Ellipsaria

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Leptoxis compacta (Anthony, 1854), Found for the First Time in Over 75 Years

Nathan V. Whelan. Department of Biological Sciences, University of Alabama, Box 870345, Tuscaloosa, Alabama 35487. nwhelan@crimson.ua.edu

In May 2011, the oblong rocksnail, *Leptoxis compacta* (Anthony, 1854), was found on a small shoal in the Cahaba River in Alabama near the Bibb and Shelby county line. This snail had last been collected in 1935 and was officially declared extinct in 2000 by

the International Union for the Conservation of Nature (IUCN). It had been believed that the oblong rocksnail had been driven to extinction due to historically poor water quality and habitat loss in the Cahaba River basin. The identification of wild caught *L. compacta* was confirmed using conchological comparisons to the lectotype and radulae of individuals collected in 1881. Life history and live animal observations were performed at the Alabama Aquatic Biodiversity Center (AABC) in Marion, Alabama, a non-game freshwater animal recovery center operated by the Alabama Department of Conservation and Natural Resources.

Recent specimen of *Leptoxis compacta* from the Cahaba River. Alabama Department of Conservation and Natural Resources photograph.

The Cahaba River Basin supports high species diversity, including 121 species of fish, 39 species of freshwater mussels, and 32 species of freshwater snails. Twelve of these aquatic species are listed as endangered or threatened under the U.S. Endangered Species Act -- the most in any single basin in Alabama. Recovery activities in the basin completed by several federal, state, and private agencies since 1985 have significantly improved water quality and riverine habitat in the Cahaba. It is unclear if these efforts allowed *L. compacta* to recover to detectable levels or if the species had merely been overlooked during previous surveys. The severe contraction of the historical range of *L. compacta* qualifies the species as critically endangered under IUCN criteria. Future management plans for *L. compacta* include an effort to establish a second population within the species' historic range with animals produced at AABC.

These findings were published in the August 8, 2012 edition of PLOS ONE by N.V. Whelan, P.D. Johnson and P.M. Harris. The article was published as open source and can be found at: http://dx.plos.org/10.1371/journal.pone.0042499.

Society News

Guntersville Symposium Abstracts Due by December 3, 2012

As indicated in the June issue of *Ellipsaria*, the 8th Biennial FMCS Symposium will be held the week of March 10-14, 2013 at Lake Guntersville State Park, outside of Guntersville, Alabama. This will be a general symposium with presentations on a range of research and management topics in both oral and poster format. The meeting will be hosted by the Alabama Department of Conservation and Natural Resources.

The tentative theme for this meeting is: "*Species Recovery and Restoration - from Concept to Implementation.*" This session will highlight implementation of river and mollusk recovery efforts. If you have an abstract that might fit well in this session, please contact Paul Johnson, the local committee chair at: paul.johnson@dcnr.alabama.gov

Second Call for Abstracts:

The general symposium will include both oral and poster presentations. Oral presentations will be limited to 20 minutes, including the question and answer period. Size of

the poster presentations will be limited to four feet high by four feet wide. If you wish to bring a display unit, special arrangements can be made.

Abstracts for posters and oral presentations will be limited to 300 words. The title should appear in all caps and bold, and be followed by the author name(s), and affiliation(s). Please underline the name of the presenter. Abstracts, which should be written in Word utilizing Arial 11 point font, should include clearly stated objectives, brief methods, general results, and the basic conclusion. The **abstract submission deadline is December 3, 2012**. Submit abstracts on-line at: fmcs2013symposium@gmail.com

Example abstract from a previous FMCS symposium:

ASSESSING THE HAZARDS OF CURRENT USE PESTICIDES TO EARLY LIFE STAGES OF NATIVE FRESHWATER MUSSELS. Robert B. Bringolf[1], LeRoy F. Humphries[2], Peter R. Lazaro[1], Chris Eads[2], Chris Barnhart[3], Damian Shea[1], Jay F. Levine[2], and W. Gregory Cope[1]. [1]Department of Environmental and Molecular Toxicology, North Carolina State University, Raleigh, NC 27695; [2]College of Veterinary Medicine, North Carolina State University, Raleigh, NC 27606; [3]Department of Biology, Missouri State University, Springfield, MO 65804.

Native freshwater mussels (family Unionidae) are among the most imperiled faunal groups in North America. Approximately 67% of the nearly 300 freshwater mussel species are considered vulnerable to extinction or already extinct. North Carolina has historically supported 56 species of mussels; however, 82% of those species are currently listed as endangered, threatened, or of special concern by the U.S. Fish and Wildlife Service and the State of North Carolina. Although numerous stressors have been implicated in the decline of freshwater mussels, the effects of pesticides on native mussels is largely unknown. Timing of pesticide application combined with the unique life history and reproductive strategy of mussels makes them susceptible to pesticide exposure. The objective of this study was to determine the hazards of pesticides to early life stages of freshwater mussels. We performed acute toxicity tests with glochidia (7 species) and juveniles (6 species) exposed to a suite of current use pesticides (atrazine, fipronil, pendimethalin, and permethrin) and a reference toxicant (NaCl). Our results indicate that these pesticides, at concentrations approaching water solubility, were not acutely toxic to the species of glochidia and juveniles tested. However, in a 21-d chronic toxicity test performed with 4-month old juvenile *Lampsilis siliquoidea* exposed to atrazine, the 14-d atrazine LC50 was 15.8 mg/L (95% confidence interval 12.0-19.5) and the 21-d atrazine LC50 was 4.3 mg/L (95% confidence interval 2.8-5.8). Effects on growth and genotoxicity (single-strand DNA breaks) were also determined in the chronic test. Our results indicate that the relative risk associated with acute exposure of early life stages of mussels to the current use pesticides tested singly is likely low; however, survival and genotoxicity results indicate that chronic exposure of juvenile mussels to atrazine may be impacting mussel populations and warrants further investigation, as does the assessment of pesticide mixtures.

At the bottom of the abstract page, please type:

1. The name, address, telephone, fax, and e-mail of the presenting author;
2. Preference for Platform or Poster presentation and willingness (yes or no) to convert from one format to the other; and
3. Whether the presenter is a Regular or a Student attendee

Provided they meet eligibility requirements, all students submitting abstracts will be judged for the best student platform or poster presentations, unless otherwise indicated.

Student Travel Awards Available:

CALLING ALL STUDENTS - To facilitate your participation in the 8th Biennial Symposium, travel awards are being offered by the FMCS. Support is provided as Society-paid lodging accommodations for the duration of the meeting at Lake Guntersville State Park. It is anticipated that eight awards will be made for the 2013 Symposium. A complete application package must be submitted by e-mail as a PDF file to Dr. Teresa Newton, FMCS Awards Committee, on or before **December 31, 2013**. For more information, application forms, and procedures, please see the Awards Committee web site at http://molluskconservation.org/Mservices_awards.html or contact Teresa (tnewton@usgs.gov, phone 608-781-6217).

Facilities:

There are a number of housing options at the park, including 112 hotel rooms and suites from $80.10 or $90.00 (bluff side) per night; 15 lakeside cabins that can accommodate up-to 6 people ($112.50 per night); or 19 chalets for up-to 6 people at $103.50 per night. Chalets and hotel rooms are adjacent to the main lodge while cabins are approximately 1.25 miles from the mountaintop lodge. To make reservations you can reach the park at: (256) 571-5440 or (800) 548-4553. You can find out more information about Lake Guntersville State Park on the web at: http://www.alapark.com/LakeGuntersville/

Symposium Registration:

Advanced registration will be available on the FMCS website within the next few weeks.

Call for FMCS Officer Nominations

The FMCS is seeking nominees for three Society positions: President-Elect, Secretary, and Treasurer. These new officers will assume their positions in March 2013 during the Symposium in Alabama. Any member may nominate any other member. Nominees must be current FMCS members in good standing and agree to be nominated. **The deadline for these nominations is Friday, October 5, 2012.**

The Nominations Committee will select the two candidates for each office who receive the most nominations and who are willing to run for that office. We anticipate that position statements from the candidates will be posted in the December 2012 issue of *Ellipsaria*, and that voting will be done on-line during December.

Send your **nominations to**: **Leroy Koch**, U.S. Fish and Wildlife Service, J.C. Watts Federal Building - Room 265, 330 West Broadway, Frankfort, Kentucky, USA 40601 or by e-mail: Leroy_Koch@fws.gov . Remember, **the deadline for nominations is October 5, 2012.**

Call for 2013 Professional Award Nominations

Do you know someone who has made worthwhile contributions to mussel conservation or to our Society, either through donating their professional time and expertise or through their scientific endeavors? Consider nominating them for one of the three FMCS Professional Awards. **Nominations** and supporting documentation **are due on December 31, 2012**. See the Awards Committee web site at http://molluskconservation.org/Mservices_awards.html for more details. For more information, contact Dr. Greg Cope, greg_cope@ncsu.edu , 919-515-5296 or Dr. Teresa Newton, tnewton@usgs.gov , 608-781-6217.

FMCS Fall 2012 Board Meeting

The 2012 FMCS Fall Board Meeting will be held starting at 3:00 PM on Tuesday afternoon, November 13th, at the Thomas More College Field Station, California, Kentucky (near Cincinnati). All FMCS members are welcome to attend. For further information, contact Caryn Vaughn, cvaughn@ou.edu.

Developing a Mussel ID App: A Progress Report

Susan Oetker, Mussel Status & Distribution Committee

Since the Board Meeting in April, major progress has been made on the development of an app for smartphones to assist with mussel identification. Stan Martin, a developer at North Carolina State University, has worked closely with Art Bogan to develop the app for the Clinch River fauna for beta testing. Currently, the beta version has been developed for both iPhone and Android users, and it includes over 30 species. In the next few months, the latest version will also be available on the internet for intial evaluation, as well. The subcommittee is currently looking for additional funding sources; however, the amount of work that has been completed with the initial funding from FMCS has been phenomenal. The Mussel App-coming to a smartphone near you.

Regional Meetings

Meeting Announcement – OVUM VI – 6 October 2012 – Fort Wayne, Indiana

Hosted by Warren Pryor (wpryor@sf.edu) and Andrea Geyer (ageyer@sf.edu)
Achatz Hall of Science, University of Saint Francis, Fort Wayne, Indiana

The Ohio Valley Unified Malacologists (OVUM) is an annual one-day meeting founded by Francisco Borrero and Tim Pearce in 1997. There are no dues, officers, abstracts, bylaws or publications. This meeting provides a friendly, inexpensive forum for professional and amateur students of mollusks to share with each other their results and ideas. Participants are encouraged to present their science, but active listening and insightful questions are extremely valuable, too. Giving a presentation is not a requisite for attending. Register for free on-line at:
http://ohiovalleyunifiedmalacologists6.blogspot.com/2012/07/6-oct-2012.html

Tentative schedule for October 6:

8 AM	Meet and Greet with hot beverages and pastry
9 AM	Morning session
12 Noon	Lunch
1 PM	Afternoon session
5 PM	Optional field excursion to Indiana Biological Station at Crooked Lake

Upcoming Meetings

September 4 – 7, 2012 -- International Meeting on Biology and Conservation of Freshwater Bivalves, Campus of Santa Apolónia of the Polytechnic Institute of Bragança, Bragança, Portugal http://esa.ipb.pt/bivalves/

November 11 – 15, 2012 -- Society of Environmental Toxicology and Chemistry (SETAC) 33rd North American Annual Meeting, Long Beach, California Theme: *"Catching the Next Wave: Advancing Science through Inovation and Collaboration"* http://longbeach.setac.org/

March 10 – 14, 2013 -- FMCS 8th Biennial Symposium, Guntersville State Park, Guntersville, Alabama Theme: "*Species Recovery and Restoration - from Concept to Implementation*."

May 19 – 23, 2013 – Society for Freshwater Science Annual Meeting, Jacksonville, Florida Theme: *Energy production and aquatic biodiversity: Understanding the threats, planning for ecosystem management* http://www.freshwater-science.org/Annual-Meeting.aspx

July 21 – 25, 2013 – Society for Conservation Biology 26th International Congress for Conservation Biology, Baltimore, Maryland Theme: "*Connecting systems, disciplines and stakeholders*" http://www.conbio.org/mini-sites/iccb-2013

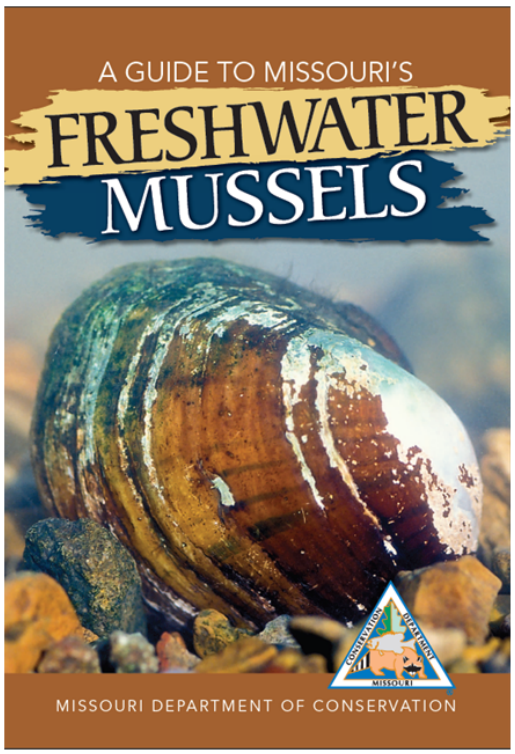
July 21 – 28, 2013 – The American Malacological Society will take part in the 2013 World Congress of Malacology to be held in the Azores. More information is available at: http://www.malacological.org/meetings/wcm2013_circular1.pdf

New Publications

A Guide to Missouri's Freshwater Mussels

By:

Stephen McMurray & J. Scott Faiman, Missouri Department of Conservation,
Andy Roberts & Bryan Simmons, U.S. Fish and Wildlife Service, and
M. Christopher Barnhart, Missouri State University



This new free publication is now available from the Missouri Department of Conservation Distribution Center. This 94 page guide provides clear pictures, key characteristics, and up-to-date distribution maps for all of Missouri's native freshwater mussel species, the invasive zebra mussel, and Asian clam. To order a copy, send an e-mail to: Pubstaff@mdc.mo.gov with the name of the publication, your name, and mailing address.

Contributed Articles

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

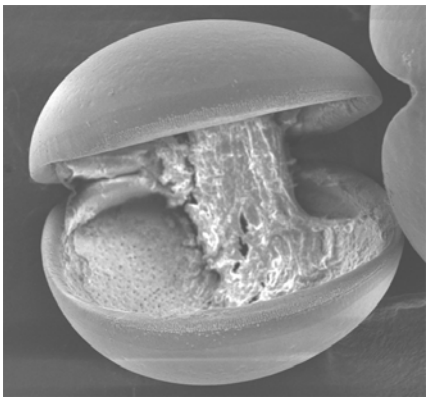
Additional Minnows and Topminnow Identified as Suitable Hosts for the Sheepnose, *Plethobasus cyphyus (*Rafinesque, 1820)

Kiru Wolf[1], **Mark Hove**[1,2], **Bernard Sietman**[3], **Sarah Boyer**[2], and **Dan Hornbach**[2]
[1] University of Minnesota, 1980 Folwell Ave., St Paul, MN 55108
[2] Macalaster College, 1600 Grand Ave, St Paul, MN 55108
[3] Minnesota Dept. of Natural Resources, 500 Lafayette Road, St Paul, MN 55155

The sheepnose (*Plethobasus cyphyus*) is a Federal Endangered mussel that was historically widespread in the Mississippi River system. To assist with conservation efforts, we have been researching sheepnose life history, including suitable hosts for the glochidia (Guenther *et al.*, 2009). The purpose of this study was to confirm and expand the list of known hosts.

We followed standard protocol for identifying suitable glochidia hosts. Gravid mussels were collected from the Chippewa River near Meridean, Wisconsin. A total of 61 fish species (14 families) were inoculated with sheepnose glochidia at 22°C. Of these, 12 species were suitable hosts (Table 1). More than half of these fishes had a survival rate of less than 50% compared to an average survival rate of 99% for non-cyprinids.

We tested a variety of fish species in this study and found for the first time that *Fundulus diaphanus*, *Nocomis biguttatus*, *Notemigonus crysoleucas*, *Notropis hudsonius*, and *Semotilus atromaculatus* are suitable sheepnose hosts. We observed high mortaility for several fish species. The mechanism(s) for the higher mortality are unknown and require further study.



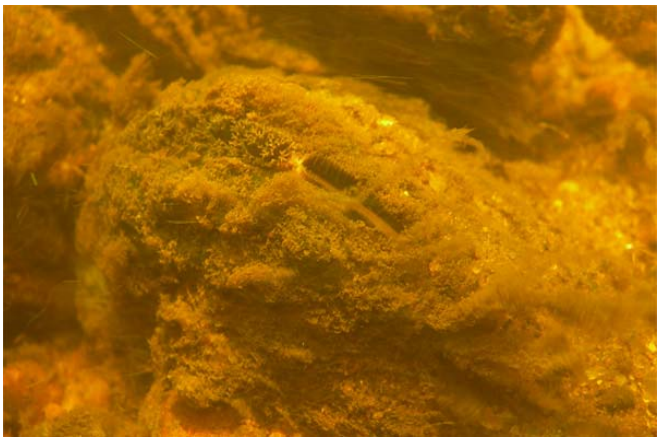
Sheepnose glochidium

Table 1. Positive sheepnose host suitability trials.

Fish species*	No. fish inoculated	Days to transformation	No. juvenile mussels	No. fish survivors	Percent survival
Cyprinella spiloptera	49	11-23	63	0	0
Cyprinella whipplei	5	12	1	0	0
Luxilus chrysocephalus	2	14-21	9	2	100
Luxilus cornutus	21	9-17	8	7	33
Nocomis biguttatus	19	12-23	79	15	79
Notemigonus crysoleucas	10	13-32	67	4	40
Notropis hudsonius	27	10-20	31	0	0
Notropis nubilus	9	22-24	6	8	89
Pimephales notatus	7	12	2	2	29
Pimephales promelas	22	16-27	11	6	27
Semotilus atromaculatus	7	14-19	25	4	57
Fundulus diaphanus	22	13-16	6	6	27

* Nomenclature follows Robins *et al.*, 1991

Bluntnose minow, *Pimephales notatus*, a suitable sheepnose host



Sheepnose branched aperture papillae

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Robins, C. R., R. M. Baily, C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea, and W. B. Scott. 1991. A list of common and scientific names of fishes from the United States and Canada. American Fisheries Society Special Publication 20, Bethesda, Maryland. 183 pp.

A Summary of Glochidia Hosts for *Pyganodon cataracta* (Say, 1817) and Evidence of Additional Fish Hosts (*Fundulus diaphanus* and *Apeltes quadracus*) from Nova Scotia

Sheldon D. Lambert[1] and **Andre L. Martel**[2]

[1]*St. Lawrence Islands National Park, 2 County Rd. 5, Mallorytown, ON, K0E 1R0, CANADA*

[2]*Malacology, Canadian Museum of Nature, P.O. Box 3443, Station D, Ottawa, ON, K1P 6P4, CANADA*

Correspondance: S. Lambert; e-mail: sheldon.lambert@pc.gc.ca

The Eastern Floater, *Pyganodon cataracta* (Say 1817), is a widely distributed freshwater mollusc from Florida to Nova Scotia (Clarke 1981). This species is a habitat and substrate generalist, and is considered one of the most common freshwater mussels in eastern Canada (Martel et al. 2010). There has been recent debate about the phylogenetic relationship with the closely related *Pyganodon fragilis* (Lamarck 1819) (Newfoundland Floater) (Cyr 2007; Cyr et al. 2007; Stanton 2008).

As with most freshwater mussels, the early growth of *P. cataracta* includes a period of larval encystment on freshwater fish. Reports of host fish for *P. cataracta* have documented glochidia attachment on 12 species of fish, most of which belong to different taxonomic families (Table 1). It should be noted, given the taxonomic uncertainty between *P. cataracta* and *P. fragilis*, that the entries in Table 1 may be representative of both species. Based on its wide geographical distribution and the wide range of freshwater habitats where this species occurs, it is not surprising that *P. cataracta* shows a lack of glochidia host specificity. Two additional host fish for *P. cataracta* are documented in this note, re-confirming that this mussel is a generalist when it comes to selection of a host fish within any given habitat.

Since 2002, *Pyganodon cataracta* has been monitored at Freshwater Lake in Cape Breton Highlands National Park, Nova Scotia, Canada. Freshwater Lake (N46° 38' 41.6", W60° 23' 48.4") is a mesotrophic

lake with circumneutral pH and a water surface area of 43 hectares. Extensive snorkel surveys around the lake in four different years have revealed the presence of only one species of mussel: *P. cataracta*. Voucher specimens have been placed at the Nova Scotia Museum of Natural History. The watershed is disconnected from any other stream or lake sources that might harbour additional unionid populations. Therefore, any glochidia found attached to fish in the lake are presumed to be those of *P. cataracta*.

During 2008, fyke nets were used to characterize the diversity and relative abundance of the fish community in Freshwater Lake. Individual fish that died during this sampling program were brought to the laboratory and examined under a stereo-microscope for the presence of attached mussel glochidia. With the exception of one sample, all fish mortalities were collected June 10-18, 2008.

Fifteen of the 19 fish examined (78 %) had attached glochidia. The glochidia were attached to both fins and the skin layer of the fish. Glochidia size ranged from 320 to 350 micrometers (see Figure 1). The four fish species that had attached glochidia were: *Gasterosteus aculeatus* Linnaeus 1758 (Three-spined Stickleback); *Pungitius pungitius* (Linnaeus 1758) (Nine-spined Stickleback); *Fundulus diaphanus* (Lesueur 1817) (Banded Killifish); and *Apeltes quadracus* (Mitchill 1815) (Four-spined Stickleback). The latter two fish species have not been reported as glochidial hosts for *P. cataracta* in the surveyed literature.

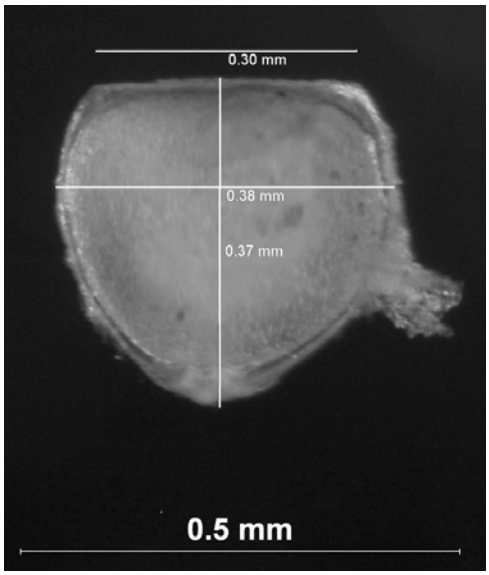

Figure 1. *P. cataracta* glochidium removed from *Pungitius pungitus*

Nine-spined Stickleback -- Two of three specimens of *P. pungitius* had six attached glochidia distributed around the body with 33% attached to the pectoral fins (Figure 1). Beaudet (2006) noted *P. pungitius* as a host for *Pyganodon cataracta*. Wiles (1975) had also identified a glochidium attached to *P. pungitius* but could not determine if was: *Pyganodon cataracta*, *Pyganodon fragilis*, or *Anodonta implicata* Say 1829 (Alewife Floater). Given these findings, it seems likely that *P. pungitius* can act as a host for *P. cataracta*.

Three-spined Stickleback -- The single specimen of *G. aculeatus* that was examined had ten attached glochidia around its fins, five of which were on the anal fin. The utilization of *G. aculeatus* as a host for *P. cataracta* was first suggested by Wiles (1975); however, he could not differentiate between the glochidia of *Pyganodon cataracta* and *Anodonta implicata*. Threlfall (1986) has previously noted glochidia that were attached to *G. aculeatus* in Newfoundland, with the typical site of host infection being the gill area.

Four-spined Stickleback -- The four individuals of *Apeltes quadracus* examined had 4-15 attached glochidia (Figure 2). While attachment sites involved different parts of the body, 68% of the attached glochidia were found on the pectoral fins. No specific references could be found to *A. quadracus* acting as a host for *P. cataracta* (Watters 1994; Martel et al. 2010). However, a glochidium of "*Anodonta* sp." (either *P. cataracta*, *P. fragilis*, or *A. implicata*) was found attached to *Apeltes quadracus* in the study by Wiles (1975).

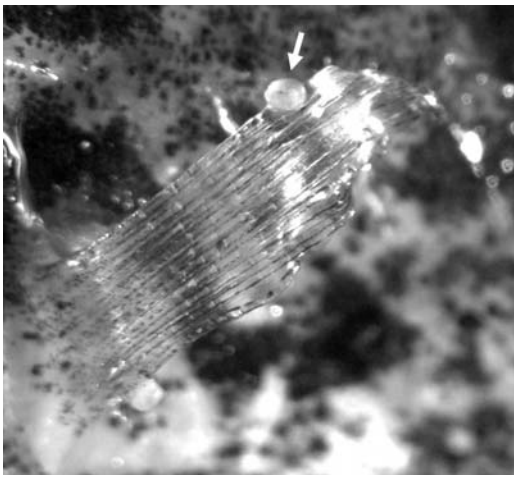

Figure 2. *P. cataracta* glochidium attached to the pectoral fin of *Apeltes quadracus*

Banded Killifish -- Eight of the eleven specimens of adult *Fundulus diaphanus* contained attached glochidia. While the majority of *F. diaphanus* contained only 1-3 attached glochidia each, one of them had 42 attached glochidia. Interestingly, this specimen was collected on May 21, 2008. Among the 55 attached glochidia observed, the three most common points of attachment were pectoral fins (29%), caudal (23%) and pelvic fins (14%). *Fundulus diaphanus* has not previously been reported as a host for the glochidia of this mussel; however, Trdan & Hoeh (1982) successfully infested glochidia infestation of *F. diaphanus* in the laboratory on a congener of *P. cataracta*, *Pyganodon grandis* Say 1829 (Giant Floater) and on a related

species, *Utterbackia imbecillis* (Say 1829) (Paper Pond-shell). Watters (1994) listed several other mussel species that use *F. diaphanus* as a host, notably; *Elliptio complanata* (Lightfoot 1786) (Eastern Elliptio), *Ligumia recta* (Lamarck 1819) (Black Sandshell), *Lasmigona complanata* (Barnes 1823) (White Heelsplitter), and *Actinonaias ligamentina* (Lamarck 1819) (Mucket).

The presence of attached glochidia in this study strongly suggests that *Pyganodon cataracta* use these fish species as hosts in Freshwater Lake. Definitive host confirmation, however, might require in-situ or experimental manipulations to confirm the transformation of the glochidia into an adult mussel.

The large number of host fish for *Pyganodon cataracta* could in part explain the broad geographical range of this species in Eastern North America as well as it ecological success in various types of lentic and lotic habitats.

Table 1. Identified glochidial hosts for *Pyganodon cataracta*

Fish Host	Information Sources	Type of Infestation
Ambloplites rupestris (Rafinesque 1817) Rock Bass	Gray et al. 1999	Natural infestation with metamorphosis
Apeltes quadracus (Mitchill 1815) Fourspine Stickleback	This study; Wiles 1975	Both studies indicate natural infestation
Catostomus commersoni (Lacepède 1803) White Sucker	Gray et al. 1999; Wiles 1975	Natural infestation with metamorphosis; Natural Infestation
Cyprinus carpio Linnaeus 1758 Common Carp	Lefevre and Curtis, 1910	Experimental Infestation
Fundulus diaphanus (Lesueur 1817) Banded Killifish	This Study	Natural Infestation
Gasterosteus aculeatus Linnaeus 1758 Threespine Stickleback	Beaudet 2006; Threlfall 1986; Wiles 1975	All three studies indicate natural infestation
Lepomis gibbosus (Linnaeus 1758) Pumpkinseed	Connor 1905; Wiles 1975; Gray et al., 1999	All three studies indicate natural infestation; Gray et al. (1999) also indicated metamorphosis
Lepomis macrochirus Rafinesque 1819 Bluegill	Gray et al. 1999	Natural infestation with metamorphosis
Luxilus cornutus (Mitchill 1817) Common Shiner	Beaudet 2006	Natural infestation
Notropis altipinnis (Cope 1870) Highfin Shiner	Eads et al. 2007	Experimental infestation
Perca flavescens (Mitchill 1814) Yellow Perch	Wiles 1975; Gray et al. 1999	Both studies indicate natural infestation
Pungitius pungitius (Linnaeus 1758) Ninespine Stickleback	This study; Beaudet 2006; Wiles 1975	All three studies indicate natural infestation
Rhinichthys atratulus (Hermann 1804) Blacknose Dace	Beaudet 2006	Natural infestation
Semotilus atromaculatus (Mitchill 1818) Creek Chub	Beaudet 2006	Natural infestation

Acknowledgements

This project was carried out with the help of several people over the course of other projects. The authors are grateful for initial laboratory work conducted by Krista Chin, Hanna Morrison, and Rebecca Rizzato. The authors are also thankful for comments on an earlier draft from Dr. Donald McAlpine at the New Brunswick Museum, and for assistance from Jacquie Madill at the Canadian Museum of Nature.

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Taxonomic Status of Pigtoe Unionids in Texas

Robert G. Howells[a], Charles R. Randklev[b], and **Neil B. Ford[c]**

[a] BioStudies, Kerrville, Texas, biostudies@hctc.net; [b] Texas A&M University, College Station, Texas, crandklev@tamu.ag.edu; [c] University of Texas-Tyler, NFord@uttyler.edu.

Among the pigtoes, three *Fusconaia* and one *Pleurobema* have generally been considered to occur in Texas. Texas Pigtoe (*F. askewi*), Wabash Pigtoe (*F. flava*), and Louisiana Pigtoe (*P. riddellii*) have been historically reported from the San Jacinto drainage to the Red River system (Howells et al. 1996; Howells 2010a, b, c) and Triangle Pigtoe (*F. lananensis*) restricted to the Angelina River-Attoyac Bayou and Village Creek waters of the Neches-Angelina drainage (Howells et al. 1996; Howells 2010a, d). The fusconaid, *F. chunii*, has been treated by nearly all recent authorities as a synonym of the Wabash Pigtoe, but without genetic confirmation. Louisiana Pigtoe is morphologically and biochemically unique and easily distinguishable from *Fusconaia* species; identification is only a concern outside Texas where

other members of the genus occur. However, identification and distribution of Texas *Fusconaia* has been, and remains, confused.

Physical descriptions alone often fail to fully address the degree of variation in these species. The Wabash Pigtoe, *F. flava*, (Figure 1) is widely recognized as having many forms, ranging from thinner-shelled, oval smaller stream morphs to heavy-shelled, triangular, big-river types; externally it may have a yellowish tint and nacre ranges from white to pink throughout.

Figure 1. Wabash Pigtoe (*Fusconaia flava*) morphs from small-stream to big-river forms in the Mississippi River Basin. No biochemical genetic studies to data have confirmed that this species occurs in Texas.

Texas Pigtoe, *F. askewi*, (Figure 2) may be oval to subtriangular or sub-rectangular, external coloration is reddish-chestnut brown to black, nacre is often white with pink tints exterior to the pallial line, but can be completely white, pink, or orange. The pink coloration exterior to the pallial line in some Texas Pigtoe is not diagnostic; indeed, other unionid species in eastern Texas may show this same trait (Figure 3).

Figure 2. Texas Pigtoe (*Fusconaia askewi*) from Texas. Nacre color may be white with a pink tint exterior to the pallial line or completely white or pink. It may also have yellowish Tulberg-layer blotches or pearly bumps on the nacre like those that can occur in any unionid species.

Figure 3. Rock Pocketbook (*Arcidens confragosus*) and several other unionids from eastern Texas can show the same pink tints exterior to the pallial line that is sometimes seen in Texas Pigtoe (*Fusconaia askewi*).

Triangle Pigtoe, *F. lananensis*, (Figure 4) is usually sub-rectangular (despite its common name), chestnut brown to black externally, and with nacre that is pink to white, usually with yellowish blotches and pearly bumps. The yellow-tinted external coloration in some pigtoes from Texas, some of which have been identified as *F. chunii* in the past, suggests they may be forms of Wabash Pigtoe (Figures 5

and 6). The pearly "excrescences" and yellowish blotches reported in the description of Triangle Pigtoe are little more than the same flaws seen at times in virtually any unionid (Howells 2010d). These are not taxonomically diagnostic, but have been the source of some confusion.

Figure 4. Triangle Pigtoe (*Fusconaia lananensis*) from the Neches-Angelina drainage, Texas. Most show yellowish blotches on a pinkish nacre and have pearly bumps, but can be nearly white and free from physical or coloration flaws.

Figure 5. Fusconaid pigtoes from the San Jacinto River, Texas. These have been variously considered to be *F. flava* (*F. chunii*), *F. askewi*, and *F. lananensis*, but have not been subjected to biochemical genetic analysis. Some are similar to certain morphs of *F. flava*, none closely resemble *F. lananensis*, and it is possible all are only forms of *F. askewi*.

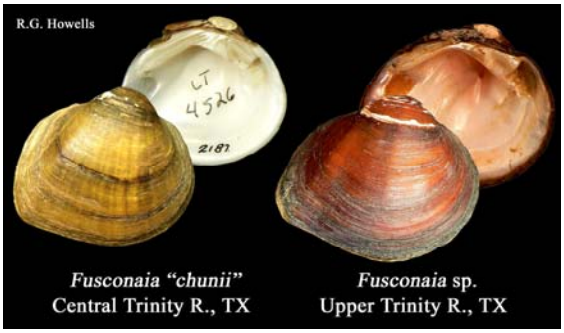

Figure 6. Fusconaid pigtoes from the Trinity River, Texas, that have been considered to be *F. flava*, *F. chuni*, and *F. askewi*, but without biochemical confirmation. The example above left is nearly identical to the type of *C. chunii* and both differ from classic examples of *F. flava* and *F. askewi*.

Electrophoretic analysis of Texas Pigtoe (Sabine River), Triangle Pigtoe (Attoyac Bayou), Wabash Pigtoe (Ohio R., Indiana), and Gulf Pigtoe (*F. cerena*; Pascagoula R., Mississippi) (Howells 1995) and subsequently with additional Texas, Triangle, and Wabash pigtoes from other locations (unpublished, but noted in Howells 2010b, d) found that Texas-Triangle pigtoes were easily distinguished from Wabash and Gulf pigtoes, but with no significant differences found between Texas and Triangle forms. Christian et al. (2008) employed DNA analysis to demonstrate a clear difference between Texas Pigtoe from the Sabine River and Wabash Pigtoe. In an expanded DNA analysis of these same species and others, Hayes (2010) found Texas-Triangle types to be distinctly different from Wabash and Gulf pigtoes, but with very little genetic difference between them. Neither Howells nor Hayes found any confirmation of Wabash Pigtoe in tissue samples from Texas, but neither appears to have had examples of the Texas *flava-chunii* morphs; however, these have been found in the Trinity, Big Cypress, and Sulphur drainages in recent surveys (Ford, pers. obs.). All three found Louisiana Pigtoe (Figure 7) to be a unique taxon as well, and recent surveys have found it in several Texas drainages.

Figure 7. Louisiana Pigtoe (*Pleurobema riddellii*) is the only pleurobemid present in Texas. It has white, rarely peach, nacre. High beaks; a distinct posterior ridge; and more-massive pseudocardinal teeth, along with white soft tissues, readily distinguish it from fusconaids in Texas.

Burlakova et al. (2012) repeated these DNA studies with specimens identified as Texas and Triangle pigtoes. They, too, found no significant biochemical differences between these two species and, like prior work, found them distinct from Wabash and Gulf pigtoes. Their morphological descriptions of Texas and Triangle pigtoes, however, were extremely narrow, not acknowledging the full range of variation in either, and did not identify their tissue collection sites. *Fusconaia lananensis* listed from the Neches River are problematic given that this species occurs in tributaries of the Neches River, but not in the Neches River itself. Further, Burlakova et al. (2012) did not address the atypical *askewi*, *flava*, and *chunii* types from Texas that have never been studied biochemically, but, nonetheless, concluded that all *Fusconaia* in Texas are Texas Pigtoe.

Some recent surveys have found Texas Pigtoe to be more numerous, particularly in the Sabine drainage, than earlier studies had suggested (Ford 2009; Howells 2010b). Indeed, Burlakova et al. (2012) indicated "on average, *F. askewi* was the third most abundant species" in their "statewide" surveys. However, the objective of most of their field work was to examine locations with either abundant/diverse assemblages, or where rare species were known to occur (Burlakova and Karatayev 2010). This focus could have made "rare" species appear more abundant than they actually are. In more extensive surveys of various habitats in all the East Texas rivers, Ford et al. (2012) found the Texas Pigtoe to be common only in the upper Sabine River and only in rocky riffle sites, which are not a major component of any of these rivers. Texas Pigtoe (and some animals resembling Triangle Pigtoe) also was abundant in a single tributary of the lower Sabine River in Louisiana (CRR). The historic and recent Howells statewide database rates Texas Pigtoe as 10th and the Burlakova/Karatayev database provided to Texas Parks and Wildlife Department placed it 16th in relative abundance among all Texas unionid records.

It is possible that the Triangle Pigtoe is only an ecophenotype of the Texas Pigtoe and that true Wabash Pigtoe may not actually occur in Texas. No studies have genetically examined *F. chunii* types to clarify their status. However, because field identification is so difficult, we have limited understanding of actual distribution and abundance and, so, suggest that too little evidence is at hand to absolutely confirm any conclusion at this point in time.

Until more-definitive studies of biochemical genetics and morphological variation are available, it would seem to be premature to dismiss a rare, endemic unionid as taxonomically invalid without further confirmation. It would also be ill-considered to base status determinations on surveys focused on sites where that taxon is known to be numerous or conducted during record droughts when specimens are concentrated and easily located (as is the case in several recent surveys).

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Additional Information Concerning the Conquest of Europe by the Invasive Chinese Pond Mussel *Sinanodonta woodiana*. 28. News from the Czech Republic, the Netherlands, Poland, Serbia, and some General Information

Henk K. Mienis, The Steinhardt National Collections of Natural History, Department of Zoology, Tel Aviv University, IL-69978 Tel Aviv, Israel, *and* National Natural History Collections, Berman Building, Hebrew University, IL-91904 Jerusalem, Israel mienis@netzer.org.il

New information concerning the invasive Chinese Pond mussel *Sinanodonta woodiana* (Lea, 1834), Fam. Unionidae, in Europe appears regularly in a large variety of journals and reports. In this instalment, I present such records published in the past months in the Czech Republic, the Netherlands, Poland, Serbia and refer also to some general information.

The Czech Republic

In his study of the aquatic mollusc fauna of the lower part of the Lužnice River in South Bohemia, Beran (2012) mentioned the Chinese pond mussel from a single locality near its confluence with the Vltava River.

The Netherlands

In May 2011, three school kids found some large mussels in the valley of a small stream the Donge near Tilburg, North-Brabant. These shells turned out to be *Sinanodonta woodiana* (van der Leij, 2012). This is the first time that this invasive mussel has been reported from a more or less natural habitat in the Netherlands. The only previous record (van Peursen, 2011) was from a pond on a private plot. However, also in this new case, fish ponds seem to play a role because the specimens were actually found in ponds which were connected to the small river.

A website dealing with ponds and pond-life in the Netherlands has issued a warning neither to release specimens of the Chinese pond mussel nor fish kept together with *Sinanodonta woodiana* in ponds in natural waters, since these exotic mussels may endanger the local mussels (www.vijvervis.info/1_mossels_soorten_chinese.htm).

Poland

Research was carried out on *Sinanodonta woodiana* present in fishponds in Góra and Goczalkowice (Spyra et al., 2012). The biomass, density, and age structure of the Chinese pond mussels were analyzed. The highest recorded biomass was 4.413 g/m², while the mussel density represented by juveniles and adults up to 8 years old turned out to be 19 specimens/m². According to the authors, the rapid expansion of *Sinanodonta woodiana* in Europe is largely caused by the accidental release of glochidia bearing fish (i.e. carps).

Serbia

Kolarević et al. (2011) used specimens of *Sinanodonta woodiana* to measure the water quality of the river Danube. These invasive mussels turned out to be reliable tools for carrying out microbiological analysis and monitoring the genotoxicity of the Danubian waters.

General information

Zieritz et al. (2012) have published an important paper dealing with the identification of North and Central European adult mussels and their parasitic glochidia by a molecular method, which yielded rather convincing results. The pre-published electronic version of the article by Douda et al. on the hosts of the glochidia of *Sinanodonta woodiana* refered to in the December 2011 issue of *Ellipsaria* (13 (4):19) has now also appeared in a printed form (Douda et al. 2012).

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Douda, K., Vr tílek, M., Slavik, O. & Reichard, M. 2012 The role of host specifity in explaining the invasion success of the freshwater mussel *Anodonta woodiana* in Europe. Biological Invasions, 14:127-137.

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On the Presence of the Invasive Seminole Rams-horn *Planorbella duryi* in Israel and Palestine (Gastropoda, Planorbidae)

Henk K. Mienis[1] and Oz Rittner[2]

[1] The Steinhardt National Collections of Natural History, Department of Zoology, Tel Aviv University, IL-69978 Tel Aviv, Israel, and the National Natural History Collections, Berman Building, Hebrew University of Jerusalem, IL-91904 Jerusalem, Israel. mienis@netzer.org.il

[2] The Steinhardt National Collections of Natural History, Department of Zoology, Tel Aviv University, IL-69978 Tel Aviv, Israel. israelbutterflies@gmail.com

The original distribution of the Seminole rams-horn *Planorbella duryi* (Wetherby, 1879), Family Planorbidae, is restricted to Florida in the southeastern corner of North-America (Baker, 1945). Due to the fact that it has turned into a popular aquarium snail, it is now known from almost every continent, where it occurs mainly in garden ponds and other man-made aquatic biotopes (Figure 1).

Distribution of *Planorbella duryi* in Israel and Palestine

The first find of this exotic Planorbid species in Israel goes back to 1949 when the late Prof. H. Mendelssohn found some juvenile specimens in a pool in the Montefiori Quarter of Jerusalem. In the following 60 years, it has been found in widely separated localities all over Israel and Palestine, almost always in the neighbourhood of built up areas, which explains its highly anthropogenic distribution pattern.

We provide here a list of selected localities were *Planorbella duryi* has been collected in Israel and Palestine. All the records are based on material preserved in the National Mollusc Collections of the Hebrew University of Jerusalem (HUJ) and the Tel Aviv University (TAU MO). The localities are more or less arranged from north to south.

Figure 1. *Planorbella duryi* crawling on the Common Water Hyacinth, *Eichhornia crassipes.*

KIBBUTZ DAN, pools for propagation of aquatic plants, leg. Ch. Goldstein, 22.08.2004 (TAU MO 49031).
NAHAL NAVOT, leg. D. Milstein, 11.02.2011 (TAU MO 72537).
HALUZ, pond in garden, leg. Y. Sinai, 15.10, 2005 (TAU MO 54542).
HULA AGMON, in quarantine basin, on *Myriophylum* brought from the Botanical Garden of the Tel Aviv University, leg. Ch. Dimentman, 25.08.1997 (HUJ 8609).
SEA OF GALILEE, Zinbar coast, depth 4.2 m, leg. Ch. Dimentman, 21.01.1987 (HUJ 2878); off Poriyya junction, depth 1.5 m, leg. Ch. Dimentman, 21.01.1987 (HUJ 2879); on the shore near Deganiya, leg. M. Dolev, 08.11.1987 (HUJ 21414).
NAHARIYYA, pond in front of the municipality, leg. Y. Ishan, 1980 (HUJ 50574).
KARMEL MOUNTAINS, Nahal Ahuzza in pool, leg. U. Roll, 05.2005 (TAU MO 52776).
BREKHAT YA'AR, near Hadera, leg. R. Gil, 08.1996 (HUJ 5897).
DURA, temporary pool near Netaniyya, leg. D. Milstein, 12.1999 (HUJ 40668).
MOSHAV SAL'IT, in garden pond, leg. N. Stern, 30.08.2010 (TAU MO 70452).
RAMAT HASHARON, aquarium, leg. H. Steinitz, 18.01.2010 (TAU MO 67897).
BET BERL, in aquarium, leg. R. Lemberger, 17.03.1964 (TAU MO 30095).
'ENAT, channel, leg. D. Milstein, 22.05.2011 (TAU MO 73102).
EN AFEK, nature reserve near Antipatris, leg. D. Milstein, 13.07.2011 (TAU MO 73529).
RAMAT AVIV, pond at the corner of Brodetsky and Einstein Street, leg. H.K. Mienis, 03.02.2000 (TAU MO 30093); Tel Aviv University, Botanical Garden, pond and streams, leg. H.K. Mienis, 28.11.1994 (TAU MO 40854); in pool with *Pistia stratiotis*, leg. H.K. Mienis, 03.03.2005 (TAU MO 50251); in pond with *Eichhornia crassipes*, leg. H.K. Mienis, 14.08.2008 (TAU MO 60814); upper part of large tropical hot house, leg. H.K. Mienis, 19.05.2005 (TAU MO 51448); Tel Aviv University, Zoological Garden, leg. H.K. Mienis, 13.01.2003 (TAU MO 42913); Park HaYarqon near the Zappari, leg. A. Zibtin, 1998 (TAU MO 51312).
TEL AVIV, Abu Kabir, in pond of the old botanical garden of the Tel Aviv University, 1956 (HUJ 1228); also leg. H.K. Mienis, 12.03.1980 (HUJ 11407); old Tel Aviv Zoo, leg. H.K. Mienis, 07.1979 (HUJ 10906).
RISHON-LEZIYYON, pond in public garden in Herzl Street, leg. H.K. Mienis, 07.05.1975 (HUJ 31764); Shafdan, in "Dana's wetland", leg. D. Milstein, 08.04.2005 (TAU MO 50800); in aquarium shop, leg. O. Rittner & D. Milstein, 2011 (TAU MO 73720).
MAZKERET-BATYA, in refuse of fishpond, leg. B.S. Singer, 01.1999 (HUJ 7000).
NETZER SERENI, in garden ponds, leg. H.K. Mienis, 07.1973 (HUJ 31767); pond of school-farm, leg. H.K. Mienis, 03.1989 (HUJ 1674); in aquarium, leg. H.K. Mienis, 08.1994 (HUJ 12630).
GEZER, En Vered (= Ein Yered), leg. H.K. Mienis, 28.01.1993 (TAU MO 62632).
PARK CANADA, in the large reservoir, leg. S. Ashkenazi, 20.04.1993 (TAU MO 71860).
EIN DUYUK, leg. I. Platner, 06.1977 (HUJ 31766).
JERUSALEM, Montefiori, in pool, leg. H. Mendelssohn, 05.1949 (HUJ 10812); Knesset compound, in pond, leg. Sh. Hayat, 07.1978 (HUJ 32571); Givat Ram, Hebrew University, Berman Building, in aquarium, leg. H.K. Mienis, 27.07.2008 (HUJ 52021); Botanical Garden, the Freund Centre for Plant Introduction and Propagation, leg. H.K. Mienis, 19.02.1995 (HUJ 40481 & TAU MO 40853); in streams and pools in the "North American" forest opposite Givat Mordechai, leg. H.K. Mienis, 01.03.1995 (HUJ 40530); in pools, leg. H.K. Mienis, 04.2003 (TAU MO 50252).

ARTAS, Solomon Pools, leg. H.K. Mienis, 07.1974 (TAU MO 42661); also leg. Ch. Dimentman, Spring 1980 (HUJ 9081).
ALON SHEVUT, garden pond, leg. 23.11.1995 (HUJ 12664).
BEERSHEVA, Ben Gurion University of the Negev, pond near the Biological Department, leg. R. Ortal, 04.03.1989 (HUJ 40488).
EN DOHAN, 3 km south of Hatzeva, leg. J. Heller, 04.1994 (HUJ 39647).
SAPIR, in pond, leg. T. Ilani, 1985 (HUJ 40493); idem, leg. T. Ilani, 03.11.1992 (TAU MO 73560).

According to these data, *Planorbella duryi* has been collected in Israel not only from such anthropogenic places as aquariums and pools in gardens and parks (see also Roll et al., 2009), but also from springs, streams and even from the Sea of Galilee (Mienis, 2009). Yet it seems to be less adapted for establishing populations in natural habitats in Israel than the North-American Lymnaeid species *Pseudosuccinea columella* (Say, 1817) (Mienis & Rittner, 2012). Nevertheless, either temporary or permanent populations may be expected to occur near built up areas throughout Israel and Palestine (Milstein, Mienis & Rittner, 2012) and in such places *Planorbella duryi* may turn into a serious competitor of local freshwater species (Mienis, 2009).

It remains a problem that this invasive species is still being commonly sold in aquarium shops. Even more regrettable is the habit of aquarium owners to release their excess snails, usually in nearby natural aquatic habitats.

Variation in shell form

The shell morphology of *Planorbella duryi* is highly population dependant. Most specimens collected in Israel show a rather high shell (Figure 2A), while the shell height may be considerably reduced in other populations (Figure 2B). Populations also occur with rather scalarid shells (Figure 2C), but they are scarce in Israel and Palestine, and local representative samples are at this moment not available in the National Mollusc Collections. In the past, these forms have received numerous separate specific or subspecific names (Pilsbry, 1934; Baker, 1945), however, they are now considered at most simple variations.

Predation

So far, only predation on *Planorbella duryi* by the leech *Helobdella triserialis* has been reported from Israel (Mienis, 1986 & 2010). In the past, such cases of predation have been recorded from Kibbutz Netzer Sereni, but more recently it was also registered as occurring in the Botanical Garden of the Tel Aviv University.

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We thank Dr. Chanan Dimentman (Hebrew University of Jerusalem), Dr. Reuven Ortal (formerly of the Nature Reserves Authority) and Dr. D. Milstein (Nature Reserves and National Parks Authority) for lodging their material in the National Mollusc Collections of the Hebrew University of Jerusalem and the Tel Aviv University.

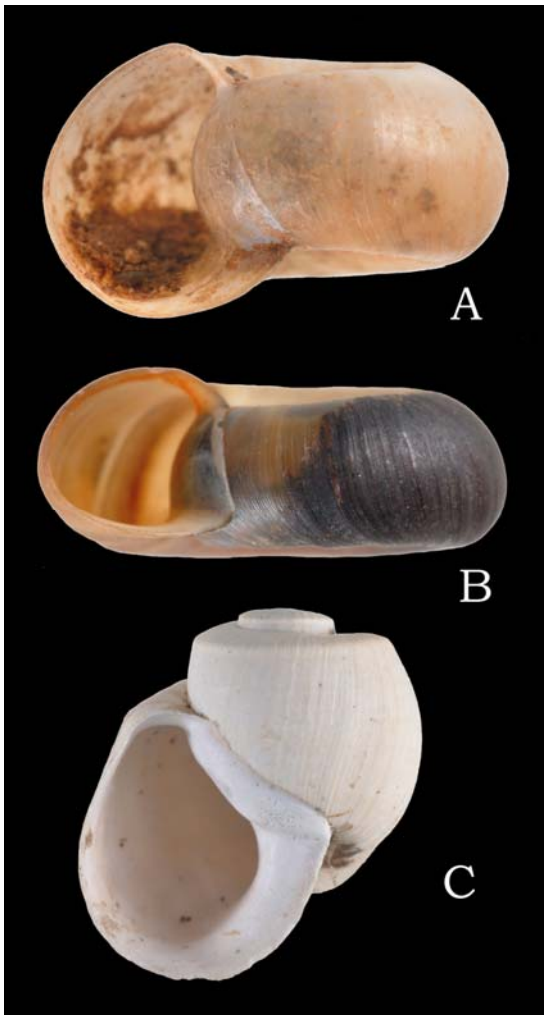

Figure 2. *Planorbella duryi*.
A. Typical form;
B. Depressed form;
C. Scalarid form (from Lake Albano, Italy).

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First Confirmed Occurrence of Amphibian Slugs *Omalonyx* (Gastropoda: Pulmonata: Succineidae) in an "Irrigated Rice Experimental Station" Located in Southernmost Brazil

A. Ignacio Agudo-Padrón, Project "Avulsos Malacológicos – AM," Caixa Postal (P. O. Box) 010, 88010-970 Centro, Florianópolis, Santa Catarina - SC, Brasil ignacioagudo@gmail.com
http://noticias-malacologicas-am.webnode.pt

Omalonyx convexus (Heynemann, 1868), representative pulmonate gastropod species of the genus *Omalonyx* d'Orbigny, 1837 and family Succineidae Beck, 1837, is present in several localities of the Rio Grande do Sul/ RS State, southernmost Brazil region (Agudo-Padrón 2009:6; Arruda 2007:43-Figure 1; Arruda 2011:75-Figure 16A, 76-Figure 17; Arruda and Thomé 2011:99-Figure 2). Specifically for the state territory of Cachoeirinha Municipal District, records of this little amphibian slug species are remarkably limited (Arruda 2007:8, 17, 42; Arruda and Thomé 2008a:95, 2008b:161, 164-Figure 4; Arruda 2011:39, 79-Table 3; Arruda and Thomé 2011).

Recently, on May 28, 2012, in the course of limnic shelling (see Agudo-Padrón 2012a) in riverside of fish pond/ dam located in the Cachoeirinha's Rice Experimental Station of the "Riograndense Institute of Irrigated Rice – IRGA" (Agudo-Padrón and Oliveira 2008; Agudo-Padrón *et al* 2009) (Figure 1), three *Omalonyx convexus* (Heynemann, 1868) specimens presenting different sizes were collected by us between wet vegetation that develops in place. These specimens were 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 09548).

This short report characterizes "the first confirmed record" of amphibian slugs for this specific locality of the "Great Porto Alegre" Metropolitan region, increasing to 19 the number of known continental mollusks (13 limnic/ freshwater forms – 6 Gastropoda and 7 Bivalvia, and 6 terrestrial Gastropoda) in it occurring (Agudo-Padrón *et al* 2010:10).

To recognize the physical appearance of the species, see Agudo-Padrón 2012b:23-Figure 2).

Figure 1. Aspect of the collection place (fish pond/ dam, left) located in the Rice Experimental Station, "Riograndense Institute of Irrigated Rice – IRGA" (right).

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Two New Freshwater Mussel Records from the Upper Uruguay River Basin Region in Santa Catarina State/ SC, Central Southern Brazil

A. Ignacio Agudo-Padrón, Project "Avulsos Malacológicos – AM," Caixa Postal (P. O. Box) 010, 88010-970 Centro, Florianópolis, Santa Catarina - SC, Brasil **ignacioagudo@gmail.com**
http://noticias-malacologicas-am.webnode.pt

The following report brings to 192 the total number of continental mollusks, terrestrial and freshwater, known to the State of Santa Catarina/ SC, Central Southern Brazil region, including 28 freshwater/ limnic bivalves (25 natives + 3 exotic invaders): 19 Unionoida, 8 Veneroida, 1 Mytiloida:

Biogeographically, the highest occurrences of freshwater/ limnic bivalve species in the State of Santa Catarina/ SC occur in the "Upper Uruguay River Basin" (Agudo-Padrón 2008 a: 150), along its western territorial border, and in the "Chapecó River", located its inferior portion (mouth) in the Municipal District of the same name (Figure 1), is your largest tributary on lands of this state, showing very sinuous along its course. Its total area is 8.180 km² and its length is about 248 km. It has a longitudinal profile with a long journey and the occurrence of numerous waterfalls, representing an important hydroelectric potential wealth for the state of Santa Catarina, so seriously compromised its environmental integrity (in fact, two great installations of this type are already operating in the region: "Foz de Chapecó" and "Quebra-Queijo" hydropowers, also other nine projects in study/ inventory).

I. *Diplodon* (*R.*) *koseritzi* (Clessin, 1888): an unexpected surprise

On 03/07/2012, a total of three singular native freshwater mussel/ naiad specimens were sent to us for analysis by the Brazilian biologist Leonardo Kleba Lisboa, originating from the upper section of Chapecó River Basin in "Passos Maia" Municipal District (26°41'32"S; 51°54'58"W), with elevation of 976 m, field locality in the Western region of Santa Catarina State/ SC next to SC highway 453 (Figure 2).

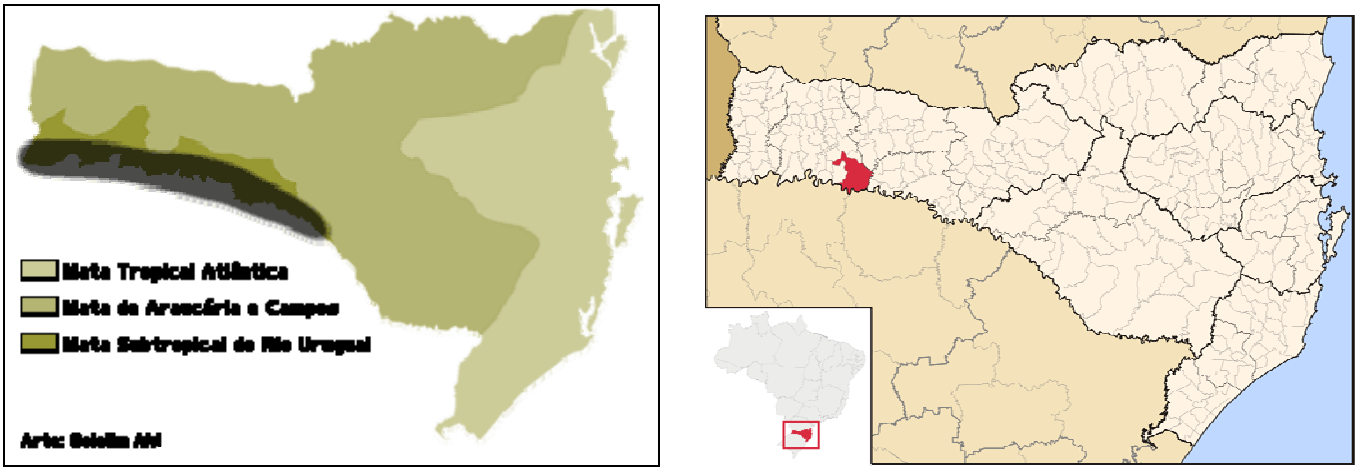

Figure 1. The Upper Uruguay River Basin (left, black color), and the Chapecó Municipal District (right, red color) in the geographical context of the Santa Catarina State/ SC.

Figure 2.- Passos Maia Municipal District (red color) in the geographical context of the Santa Catarina State (left), and environment regional aspect of the Upper Chapecó River Basin (right).

The taxonomic determination of these little bivalves (30 mm of length) was based on the fundamental contributions of Simone (2006) and Mansur and Pereira (2006), coming to the conclusion that they belong to the species *Diplodon* (*Rhipidodonta*) *koseritzi* (Clessin, 1888), representative of the Family Hyriidae (Figure 3), a freshwater mussel/ naiad so far have not reported for the Santa Catarina's State (Agudo-Padrón 2008: 167-168).

Figure 3. *Diplodon* (*R.*) *koseritzi* (Clessin, 1888) specimens of the Upper Chapecó River Basin

Originally collected by Daniel Dinslaken on 21/06/2012 (Biol. *Leonardo Kleba Lisboa*, Florianópolis/ SC, 03/07/2012, Pers. comm.), the specimens finally were 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 09559).

Also referred to by some contemporary authors (Simone 2006: 267) under the status *Rhipidodonta charruana* (d'Orbigny, 1835), considering the "original name" a synonym of this latter, situation in current discussion (Agudo-Padrón 2011 c), this species characterized by "non producing parasitic *glochidium* larvae". Coincidently, due to reason before exposure, mainly, in the neighboring State of Rio Grande do Sul/ RS, *Diplodon* (*Rhipidodonta*) *koseritzi* (Clessin, 1888) is a form considered in "endangered" status (Mansur & Pereira 2006: 1132; Pereira *et al* 2012: 92).

II. *Limnoperna fortunei* (Dunker, 1857): an expected invader

Starting from the year 2004 were initiated by us, in time, a sequence of public technical alerts about the vulnerability of the hydrographic system of the Santa Catarina's State territory before the aggressive invader advance of the asiatic golden mussel *Limnoperna fortunei* (Dunker, 1857), only

freshwater/ limnic representative known of the Family Mytilidae, in the principal South American river basins below the equatorial line, the Uruguay River* among them (Agudo 2004 a: 20, 2004 b; Agudo-Padrón 2006, 2007 a-b, 2008 b), all of which were totally "ignored or underestimated" by the corresponding regional authorities.

The great Uruguay River Basin is geographically born from the fork of the rivers "Pelotas" and "Canoas" of Santa Catarina's State/ SC, in the Municipal District of Celso Ramos – Campos de Lages region, emblem with the neighbor State of Rio Grande do Sul/ RS, currently occupied in its Upper section by a veritable "cascade" of large, medium and small hydroelectric power plants < http://www.natbrasil.org.br/Docs/cartilha_rio_uruguai/hidro2.pdf >

On 30-31/05/2012, a total of five photos of singular freshwater mussels, obtained on 26/05/2012, were sent to us for analysis by the Brazilian limnologist Prof. Érico Porto Filho, of the Department of Geosciences at the Federal University of Santa Catarina – UFSC, Florianópolis/ SC. These mussels came from the "Pelotas River Basin" in the downstream area of "Barra Grande" Hydroelectric Power Plant (therefore, in the neighbor reservoir of the "Machadinho" Hydroelectric Power Plant), Upper Uruguay River Basin border region in "Anita Garibaldi" Municipal District (Figure 4, left). Shortly after, on 06/06/2012, the same person forwarded a lot of 19 specimens presenting sizes between 6,0 and 17,0 mm of length, collected in the locality mentioned above previously on 30/05/2012, material finally received and examined by us on date 11/06/2012, with the posterior emission of corresponding document/ technical report to the requester.

The taxonomic determination of this material was that it is *Limnoperna fortunei* (Dunker, 1874) (Figure 4, right), a problematic exotic freshwater mussel not previously reported for the Santa Catarina's State (Agudo-Padrón 2011 b, 2012: 20).

Figure 4. Municipal District of Anita Garibaldi (left, red color), and general aspect of the asiatic golden mussel *Limnoperna fortunei* (right) from the "Pelotas River", SC State, Upper Uruguay River Basin region.

Photos and specimens were originally collected in field by the Technical José Manuzzi, of BAESA (regional enterprise that operates the "Barra Grande" Hydroelectric Power Plant) (Prof. Érico Porto Filho, UFSC, Pers. comm.). The lot was deposited by us 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 09547).

The above information was "partially submitted" in a recent local workshop by the requester (Porto Filho, 2012); however, the present is the first known published report confirming the "expected occurrence" of this invasive alien species in the Santa Catarina's State territory and the Upper Uruguay River Basin region.

In addition to the earlier, as reported in the technical literature (Pestana *et al* 2010: 555- Tabela 1, 556-Figure 1), occurrence of "larvae" of the species were recently found in Paraná State/ PR, in "São Mateus do Sul" Municipal District, on the right bank of the Iguaçu River Basin immediately adjacent to Santa Catarina State/ SC front of "Canoinhas" Municipal District, which is why the local river system North of the State also is seriously compromised by this exotic invader.

Already in the locality of "Porto Union," downstream of the previous, was confirmed before the

occurrence of another important invasive alien species: the Asian freshwater clam *Corbicula fluminea* (Müller, 1774) (Biologist Dr. Daniel Mansur Pimpão, IV IGNIS Forum Discussion about Fauna Threatened in Santa Catarina State, Camboriú, 02-03/03/2010, Com. pers. Also see Agudo-Padrón 2011a, page: 4).

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New Geographical Record of Freshwater Mussels/ Naiads in the Gravataí Municipal District, Great Porto Alegre, Rio Grande do Sul State/ RS, Southernmost Brazil Region

A. Ignacio Agudo-Padrón, Project "Avulsos Malacológicos – AM," Caixa Postal (P. O. Box) 010, 88010-970 Centro, Florianópolis, Santa Catarina - SC, Brasil ignacioagudo@gmail.com
http://noticias-malacologicas-am.webnode.

The Gravataí Municipal District, territory geopolitically belonging to Northern section of the Great Porto Alegre metropolitan region, Rio Grande do Sul State, RS, in the Southernmost Brazil (Agudo-Padrón 2009:4-Figure 2; Agudo-Padrón & Lenhard 2011:164-Figure 2; Agudo-Padrón 2012) (Figure 1), until now had only the record of three species of limnic/ freshwater bivalves (Agudo-Padrón & Lenhard 2011:164-165, 169): *Rhipidodonta charruana* (d´Orbigny, 1835) (Unionoida, Hyriidae), *Eupera klappenbachi* Mansur & Veitenheimer, 1975 and *Pisidium forense* Meier-Brook, 1967 (Veneroida, Sphaeridae).

Recently, on 08 and 19/06/2012, the new occurrence of five freshwater mussel/ naiad species (Unionoida - two Hyriidae and three Mycetopodidae) is registered by us for this territory in the next localities: the "Morungava stream", tributary sub-basin of the Gravataí river located in the District – 29°51'3"S; 50°55'3"W (Figures 2 and 3), and a central great pond/ dam located in the "Pampas Safari Creating Wildlife (native and exotic) Park", the largest safari park in South America, comprising an area of 320 hectares (Figure. 4), both localized for equal close to the RS-020 highway that crosses the region.

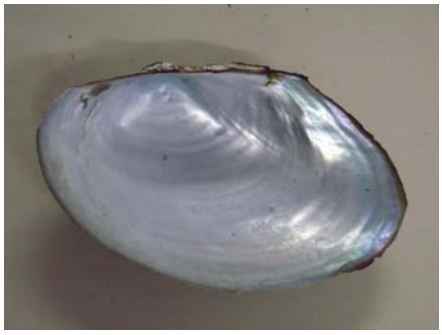
Figure 1. Gravataí Municipal District (red color) in the geographical context of the Rio Grande do Sul State/ RS territory, Southernmost Brazil

Figure 2. Aspect of the "Morungava stream", tributary sub-basin of the Gravataí River. Photograph by Biologist Everton Belloli Moura, Morungava, Gravataí, RS

Diplodon granosus (Bruguière, 1792)

Anodontites cf. obtusus (Spix, 1927)

Diplodon aethiops (Lea, 1860)



Anodontites trapesialis (Lamarck, 1819)

Anodontites cf. *trapezeus* (Spix, 1827)

Figure 2. New geographical records of local mussels/ naiads found inthe "Morungava stream", tributary sub-basin of the Gravataí River. Collection and photographs by Biologist Everton Belloli Moura, Morungava, Gravataí, RS

Anodontites obtusus (Spix, 1927)

Figure 3. Aspects of the central pond/ dam in the "Pampas Safari Creating Wildlife Park" (upper) and your new geographical record of local mussel/ naiad. Collection and photographs by Biologist Everton Belloli Moura, Morungava, Gravataí, RS

The taxonomic determination of the specimens/ shells examined and corresponding systematic arrangement are based in Simone (2006) and Mansur and Pereira (2006):

Systematic Species List

Class Bivalvia
Order UNIONOIDA

Family HYRIIDAE
Diplodon aethiops (Lea, 1860) = *Rhipidodonta charruana* (d'Orbigny, 1835)
Diplodon granosus (Bruguière, 1792) = *D. granosus multistriatus* (Lea, 1831)

Family MYCETOPODIDAE
Anodontites obtusus (Spix, 1927) = *A. lucidus* (d'Orbigny, 1835)
Anodontites trapesialis (Lamarck, 1819)
Anodontites trapezeus (Spix, 1827)

Finally, the present communication increases to 31 the number of continental molluks species (26 freshwater forms = 18 Gastropoda, including the little snail *Potamolithus catharinae* Pilsbry, 1896, and 8 Bivalvia) reported for this Municipal Brazilian territory (Agudo-Padrón and Lenhard 2011:164; Agudo-Padrón 2012:64).

Acknowledgement:

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University of Oklahoma
111 E. Chesapeake Street
Norman, OK 73019
405-325-4034
cvaughn@ou.edu

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Ohio River Islands NWR
3982 Waverly Road
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304-375-2923 x 124
patricia_morrison@fws.gov

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EnviroScience, Inc.
6751 A-1 Taylor Road
Blacklick, OH 43004
615-866-8540
gzimmerman@enviroscienceinc.com

Treasurer
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1417 Hoff Industrial Park
O'Fallon, Mo 63366
636-281-1982; Fax: -0973
Hdunn@ecologicalspecialists.com

Past President
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North Carolina State University
Dept. of Environ. & Molecular Toxicology
Box 7633
Raleigh, NC 27695-7633
919-515-5296; Fax -7196
greg_cope@ncsu.edu

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University of South Dakota
emy.monroe@usd.edu

Environmental Quality & Affairs
Steve McMurray
Missouri Dept. of Conservation
stephen.mcmurray@mdc.mo.gov
Braven Beaty
The Nature Conservancy
bbeaty@tnc.org

Gastropod Status and Distribution
Jeff Garner
Al. Division of Wildlife and Fw. Fisheries
bleufer@aol.com
Jeremy Tiemann
Illinois Natural History Survey
jtiemann@illinois.edu

Genetics
David J. Berg
Miami University
bergdj@MUOhio.edu
Curt Elderkin
The College of New Jersey
elderkin@tcnj.edu

Guidelines and Techniques
Nevin Welte
Pennsylvania Fish & Boat Commission
c-nwelte@state.pa.us
Rita Villella Bumgardner
Harpers Ferry, West Virginia
rbumgardner17@comcast.net

Information Exchange
G. Thomas Watters
OSU Museum of Biological Diversity
Watters.1@osu.edu
John Jenkinson
Clinton, Tennessee
jjjenkinson@hotmail.com

Mussel Status and Distribution
Arthur E. Bogan
N.C. State Museum of Natural Sciences
arthur.bogan@ncdenr.gov
John L. Harris
Arkansas State University
omibob1@gmail.com

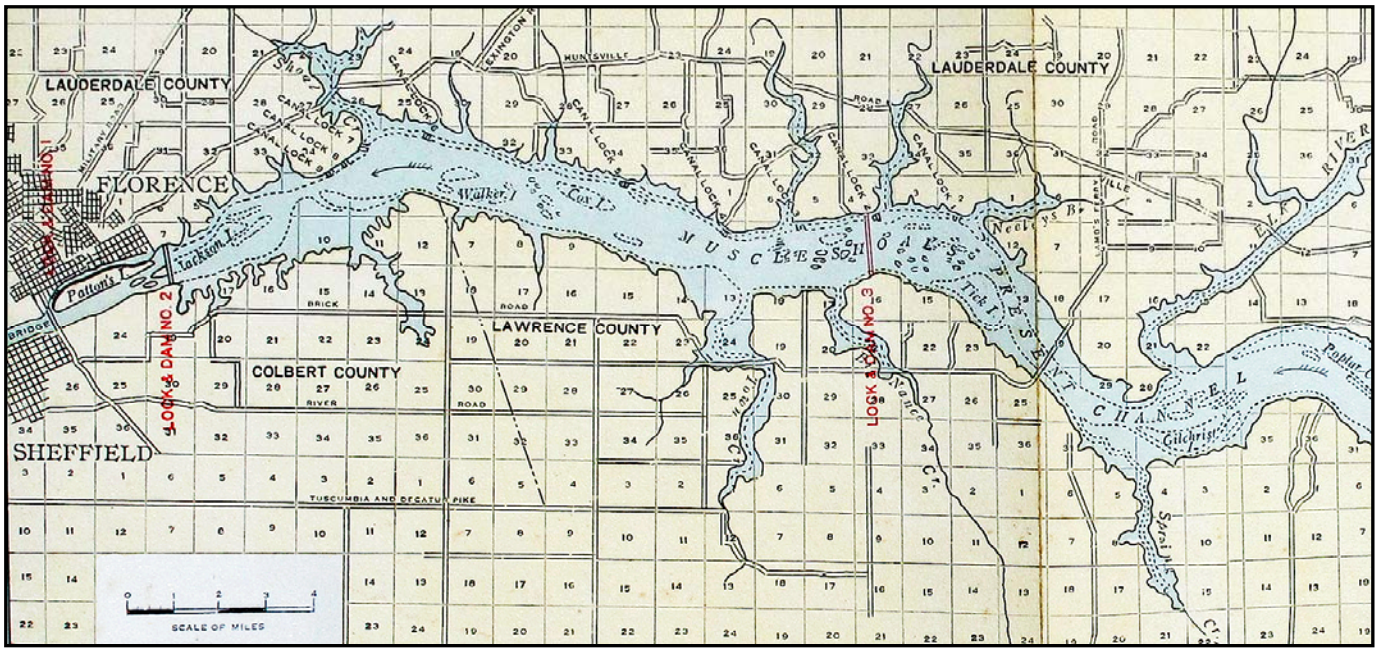
Nominations
Leroy Koch
U.S. Fish and Wildlife Service
leroy_koch@fws.gov

Outreach
Megan Bradley
Missouri State University
mebradl1@vt.edu
Tom Jones
Marshall University
jonest@marshall.edu

Propagation, Restoration, & Introduction
Rachel Mair
White Sulphur Spr. Nat. Fish Hatchery
Rachel_Mair@fws.gov
Christopher Owen
Kentucky State University
musseldoc@gmail.com

Symposium
Patricia Morrison
U.S. Fish and Wildlife Service
patricia_morrison@fws.gov

Parting Shot



This is most of a 5- x 16-inch foldout diagram showing two proposed large impoundments on the Tennessee River just east of Florence, Alabama, USA. It was printed in a 1916 proposal entitled *America's Gibraltar, Muscle Shoals – A Brief for the Establishemnt of our National Nitrate Plant at Muscle Shoals on the Tennessee River.* The purposes of these impoundments were to provide electric power for the production of nitric acid (for munitions and fertilizer) and to improve navigation over the Muscle Shoals. The U.S. Army Corps of Engineers completed Lock & Dam No 2 [Wilson Dam) in 1926. The Tennessee Valley Authority completed Lock & Dam No3 [Wheeler Dam) in 1936. Enlarge this image to see all the details of the original river channel, the islands, and the barge canal that it includes. *America's Gibraltar* also has several pre-impoundment color photographs of the Muscle Shoals area.

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