguppya semenlini* (Moricand, 1846) – “FURB Campus I”, on the edge of forest - in litterfall (FURB MO179 = 11 specimens, random sample) (Figure 10)



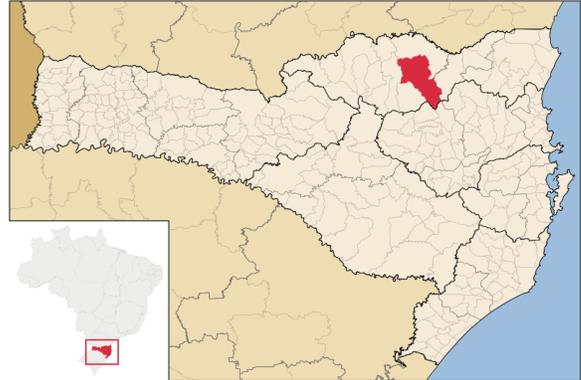
Figure 10.- *Pseudoguppya semenlini* (Moricand, 1846) Photo: Luís Adriano Funez

Philomycidae *Meghimatium pictum* (Stoliczka, 1873) -- “Pastor Osvaldo Hesse” Street, “Ribeirão Fresco” Quarter, at edge of a forest fragment, 28/IV/2013 (FURB MO141 = 7 specimens) ...

Agrolimacidae *Deroceras laeve* (Müller, 1774) -- “Pastor Osvaldo Hesse” Street, “Ribeirão Fresco” Quarter, at edge of a forest fragment, 28/IV/2013 (FURB MO142 = 15 specimens) ...

Itaiópolis, SC:

Map 5.- Municipal District of Itaiópolis (red color) in the geographical context of Santa Catarina/ SC State territory



Terrestrial forms

Megalobulimidae *Megalobulimus haemastomus* (Scopoli, 1786) – near to “Rio do Couro” (Couro River), 26°33'25.13"S & 49°55'45.30"W, rapids of the Itajaí River Basin, with primary Atlantic Forest < http://www.ra-bugio.org.br/ver_especie.php?id=1588

Megalobulimus musculus (Bequaert, 1948) – near to rapids of the Itajaí River Basin, with primary Atlantic Forest < http://www.ra-bugio.org.br/ver_especie.php?id=1585

Strophocheilidae *Mirinaba erythrosoma* (Pilsbry, 1895) – “Raso do Mandi” (Shallow Mandi), in the headwaters of the Itajaí-Acu River < http://www.ra-bugio.org.br/ver_especie.php?id=1583

Joinville, SC:

Map 6.- Municipal District of Joinville (red color) in the geographical context of Santa Catarina/ SC State territory



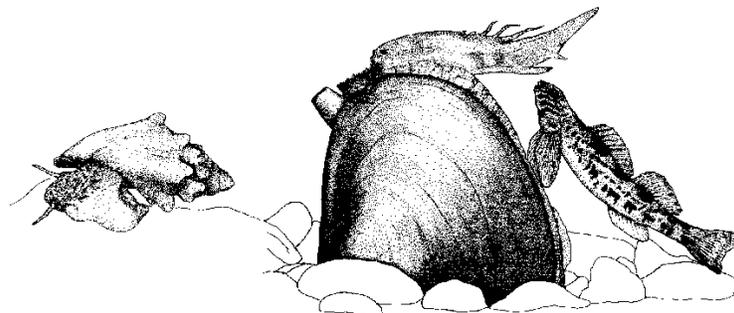
Terrestrial forms

Charopidae *Zilchogyra cf. cleliae* Weyrauch, 1965 -- Joinville city, 29/III/2013 (MCP 09901 = 2 specimens)

Systrophiidae *Prohappia besckei* (Dunker, 1847) -- Joinville city, 29/VI/2013 (1 specimen)

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Ellipsaria is posted on the FMCS web site quarterly: early in March, June, September, and December. This newsletter routinely includes Society news, abstracts, job postings, meeting notices, publication announcements, informal articles about ongoing research, and comments on current issues affecting freshwater mollusks. Anyone may submit material for inclusion in *Ellipsaria*; however, only current dues-paying members of FMCS can access it on-line for the first six months after each issue is posted. Information for possible inclusion in *Ellipsaria* should be submitted via e-mail to the editor, John Jenkinson, at jjjenkinson@hotmail.com.

Contributions may be submitted at any time but are due by the 15th of the month before each issue is posted. MSWord is optimal for text documents but the editor may be able to convert other formats. Graphics should be in a form that can be manipulated using PhotoShop. Please limit the length of informal articles to one page of text. Note that submissions are not peer reviewed but are checked for clarity and appropriateness for this freshwater mollusk newsletter. Feel free to contact the editor with any questions about possible submissions or transmission concerns.

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If you are interested in participating in committee activities, please contact one of the appropriate chairs.

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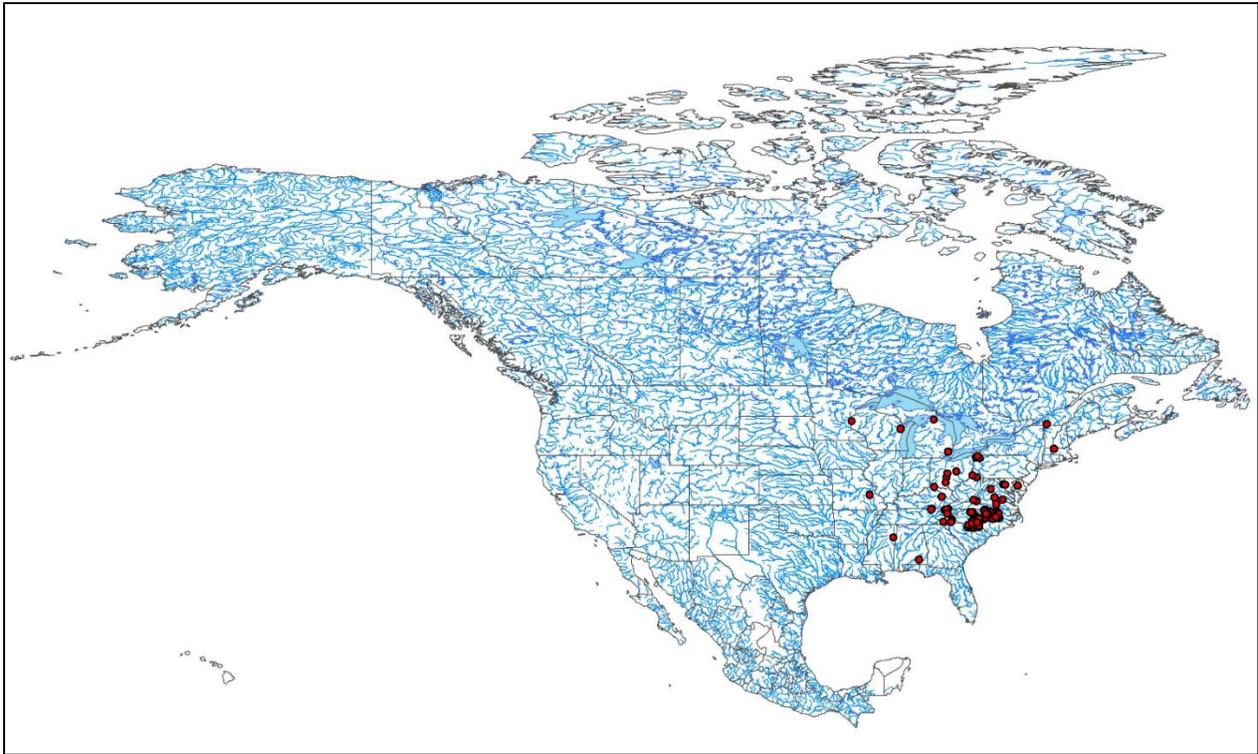
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Parting Shot



This draft distribution map for the Creeper, *Strophitus undulatus*, was prepared by J. M. Smith, North Carolina State Museum (NCSM), as an example of the maps to be included in the Atlas of North American Freshwater Mussels, now being prepared by FMCS members. The dots represent verified and geo-referenced specimens in catalogued museum collections (This draft includes only *S. undulatus* records in the NCSM collection.). Additional authors for species accounts are still being recruited by the co-chairs of the FMCS Mussel Status and Distribution Committee: Arthur Bogan and John Harris. For more details about the Atlas and the need for more contributors, see the Announcement on page 9.

If you would like to contribute a freshwater mollusk-related image for use as a **Parting Shot** in *Ellipsaria*, e-mail the picture, informative caption, and photo credit to jjjenkinson@hotmail.com.

