



Newsletter of the Freshwater Mollusk Conservation Society
 Volume 18 – Number 2 June 2016

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Planning Well Underway for Our 2017 Symposium in Cleveland, Ohio

The 10th Biennial FMCS Symposium will be held on March 26 -30, 2017, at the Cleveland Downtown Marriott at Key Center, in Cleveland, Ohio. The Planning Committee is pleased to announce that our conference theme will be: ***Ecosystems, Engineering, Valuation, and Practice – The Roles of Freshwater Mollusks in a Changing Environment.*** The goal for this Symposium is to focus on how freshwater mollusks affect nature and society by: (1) providing ecosystem services, (2) being ecosystem engineers, (3) understanding their value relative to other biota and us, and (4) guiding the regulations and actions we use in

practice. The Symposium will bring together regulators, researchers, consultants, and enthusiasts in a forum that will allow for collaborative opportunities and information exchange. The result of these collaborations will help identify how to best apply past and present experiences in a changing environment, as well as guide the Nation's regulatory framework surrounding freshwater mollusk conservation. We are organizing four plenary sessions on the following themes:

- (1) Mollusks in Ecosystems – Implications for a Changing Environment,
- (2) Mollusks as Ecosystem Engineers – Species to Landscape Level Review,
- (3) Value of Freshwater Mollusks (monetary, human, and ecosystems),
- (4) A Review in Freshwater Mollusk Research – Lessons Learned: from Research, to Regulation, to Practice.

Internationally recognized speakers will present the state of current research on these topics and, we expect, will spark debate and interest on research needs concerning the many ways mollusks affect society and ecosystems. We cannot promise any earth-shattering new revelations on the critical roles freshwater mollusks play in nature and society. We **do**, however, promise a thought-provoking Symposium that will introduce new research, discuss challenging topics imposed by an uncertain future in the face of climate and land use changes, and nurture our Society's commitment to the conservation of America's most imperiled group of animals.

Coming Soon: Information regarding travel, accommodations, registration, and the Symposium agenda will be posted soon on the 2017 FMCS Symposium page on our website: http://molluskconservation.org/EVENTS/2017Symposium/2017_FMCS-Symposium_INTRO.html Much of this information also will be presented in the September issue of *Ellipsaria*.

For those Pre-planning: During this Symposium, we will have the use of 17,000 square feet of meeting space at the Marriott at Key Center, including meeting rooms and a Grand Ballroom. The Symposium rate for hotel rooms at this Marriott will be \$129/night for standard rooms. More information on lodging also will be available soon on the website and in *Ellipsaria*.

FIRST CALL FOR ABSTRACTS
2017 Biennial FMCS Symposium
Cleveland, Ohio -- March 26 – 30, 2017

The abstract submission deadline for the 2017 Symposium will be **Friday December 16, 2016**. The Symposium format will include both oral and poster presentations. Oral presentations will be limited to 20 minutes (including the question and answer period). Poster size will be limited to 4 by 4 feet.

Abstracts for both the posters and the oral presentations are limited to 300 words. Abstract title should appear in all caps and be followed by the author(s) name(s), affiliation(s) and e-mail address(es). Abstracts should be written in Word utilizing Arial 11-point font. The text of the abstract should include clearly stated objectives, a brief description of methods, general results, and the basic conclusion(s). An example abstract has been posted on the 2017 Meeting page on our website: http://molluskconservation.org/EVENTS/2017Symposium/2017_FMCS-Symposium_INTRO.html At the bottom of the abstract, please indicate your preference of oral or poster presentation, and if you would be willing to switch formats.

Submit your abstract to: 2017fmcssymposium@gmail.com .

Volunteers Needed



Looking to be more involved in the FMCS? Here is your opportunity! The 2017 Symposium Planning Committee is looking for volunteers to help in pre-conference planning and during the Symposium. If you are interested in volunteering to serve on a planning sub-committee, please contact Becca Winterringer at rwinterringer@trcsolutions.com or Greg Zimmerman at gzimmerman@enviroscienceinc.com. If you're an "early bird catches the worm" type and would like to sign up to volunteer for on-site tasks during the Symposium, please contact Susan Oetker at susan.oetker@fws.gov.

Society News

**Minutes of Spring 2016 FMCS Board Meeting Teleconference
Tuesday, April 19, 2016**

Call to Order – President Teresa Newton

The call to order was made by President Teresa Newton followed by roll call. In attendance were: Teresa Newton, Emily Grossman, Janet Clayton, Heidi Dunn, Greg Cope, Patricia Morrison, Nathan Whelan, Mary McCann, John Harris, Megan Bradley, John Jenkinson, Braven Beaty, Ryan Schwegman, Jeremy Tiemann, Becca Winterringer, Greg Zimmerman, Steve McMurray, Emy Monroe, and Rachael Hoch. A quorum was established.

Minutes of the December 3, 2015 Board Meeting were published in the March 2016 issue of *Ellipsaria*. A motion to accept those minutes as published was made by Heidi Dunn and seconded by Braven Beaty. All approved.

Treasurer’s Report -- Emily Grossman

2016 Workshop recap

Income	
• Registrations:	\$12,480.00
• <u>Sponsorships:</u>	<u>\$7,283.00</u>
• Total:	\$19,763.00

Expenses \$13,440.33

We came out over \$6,000 ahead on the Workshop – thanks to all the sponsors!

Other income and expenses, 11/22/15 – 4/4/16

Income	
• Memberships:	\$4,120.00
• T-shirts/hats/etc.:	\$162.05
• <u>Interest:</u>	<u>\$50.87</u>
• Total:	\$4,332.92

Expenses

- Allen Press/FMBC costs: \$210.00
- Four Regional meetings: \$400.00
- Old credit card machine fees: \$170.00
- PayPal fees: \$326.44
- Square (new CC system) fees: \$104.79
- Bank fees: \$4.00
- Misc. other expenses (CC reader, etc.): \$37.78
- Total: \$1,253.01

Current bank balance

- Checking: \$11,050.24
- Savings: \$124,882.88
- Total: \$135,933.12

The final credit card machine update (hopefully):

The Square credit card system worked great for all aspects of the 2016 workshop. No objections were voiced on Emily’s plan to close out/return our old machine so we can stop paying fees on it. Heidi also suggested linking the Square with website.

Secretary’s Report -- Janet Clayton

The Society currently has 518 folks on the mailing list. That figure includes 385 regular members, and 106 student members; 128 of these are lapsed memberships. Janet noted that although the membership information resides online, it can be exported to Excel which allows lists of committee members to be provided to committee chairs. We will work with the 2017 Symposium committee to organize committee meeting lunches to best fit those individuals who belong to several committees.

Old Business

Long term investment and funding strategies for the Society

Heidi Dunn had nothing to report.

Update on AFS monetary values of fish and freshwater mussels

Heidi Dunn reported that AFS requested \$40,000 from FMCS for the revision and publication of the Fish and Mussel Kill Monetary Values. Currently \$27,000 has been pledged by Genoa National Fish Hatchery (\$10,000), Upper Mississippi River Conservation Committee (\$10,000), Alabama Division of Wildlife and Fisheries (\$4,500), and the Ohio River NRDA (\$2,500). Heidi made a motion that FMCS provide the additional funds needed to make up the difference not to exceed \$20,000. A unanimous vote followed and the motion passed.

Our Society is taking an active role in the revision process. Mary McCann, Co-Chair of the Guidelines and Techniques Committee, is taking the lead on soliciting and organizing comments on the field methodologies chapter and has sent it out to all committee members. Comments are due back to Mary by Friday April 22. A conference call is to follow to discuss the comments. Rachael Hoch, Co-Chair of the Propagation Committee, is taking the lead on soliciting and organizing comments on the mussel propagation facility questionnaire. She will be working with Paul Johnson and Southwick Inc. to revise the mussel questionnaire and develop a similar questionnaire for gastropods.

Professional Certification -- Becca Winterringer

Becca previously presented an outline to the Board on a certification program to be administered by FMCS. This would be an education- and experience-based program, not a taxonomic or surveyor certification. This program would be similar to those administered by the American Fisheries Society (Certified Fisheries Professional), the Wildlife Society, and others. Teresa suggested developing a list of required guidelines for coursework and experience. If a given applicant met the criteria, then FMCS would provide certification. Becca noted that providing an education-based certification would support the Society's education strategy. The Board agreed to carry this forward in the form of an ad-hoc committee. Becca will take the lead on soliciting members and was directed by Teresa to ensure the committee had a mix of academia, state and federal government, and private industry. A notice will be placed in the next issue of *Ellipsaria* (see announcement on Page 9) and on the Unio list-serve. John Jenkinson suggested providing an outline of the suggested certification program and then solicit members for the committee.

New Business**Position statement of the importance of museum collections**

Jeremy Tiemann noted that funding to maintain mollusk collections have significantly declined, and recently, the National Science Foundation announced suspension of collections support. Currently, many collections try to solicit funding from state and federal agencies but one day collections like those at the Illinois Natural History Survey (INHS) could disappear due to lack of funding. Several other societies have drafted letters to solicit funds for collections. Jeremy suggested that FMCS draft a position statement letting folks know why collections are important. This statement would be made available to anyone who had the opportunity to pass it on to administrators or the like showing the need for support. There continues to be a need for voucher specimens and it currently costs INHS about \$2 per specimen yet they often don't/can't charge for deposition of voucher material. It was proposed that this position statement reside on-line so that folks could copy as needed. Teresa suggested putting it on-line and see what the response is.

Discussion continued on whether position statements were searchable on-line as the collections statement. Currently, this position statement would reside on the Environmental Quality and Affairs Committee page with all the other position statements. Teresa questioned if there should be a position statement section on the website? It was suggested that the position statement be published in the next issue of *Ellipsaria*. A title "Position Statement of Natural History Collections" was decided and the position statement should be very short (this one is 2 pages). Teresa directed Steve McMurray, Braven Beaty, and Jeremy Tiemann to decide how they wanted to post it -- as a letter or as a position statement.

Position statement for Black Creek mine permit – Steve McMurray

It was agreed that one of the Past Presidents would be approached to sign this position statement for FMCS. [Note, this letter was signed by Greg Cope on 4/29/2016 and forwarded to Mike Gangloff who will deliver it to the Black Warrior Riverkeeper].

Position statement for Mountain Valley and Atlantic Coast pipelines – Steve McMurray

Braven Beaty noted this statement addresses one of two pipelines crossing Appalachia. The statement identifies potential impacts to listed species with references to sediment and erosion control and release of contaminants. If someone on the committee is able to sign then do so, otherwise defer to Past Presidents. [Note, this letter was signed by Greg Cope on 4/26/2016].

Position statement for protecting aquatic life from effects of hydrologic alteration –

Steve McMurray

This statement is still in draft form. Heather Galbraith is working on the letter and if anyone has additional comments they should submit them to her soon. The basis for the position statement is that mollusks were not included in this report. After Teresa questioned the need for this since the document was already out, it was noted that the public comment period was extended to June 17. It was suggested that our statement should be that the report was great, but forgot to list mollusks as a group of organisms also affected by hydrologic alteration. Patty Morrison said to make sure lack of mollusks was in the first paragraph. Steve agreed to sign this statement for the committee.

Should FMCS support listing of individual species

Nathan Whelan noted that Tierra Curry (Center for Biological Diversity) was putting together a petition on listing of a snail species and wanted to know if FMCS was interested in being involved. The Board decided that if this species was already listed on the federal register for comment, only those comments that provided data for or against were accepted. If your letter is of support or non-support and didn't provide any data, then it was ignored. Patty Morrison noted that, in the past, the Board decided to go through the appropriate committee and if the committee decided that it was significant, they would work with the Environmental Quality and Affairs Committee to put it into their format. In this case, this letter would go through the Gastropod Committee.

Who can sign FMCS advocacy letters?

The Board discussed who was able to sign position statements due to conflicts of interest of many members of the Executive Committee. It was noted that the Operations Manual states that signing was to be by the President or his/her designee. It was decided that Past Presidents would be the best choice and they could be designated signee on a rotating basis. If the letter is coming from a Committee and can be signed by a Committee Co-Chair, then they should do so.

Update on 2017 Symposium – Heidi Dunn, Becca Winterringer, Greg Zimmerman

Becca Winterringer noted that the Symposium Committee had their first kickoff call last Friday (April 15). The current working theme for the Symposium is: Ecosystems, Engineering, Valuation, and Practice: The Roles of Mollusks in a Changing Environment. Greg Zimmerman and Becca are lining up Keynote Speakers for the plenary sessions (of which two have confirmed thus far). They tried to contact David Strayer but, apparently, he has retired. Does anyone have his new contact information? (Note-he has been contacted). John Jenkinson suggested including international speakers for the plenary session. Some suggestions included Manuel Lopez-Lima, Joseph Akerman, and/or Jürgen Geist. Could also look for someone with economics and evaluation – possibly marine related.

A draft Symposium schedule was distributed to the Board, and Heidi and others provided feedback for laying out evening activities, time needed for the Board Meeting, and committee lunches, etc. As presently drafted, the schedule has spaces for a total of 84 platform papers. Currently, Becca and Greg are hoping to have a plenary session with panel discussion to promote more dialogue and facilitate society participation at the Symposium. The Committee is continuing to look for volunteers; most volunteers are needed locally. The Planning Committee still needs some help in a couple areas, such as a lead person to manage audio-visual tasks during the symposium.

The Planning Committee is considering two workshops for Sunday, March 26. Ryan Schwegman is planning and coordinating these workshops and has confirmed Tom Watters for conducting one advanced taxonomic workshop. The other possibility being explored is an entry level gastropod taxonomy and collection workshop. The Committee is exploring a more regional-based taxonomy for both faunal groups.

The Board suggested setting the Sunday Board meeting from 2-5 PM. Other comments included: keep in close contact with the hotel on logistics, how much time do the committee chairs need for their lunch meetings, keep the social events to one venue, and options for field trips (outdoors will be challenging).

John Jenkinson encouraged the planners to get some information about the 2017 Symposium in the next *Ellipsaria* and to try not to provide all the details at once. (See the first such article on Page 1.)

Mollusk modeling session at the 2017 FMCS Symposium? – Heidi Dunn, Teresa Newton

Heidi and Teresa recently attended a modeling session at the Midwest Fish and Wildlife Conference and suggested that a modeling session might be appropriate at the 2017 symposium. Heidi agreed to be point of contact for a proposed session. Becca noted that the topic fits with the current program.

Student events at future FMCS symposia – Teresa Newton

Dan Symonds, a graduate student at Ohio State University, suggested that we should have a student/ professional mixer where students can meet and asked questions. Dan suggested two possible types of mixers, one of which was lunch with a professional consisting of 1-4 students per professional, and the other was a student/professional mixer like the one at the recent Midwest Fish and Wildlife Conference. Board members raised some concern that the agenda for the 2017 Symposium was already packed. The ensuing discussion included the following points:

- Concern was raised that the a lunch mixer would conflict with committee meetings. We could poll committee chairs to see if they need to meet at the symposium or not,
- Pick 12 (12) professionals from different disciplines then have a social/professional mixer,
- Hold a late afternoon social but this would require another meeting room,
- Maybe hold a student mixer as one session of the program,
- Do something small in 2017 and expand this effort in 2019,
- Have list of professionals available for a mixer at the symposium,
- Could make check-boxes for the registration form to see who is willing to mentor,
- “Mentoring” folks could wear a ribbon indicating their willingness to talk to students,
- Becca may work on trying to set up a situation where a professional could meet with student at an already scheduled mixer,

At the end, Megan Bradley offered that the Outreach Committee should take on this task and work with Dan Symonds to develop a way to encourage more student/professional interaction at the 2017 symposium.

Future Workshop Idea’s – Heidi Dunn, Teresa Newton

Discussion continued on developing ideas for the 2018 Workshop. A notice should be placed in *Ellipsaria* again (See Page 8). Everyone should continue to think about Workshop ideas and network. Is anyone willing to host a Workshop? Ideas brought forward so far include:

- Sampling protocols, state by state with panel discussion
- Diseases of mollusks
- New tools, like genomics, acoustic doppler current profiler, etc.
- Standardized sampling, are there minimum guidelines.

Teresa Newton made motion to adjourn. Heidi Dunn seconded. The meeting was adjourned at 12 noon (central).

Respectfully submitted by Janet L. Clayton, Secretary

FMCS Officer Nominations for 2017

We are now seeking nominees for **President-Elect**, **Secretary**, and **Treasurer** of our Society. Each position is for a time period of two years. These positions will take office during the FMCS Symposium in Cleveland, Ohio, in March of 2017.

Any member may nominate any other member. Nominees must be current FMCS members in good standing, and who agree to be nominated. Please consider yourself or another worthy member for these positions. This is a great opportunity to serve in the FMCS.

The Nominations Committee will select the two candidates willing to run for each office who receive the most nominations for that office. We anticipate that position statements from the candidates will be posted in the December issue of *Ellipsaria*, and on the FMCS website in January, 2017; and that voting will also be done on the FMCS website.

Send your nominations to: Leroy Koch, either by e-mail at Leroy_Koch@fws.gov or by surface mail at U.S. Fish and Wildlife Service, J.C. Watts Federal Building - Room 265, 330 West Broadway, Frankfort, Kentucky 40601. If you have any questions, feel free to contact Leroy by e-mail or call him at 502-695-0468 ext. 106. **The deadline for nominations is October 5, 2016.**

Workshop Topics Still Needed for 2018 !

Hi all of you enthusiastic FMCS members. We had another great Workshop in 2016. Thanks to all who organized and attended the Genetics Workshop in Shepherdstown, West Virginia. Now, we need to decide what to focus on in 2018. Potential topics suggested so far include:

- Sampling protocols, state by state with a panel discussion
- Diseases of freshwater mollusks
- New tools, like genomics, acoustic Doppler current profiler, etc.
- Standardized sampling, are there minimum guidelines?
- ? ?

Our even-year Workshops keep us up to date on the latest research (and are always a lot of fun). If you have a topic you would like to see addressed and/or would like to assist with planning the 2018 Workshop, please let me know. You can send ideas to Heidi Dunn at HDunn@ecologicalspecialists.com. I look forward to seeing some great ideas.

Announcing a New Ad-Hoc Committee for Professional Development

The FMCS Board has authorized the establishment of an ad-hoc Professional Development Committee to establish criteria and implement a certification program for specialists working with freshwater mollusks. Certifications such as the one we propose to develop are typically used by organizations and institutions to establish standards and guidelines for professional recognition. Our professional development program will be an education-based certification that will support the Society's education strategy. Components of the Professional Development Program will include: level of education and coursework, pertinent experience, and other service accomplishments to be established by the Committee. The specific objectives of the certification are to: (1) provide governmental and nongovernmental agencies and organizations, private firms, courts, and the general public with a minimum standard of experience and education for freshwater mollusk biologists; and (2) to recognize these professionals as well-educated and experienced in their area of expertise.

We are seeking a limited number of individuals to serve on this new ad-hoc committee and would like to include representatives from academia, state government, federal government, private industry, as well as international perspectives. If you feel you could provide value and service in the development of this certification program, please contact the committee chair, Becca Winterringer, at rwinterringer@trcsolutions.com.

Check it Out !

The FMCS Guidelines and Techniques Committee has updated their website page with information on mussel survey and translocation guidelines, and protocols that have been developed by various states and the U.S. Fish and Wildlife Service regions. The committee webpage provides examples of what some regulatory entities require when mussel surveys are requested as part of an environmental review of a proposed project. That information also may be helpful for those who are in the process of developing their own protocols or guidelines. Here is a direct link to the Guidelines and Techniques Committee website page: http://molluskconservation.org/MServices_guidelines.html

Announcements

Revision of the Manual of the Freshwater Bivalves of Maryland.

Matt Ashton, Maryland Department of Natural Resources, Monitoring and Non-tidal Assessment Division, 580 Taylor Avenue, C-2, Annapolis, MD 21401

The Maryland Department of Natural Resources (MD DNR) has issued a substantial revision to Manual of the Freshwater Bivalves of Maryland. First issued in 1997 at a workshop on unionid identification held by MD DNR and authored by Dr. Author Bogan and the late Thomas Proch, the document was an adaptation of Bogan (1996) and incorporated distributional maps of Gerbrich (1984), which consisted largely of historic accounts.

The new edition (Ashton and Bogan 2016), incorporates records of freshwater mussel observation from over 3,000 surveys or biological monitoring sites sampled by the Department's Natural Heritage Program and Maryland Biological Stream Survey since 1994. Additional historic records were obtained from natural history museum visits and online collection downloads. The result is distributional maps of the 16 native unionid species (Figure 1), two non-native species, and two invasive bivalves that have been

documented in Maryland or in close proximity (i.e., *Alasmidonta marginata susquehannae*). Additional notes on distribution and ecology are provided along with updated mussel-host lists, which were derived primarily from Cummings and Waters (2012) or personal communication with propagation hatchery staff in the mid-Atlantic.

A pdf version of Ashton and Bogan 2016 is available for free download at <http://dnr2.maryland.gov/streams/Publications/Manual-Freshwater%20Mussels%20of%20MD.pdf>. Further updates to the manual are necessary as the taxonomy of dark lances is in flux. We hope to update the distributional maps annually and incorporate observations from consultant surveys.

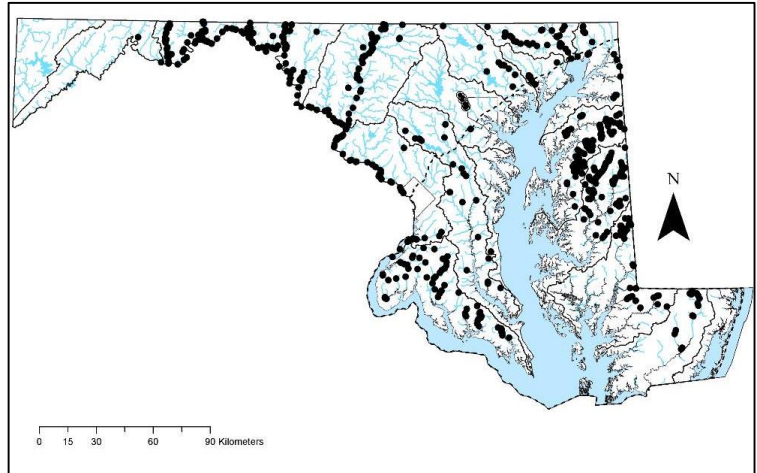


Figure 1. Distribution map for *Elliptio complanata* from Ashton and Bogan 2016.

References:

- Ashton, M.J. and A.E. Bogan. 2016. *Manual of the freshwater bivalves of Maryland*. CBWP-MANTA-EA-96-03. <http://dnr2.maryland.gov/streams/Publications/Manual-Freshwater%20Mussels%20of%20MD.pdf>
- Bogan, A.E. 1996. *Freshwater mollusks, with emphasis on the Northeast*. Eagle Hill Research Station. http://files.naturalsciences.org/Bogan_NE_Mollusks_Workbook.pdf
- Gerberich, A.G. 1984. *The endangered and threatened freshwater mollusks of Maryland*. Maryland Natural Heritage Program Special Publication, 84-1:245-266.

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 bring 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. Support is provided via a cash award of \$100 to the regional group to help defray the costs (e.g., meeting room rental, speaker travel, break refreshments, etc.) associated with holding 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.

Canadian Freshwater Mussel Research Meeting

The first Canadian Freshwater Mussel Research Meeting (CFMRM) was held March 30, 2016 at the Canada Centre for Inland Waters in Burlington, Ontario. The meeting was jointly hosted by Fisheries and Oceans Canada and the Ontario Ministry of Natural Resources and Forestry with financial support from the University of Guelph and the FMCS Regional Mollusk Meeting Assistance Award Program.

The CFMRM grew out of past meetings of the Ontario Freshwater Mussel Recovery Team and a desire to bring together malacologists from across Canada. Representing the first truly national gathering of freshwater mussel researchers in Canada, the meeting was a huge success drawing an attendance of 65 in person with an additional 25 attending via webex. With representation from the Pacific to the Atlantic, attendees came from six Canadian provinces (British Columbia, Manitoba, Ontario, Quebec, New Brunswick, and Nova Scotia) and two American states (Michigan and New York) and represented federal departments, provincial/state agencies, academic institutions, environmental non-governmental organizations, naturalist groups, zoos, museums, and interested citizens. A full agenda of 23 platform presentations and three posters were presented on topics relating to mussel distribution and conservation, threat evaluation, conservation genetics, sampling issues, recovery efforts and stewardship activities. A successful day was capped off by a casual dinner with new friends and a chance to foster new and productive research partnerships.



Abstracts from the meeting are available at <http://waves-vagues.dfo-mpo.gc.ca/Library/363570.pdf>

Morris, T.J., K.A. McNichols-O'Rourke, and S.M. Reid (Editors). 2016. Proceedings of the 2016 Canadian Freshwater Mussel Research Meeting: March 30, 2016, Burlington, Ontario. *Can. Tech. Rep. Fish. Aquat. Sci.* 3164: vii + 23 pp.

2016 I-CLAM Symposium

25 February 2016

Illinois and neighboring states have a long history of research and commerce in freshwater mollusks. Several agencies in Illinois are collaborating to conserve North America's most imperiled groups of animals. To bring folks together and showcase these projects, the Illinois Natural History Survey hosted the 2nd Illinois Consortium for Land and Aquatic Mollusks (I-CLAM). This symposium provided a forum to present research or survey projects, discuss mollusk conservation issues and concerns, share educational efforts, and meet other "mussel-heads" in and around Illinois. The Freshwater Mollusk Conservation Society, Illinois Natural History Survey, Illinois-Indiana Sea Grant, Prairie Research Institute, and University of Illinois sponsored this event. Despite the weather and flu-bug running

rampant across Illinois, 48 people from 17 groups descended upon Champaign on 25 February 2016 to hear the following 22 talks:

- Andrea Fritts (INHS) – “Freshwater mussel shells chronicle changes over the past 1000 years”
- Diane Shasteen (IL EPA) – “Mussel presence in Illinois and the USEPA recommended ammonia water quality standard”
- Alison Stodola (INHS) – “Recent updates for freshwater mussels for the Wildlife Action Plan and Stream Campaign”
- Scott Chiavacci (INHS) – “Using structured decision making to develop restoration criteria for freshwater mussel Species in Greatest Need of Conservation”
- Jeremy Tiemann (INHS) – “Vermilion River mussel projects – from reintroductions to dam removal”
- Brant Fisher (IN DNR) – “Indiana’s Northern Riffleshell project”
- Lunch (provided) – Kevin Cummings (INHS) gave a travelogue for those interested, while two open meeting rooms offered a chance for breakout sessions.
- Kelly Hannan (U of I) – “The physiological effects of CO₂, in the context of a non-physical barrier to fish movement, on freshwater mussels”
- Joshua Peters (SIU) – “Lack of mitochondrial DNA data in *Lampsilis* species and using field work and museum collections to fill in the gaps”
- Jessi DeMartini (DuPage Co. FPD) – “Propagating *Lampsilis cardium* / *Lampsilis siliquoidea* at the Urban Stream Research Center at DuPage County Forest Preserve”
- Donovan Henry (USFWS) – “Ohio River Basin Fish Habitat Partnership mussel projects”
- Joe Jordan (USACE) – “Update on upper Mississippi River mussel activities”
- Jeremiah Haas (Exelon) – “Quad Cities Nuclear Station mussel program history and overview”
- Nathan Grider (IDNR) – “A Quick Tour of the IDNR Aquatic Impact Review Program and Your Role as Managers and Researchers”
- Ann Holtrop (IDNR) – “IDNR needs for mussels and updating EORs”
- Steve Buck (INHS) – “Freshwater mussels in a small prairie/ag stream in Champaign County, IL - external ring patterns and frequency of annual mussel movement.”
- Ders Anderson (Openlands) – “Observations of the effects of the 2012 drought on mussel habitat”
- Sarah Douglass (INHS) – “INHS Kishwaukee mussel projects”
- Rachel Vinsel (INHS) – “Glochidia presence on Asian carp and native fishes in the Illinois River”
- Jeremy Tiemann (INHS) – “Exotic freshwater molluscs in Illinois”
- Jim Lamer (WIU) – “Western Illinois University’s mussel collection”
- Kevin Cummings (INHS) – “Select mussel resources for Illinois biologists”

PDFs of the presentations can be viewed at <http://wwx.inhs.illinois.edu/collections/mollusk/iclam16/> .

Much like the 2006 I-CLAM meeting, this symposium ended with an open forum to discuss potential collaboration and mollusk conservation issues (e.g., mussel kills / aquatic damage assessment). The meeting was followed by a tour of the INHS Mollusk Collection. We thank all those that attended and presented, and are extremely grateful for the support of our sponsors that allowed this event to happen.

Submitted by Jeremy Tiemann, Sarah Douglass, and Alison Stodola, Illinois Natural History Survey

2016 Southeast Atlantic Slope Mollusk and Virginia Atlantic Slope Mollusk Recovery Group (SEASMM/VAS MRG) Meeting

The Southeast Atlantic Slope Mollusk and Virginia Atlantic Slope Mollusk Recovery Group meeting was held in Danville, Virginia, on March 14 and 15, 2016. This meeting was held in advance of an annual meeting of the North Carolina and Virginia Chapters of the American Fisheries Society (AFS). Over 50 participants representing eight state agencies, three federal agencies, five universities, and seven private entities attended for this day and a half meeting. 59 Virginia and 96 North Carolina attendees participated

in the joint AFS chapter meeting which included presented papers on mollusks and fish as well as a continuing education workshop on conservation genetics. Topics covered included propagation activities at the Virginia Fisheries and Aquatic Wildlife Center, North Carolina Conservation Aquaculture Center and Virginia Tech, and a new Atlantic Slope propagation facility in North Carolina; conservation and propagation of James Spiny mussel and Tar River Spiny mussel, habitat modeling; status assessments for petitioned mollusks, survey, damage assessment, and recovery efforts for the Dan River Coal Ash Spill; proposed natural gas pipeline routes, and species identification training efforts.

2016 SEASMM/VAS MRG Attending Organizations

Federal	State	University	Private/NGO
US Fish and Wildlife Service	South Carolina Department of Transportation	North Carolina State University	Duke Energy
US Forest Service	North Carolina Wildlife Resources Commission	Virginia Tech	Cardno
South Atlantic LCC	North Carolina Natural Heritage Program	Appalachian State	Three Oaks
	Virginia Natural Heritage Program	St. Anselm College	EnviroScience
	Virginia Department of Game and Inland Fisheries	Gardner-Webb University	John Kent
	South Carolina Department of Health and Environmental Control		Daguna Consulting
	Georgia Department of Natural Resources		James River Association
	Maryland Department of Natural Resources		

2016 SEASMM/VAS MRG AGENDA

Propagation

- USFWS/NCSU Mussel Propagation Facility Update – Sarah McRae, USFWS
- VFAWC – Rachel Mair/Madeline Pletta, USFWS/VDGIF
- James spiny mussel streamside infestations – Jess Jones, USFWS
- NCWRC Conservation Aquaculture Center 2016 - Rachael Hoch, NCWRC

Conservation

- Tar Spiny and Yellow Lance augmentations and monitoring surveys – Tom Fox, NCWRC
- James spiny mussel Mark-recapture project update
- Project overview – Brian Watson, VDGIF
- Rock Island Creek – Steve Roble/Ellison Orcutt, VA Heritage
- Data analysis and Rivanna River watershed work – Brett Ostby, Daguna Consulting
- Habitat modeling project, includes mussels – Steve Roble, VA Heritage

Environmental Issues

- Pipeline projects: Mountain Valley and Atlantic Coastline – Paul Bugas, VDGIF
- NC Atlantic Coast Pipeline – Vann Stancil, NCWRC
- Coal ash ponds – Scott Smith or Brian Watson, VDGIF
- Dan River Mussel Survey – Rick Smith, Duke Energy
- James spiny mussel predation – Brian Watson, VDGIF
- Mussel Training project – Three Oaks/ SCDOT
- Appalachian State update – Mike Gangloff, ASU

Genetics Sampling Discussion

Distribution/Status

- Species Status Assessment: Yellow Lance, Atlantic Pigtoe – Sarah McRae, USFWS
- Broad River, Boiling Springs, NC freshwater mollusk survey – David Campbell, Gardner-Webb U.
- Swift Creek Dwarf Wedgemussel population viability study Update – Three Oaks
- Brook Floater in the Catawba River Basin, NC – Michael Perkins, NCWRC
- Brook Floater Status Assessment – Barry Wicklow (11:00)
- Potential brook floater C-SWG project – Brian Watson, VDGIF
- Carolina Heelsplitter Recovery Efforts in SC – Morgan Wolf & Jonathan Wardell, USFWS
- Evaluation of NCWRC Conservation Status Assessment Rubric – Mike Gangloff, ASU

Freshwater Mollusk Conservation Society Regional Mollusk Meeting Assistance Awards were combined with donations from Virginia Department of Game and Inland Fisheries, North Carolina Wildlife Resources Commission, and Three Oaks Engineering to cover the costs for meeting space and refreshments. THANK YOU ALL for your support!

Submitted by Judith Ratcliffe and Brian Watson

Upcoming Meetings

June 12 – 16, 2016 – American Malacological Society 82nd Annual Meeting and 49th Annual Meeting of the Western Society of Malacologists, Universidad Autónoma de Baja California, Ensenada, Mexico.
http://www.cpp.edu/~aavaldes/wsm_ams/index.htm

July 17 – 20, 2016 – Society for Conservation Biology North American Sectional Meeting, Madison Wisconsin Theme: *Communicating Science for Conservation Action*
<http://scbnorthamerica.org/naccb2016/>

August 21 – 25, 2016 – American Fisheries Society 146th Annual Meeting, Kansas City, Missouri Theme: *Fisheries Conservation and Management: Making Connections and Building Partnerships*.
<http://2016.fisheries.org/> **Included Symposium: What Data are Needed to Ensure Freshwater Mollusk Conservation into the Future?** Organizers: Wesley Daniel, Arthur R. Cooper, and Dana M. Infante. titles at: <https://afs.confex.com/afs/2016/webprogrampreliminary/Session4378.html>

March 26 – 30, 2017 – FMCS 10th Biennial Symposium, Cleveland Downtown Marriott at Key Center, Cleveland, Ohio Theme: *Ecosystems, Engineering, Valuation, and Practice – The Roles of Freshwater Mollusks in a Changing Environment*.
http://molluskconservation.org/EVENTS/2017Symposium/2017_FMCS-Symposium_INTRO.html

March 26 - 30, 2017 – National Shellfisheries Association 109th Annual Meeting, Knoxville, Tennessee, USA Theme: [not yet posted] <https://shellfish.memberclicks.net/annual-meeting>

Spring 2017 – Society for Freshwater Science Annual Meeting Dates, Location, and Theme not yet posted <http://www.freshwater-science.org/Annual-Meeting/Annual-Meeting.cfm>

Spring (?) 2018 – FMCS Workshop, Topic and location yet to be determined.

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.

Two Reproductively-Isolated Populations Cryptic Under *Pleurocera simplex* (Say, 1825) Inhabiting Pistol Creek in Maryville, Tennessee

Robert T. Dillon, Jr., Department of Biology, College of Charleston,
Charleston, SC 29424 USA dillonr@cofc.edu

Although focused primarily upon genetic relationships among 11 populations of the *Pleurocera carinifera* group, the allozyme survey of Dillon (2011) also included four populations of *Pleurocera simplex* as controls. The results obtained for three of those four *simplex* populations were unremarkable. But certain observations made during the spring of 2008, at the initial sampling of *P. simplex* population S6 from Pistol Creek in Maryville Courthouse Park, Blount County, Tennessee (35.7535°N; 83.9711°W), prompted me to open a second line of inquiry described here.

In particular, my initial sample of nominal *P. simplex* from site S6 demonstrated striking deviations from Hardy-Weinberg expectations at three enzyme-encoding loci and strong evidence of linkage disequilibrium. Of the 30 individuals initially sampled from Pistol Creek in May of 2008, 17 appeared homozygous for allele 100 at the octanol dehydrogenase locus (*Oldh*) and allele 96 at the opipine dehydrogenase locus (*Opdh*), while 13 individuals appeared homozygous for allele 104 at *Oldh* and allele 98 at *Opdh*, with no putative heterozygotes in evidence at either locus. A striking difference was also noted between the two sets at the phosphoglucosyltransferase (*Pgm*) locus, the set of 17 showing *Pgm*⁹⁶ at a frequency of 0.882, the set of 13 showing *Pgm*¹⁰² at a frequency of 0.923, just six *Pgm* heterozygotes identified in total. No variation was uncovered at any of seven additional loci examined in the Pistol Creek sample.

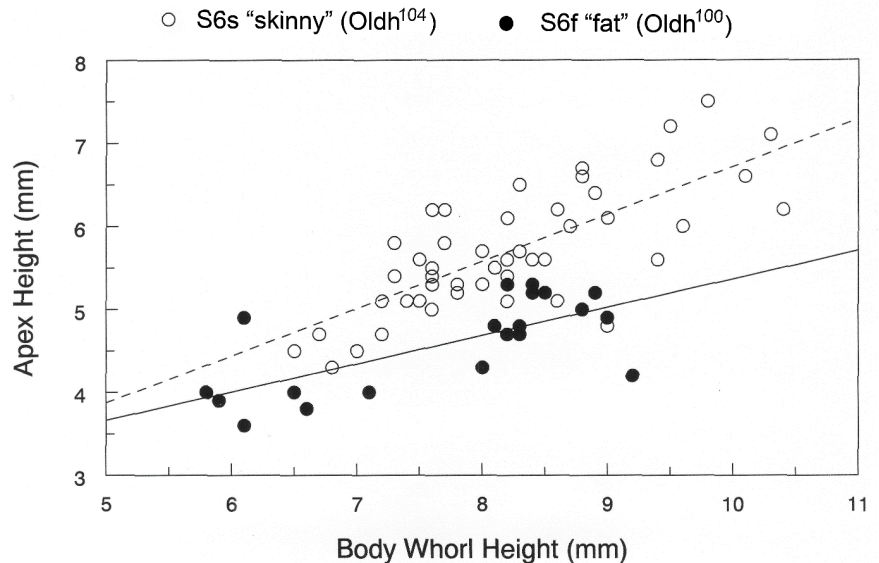
These observations suggested strongly that Pistol Creek might be inhabited by two reproductively isolated species indistinguishable [to my eyes] from *P. simplex*. So, In August of 2008, I returned to site S6 for a second sample. On this occasion, I examined the shell morphology of the animals collected more critically. It was my subjective impression that significant variation might exist in simple shell proportions within the sample, particularly with respect to the relative height of the body whorl. So, for the 71 snails sampled in August, I measured the maximum shell dimension (or "shell height"), and body whorl height (B), defined as the length of the final 360° of whorl, along the axis of coiling. I then defined apex height (A) as shell height minus body whorl height, and analyzed the relationship between body whorl height and apex height by analysis of covariance using the separate slopes model (JMP version 7).

Next, I classified my fresh sample of 71 individuals by their allozyme phenotype at 10 allozyme-encoding loci using the methods outlined in Dillon (1992, 2011). A total of 20 snails were homozygous for *Oldh*¹⁰⁰, while 51 were homozygous for *Oldh*¹⁰⁴, again with no putative heterozygotes. Differences were also very marked at the *Opdh* and *Pgm* loci, although a few heterozygotes were observed in both groups. The combined sample of 20 August snails plus 17 snails sampled in May showed *Opdh*⁹⁶ = 0.946 and *Pgm*⁹⁶ = 0.946, and the combined sample of 51 + 13 showed *Opdh*⁹⁸ = 0.953 and *Pgm*¹⁰² = 0.852. Again no variation was detected at the seven additional genetic loci examined, all individuals being fixed for the same putative alleles *Gpi*¹⁰⁰, *Mpi*¹⁰⁰, *Est*¹⁰⁰, *6pgd*¹⁰⁰, *Xdh*¹⁰⁰, *IsdhS*¹⁰⁰ and *IsdhF*¹⁰².

Figure 1 compares the regressions of (A) on (B) for the two subsamples, the N = 20 fixed for *Oldh*¹⁰⁰ and the N = 51 fixed for *Oldh*¹⁰⁴. The regressions of $A = 0.34B + 1.96$ ($r = 0.69$) for the former group and $A = 0.57B + 1.02$ ($r = 0.74$) for the latter group differed significantly in their slopes, although not in their intercept. Separate-slopes ANCOVA returned a value of $t = -7.14$ ($p < 0.0001$) testing for a difference between the two groups, the group of 20 showing a very significantly lower apex (holding body whorl constant) than the group of 51. The shells of this former group appeared stout or "fat," while the shells of the latter group appeared more slender or "skinny." I provisionally designated the (N = 20) snails

bearing fat shells and fixed for Oldh¹⁰⁰ as population S6f, and the (N = 51) snails bearing skinny shells and fixed for Oldh¹⁰⁴ as population S6s.

Figure 1. Shell apex height (A) as a function of body whorl height (B) in a sample of 71 putative "*Pleurocera simplex*" from Pistol Creek in Maryville, Tennessee.



Which of these two reproductively isolated populations might match bona fide *Pleurocera simplex*, and what might be the specific identity of the cryptic population underneath it is considered in the accompanying article by Dillon and Robinson (2016).

References:

- Dillon, R. T., Jr. 1992. Electrophoresis IV, Nuts and Bolts. *World Aquaculture* 23(2):48-51.
 Dillon, R. T., Jr. 2011. Robust shell phenotype is a local response to stream size in the genus *Pleurocera* (Rafinesque 1818). *Malacologia* 53:265-277.
 Dillon, R. T., Jr. and J. D. Robinson. 2016. The identity of the "fat *simplex*" population inhabiting Pistol Creek in Maryville, Tennessee. *Ellipsaria* 18(2):16-18.

The Identity of the "Fat *simplex*" Population Inhabiting Pistol Creek in Maryville, Tennessee

Robert T. Dillon, Jr. and John D. Robinson, Department of Biology, College of Charleston, Charleston, SC 29424 USA dillonr@cofc.edu, robinson.johnd@gmail.com

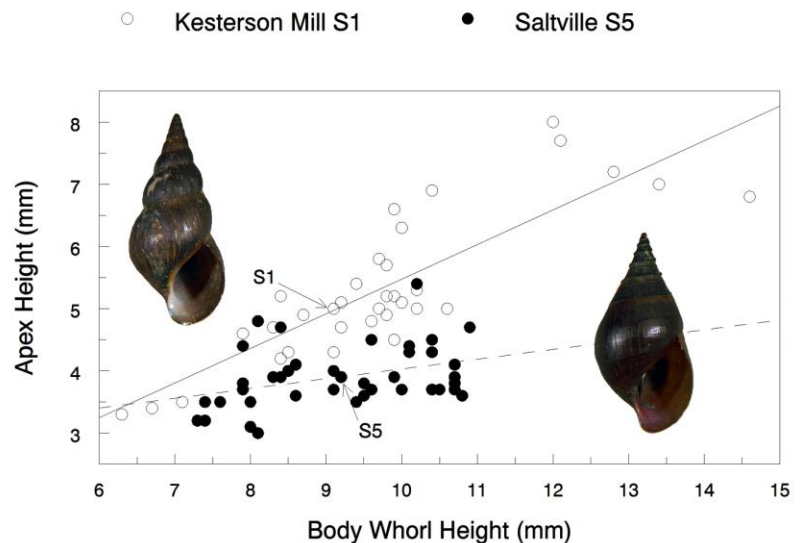
In an accompanying article, Dillon (2016) reported allozyme and shell morphometric evidence suggesting the presence of two reproductively-isolated populations cryptic under the nomen *Pleurocera simplex* at Pistol Creek site S6 in Maryville, Tennessee (35.7535°N; 83.9711°W). These observations prompted us to re-examine data previously published by Dillon and Robinson (2007) on gene frequencies at ten allozyme-encoding loci in five populations of nominal *P. simplex* inhabiting southwest Virginia. That 2007 study included a sample from Thomas Say's type locality S5, the mouth of Cedar Branch as it enters the North Fork Holston River at Saltville, Smythe County, Virginia (36.8907°N; 81.7491°W). Among the four other nominal *P. simplex* populations sampled by Dillon and Robinson, the most genetically divergent from S5 was population S1, sampled in Indian Creek at Kesterson Mill, Lee County, Virginia (36.6283°N; 83.5019°W). Our (2007) Table 1 reminded us that the Indian Creek population S1 was nearly fixed for the S6s "skinny" Pistol Creek marker allele, Oldh¹⁰⁴, while the Saltville type population S5 was fixed for the S6f "fat" marker allele Oldh¹⁰⁰.

So, in August of 2008, we returned to *simplex* type locality S5 at Saltville for additional samples, collecting 54 individuals, and to site S1 at Kesterson Mill, collecting 77 individuals. Each of these samples was divided into two subsamples. Subsamples of 14 individuals from the Saltville type population S5 and 41 from the Indian Creek population S1 were analyzed electrophoretically together with the 71 individuals from Pistol Creek as outlined by Dillon (2016) to confirm allelic matches across the two-state region. These data were combined with the larger data sets previously published by Dillon & Robinson (2007). Then BIOSYS version 1.7 (Swofford & Selander, 1981) was used to calculate matrices of Nei's (1978) unbiased genetic identity and Cavalli-Sforza and Edwards (1967) chord distances between all pairs of control populations S1 and S5 and the two cryptic populations co-occurring in Pistol Creek S6. Chord distances were used as the basis for a neighbor-joining tree calculated using PHYLIP v3.65 program NEIGHBOR (Felsenstein, 2004).

The shells of the remaining 40 individuals from Saltville S5 and 37 individuals from Kesterson Mill S1 were measured and analyzed by analysis of covariance, following the morphometric procedures described by Dillon (2016) for the 71 individuals sampled from Pistol Creek. These shells have been deposited in the Academy of Natural Sciences of Philadelphia under catalog number 426375 for Saltville S5 and number 426377 for Kesterson Mill S1.

The snails sampled from the Saltville type locality S5 tended to demonstrate “fatter” shell morphology than the snails sampled from Kesterson Mill S1. Figure 1 shows that the simple regression of apex height (A) on body whorl height (B) for the Saltville type population S5 was $A = 0.157B + 2.46$ ($r = 0.36$), very significantly different (ANCOVA $t = -9.52$, $p < 0.0001$) from the regression for the Kesterson Mill population S1, $A = 0.556B - 0.09$ ($r = 0.84$).

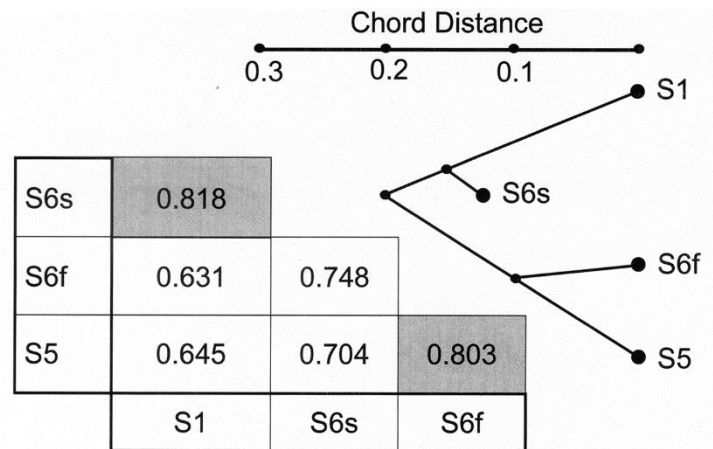
Figure 1. Shell apex height (A) as a function of body whorl height (B) in *Pleurocera* population S1 sampled from Indian Creek at Kesterson Mill, and in topotypic *P. simplex* population S5 sampled from the mouth of Cedar Branch in Saltville. Data corresponding to the two exemplar shells are marked with arrows.



Negligible genetic variation was uncovered at five of the 10 allozyme loci analyzed across the four combined samples: the 20 + 17 = 37 Pistol Creek S6f, the 51 + 13 = 64 Pistol Creek S6s, the 14 + 34 = 48 topotypic *P. simplex* from Saltville S5, and the 41 + 37 = 78 individuals from Kesterson Mill S1. All four of the populations were fixed (or nearly fixed) for different alleles at the *Opdh* locus. Population S1 was distinguished from the other three populations by higher frequencies of *Xdh*⁹⁵ and *Idhf*¹⁰⁴, consistent with the results of Dillon and Robinson (2007), and both S5 and S6f had unique alleles at the *Pgm* locus in high frequencies. But overall, the matrix of Cavalli-Sforza and Edwards chord distances and the neighbor-joining tree (Figure 2) confirms that the fat population S6f of Pistol Creek was more genetically similar to the *simplex* type population inhabiting Cedar Branch at Saltville (S5), and the skinny population S6s from Pistol Creek was more genetically similar to population S1 inhabiting Indian Creek at Kesterson Mill.

Since the fat Pistol Creek population S6f matched topotypic *P. simplex* S5 both genetically and morphologically, only the allozyme data from that subsample of 37 here designated S6f were (ultimately) reported among the *P. simplex* controls in the study of Dillon (2011). The specific identity of the skinny *simplex* population S6s inhabiting Pistol Creek, as well as that of the S1 *Pleurocera* population inhabiting Indian Creek at Kesterson Mill, will be addressed in a subsequent article.

Figure 2. Data below the diagonal are Nei's unbiased genetic identities between four pleurocerid populations of east Tennessee and southwest Virginia, with conspecific values shaded. A neighbor-joining tree based on Cavalli-Sforza and Edwards chord distances is shown above the diagonal. S1 was sampled from Kesterson Mill, S5 was sampled from the *P. simplex* type locality at Saltville, S6f is the fat *simplex* population from Pistol Creek, and S6s is the skinny *simplex* from Pistol Creek.



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Natural and Suitable Glochidial Hosts for the Creek Heelsplitter (*Lasmigona compressa*)

Mark Hove and **Dan Larson**, University of Minnesota (UMN), St. Paul, Minnesota 55108; mark_hove@umn.edu,

Matt Berg, Hallie Jensen, Claire Palmquist, Josh Curtin, Nick Larsen, Nick Klemann, Maddie Duncan, Holly Fiedler, and Alyssa Swenson,

Grantsburg High School (GHS), Grantsburg, Wisconsin, 54840,

Dan Hornbach, Macalester College, St. Paul, Minnesota, 55105, and

Bernard Sietman, Minnesota Dept. of Natural Resources, Lake City, Minnesota 55041

We undertook the following research objectives to improve conservation efforts for *Lasmigona compressa* (I. Lea, 1829): (1) determine suitable glochidial hosts, and (2) identify glochidia and juvenile mussels from naturally infested fishes. Following standard methods for this type of project (Allen *et al.*, 2007), we collected gravid *L. compressa* from Turtle Creek near Owatonna, Minnesota, during fall 2015. Glochidia are difficult to flush from *L. compressa* marsupia, and doing so can damage the gills (Marr *et*

al., 2015) so we used the small groups of glochidia that females released over the winter to infest fishes. Except for two coldwater fish species, all of the mussels and fishes were held at 20-21°C.

Most fish species exposed to *L. compressa* glochidia facilitated metamorphosis. Of the 23 species (in 7 families) exposed to glochidia in the laboratory, 19 (in 6 families) released juveniles (Table 1). Fishes that did not facilitate glochidia metamorphosis (number of inoculated fish/number of surviving fish, range of days to rejection) were: *N. dorsalis* (5/5, 12), *Catostomus commersonii* (2/2, 9), *E. caeruleum* (4/4, 13), and *P. phoxocephala* (1/1, 8).

Table 1. *Lasmigona compressa* host suitability trial results.

Fishes	Water temp. (°C)	No. fish inoculated	No. fish survived	Recovery period (d)	No. <i>L. compressa</i> juveniles recovered
<i>Campostoma anomalum</i>	20-21	4	4	10-21	18
<i>Chrosomus eos</i>	20-21	6	6	8-15	27
<i>C. erythrogaster</i>	20-21	10	9	11-18	73
<i>Clinostomus elongatus</i>	20-21	8	5	9-16	9
<i>Hybognathus hankinsoni</i>	20-21	4	4	10-20	19
<i>H. nuchalis</i>	20-21	1	1	11-15	2
<i>Nocomis biguttatus</i>	20-21	3	3	10-21	33
<i>Notropis heterodon</i>	20-21	2	2	15	5
<i>N. hudsonius</i>	20-21	5	5	8-18	37
<i>N. percobromus</i>	20-21	18	18	9-16	20
<i>N. volucellus</i>	20-21	18	17	9-19	18
<i>Pimephales notatus</i> Trial 1	20-21	24	24	9-16	35
<i>P. notatus</i> Trial 2	20-21	4	4	10-17	12
<i>P. vigilax</i>	20-21	3	3	9-16	25
<i>Rhinichthys atratulus</i>	20-21	13	13	9-26	215
<i>R. cataractae</i>	20-21	1	1	11-22	39
<i>Salvelinus fontinalis</i>	12	4	0*	10	47
<i>Umbra limi</i>	20-21	8	8	13	55
<i>Cottus bairdii</i>	12	1	1	12-19	13
<i>Ambloplites rupestris</i>	20-21	1	1	17	1
<i>Etheostoma exile</i>	20-21	10	10	12	1
<i>E. nigrum</i> Trial 1	20-21	1	1	12	1
<i>E. nigrum</i> Trial 2	20-21	23	23	10-17	37
<i>Percina maculata</i>	20-21	13	13	13	2
<i>P. shumardi</i>	20-21	2	2	10	3

* Incomplete trial, fish died prior to study completion

Fishes naturally infested with glochidia were collected from the Willow River near Cylon, Wisconsin, on May 7, 2015, and were held at GHS. We later collected fishes from Turtle Creek on October 25, 2015, which were held at UMN facilities. Anodontines recorded from the Willow River include *Anodontoides ferussacianus*, *L. compressa*, *Pyganodon grandis*, and *Strophitus undulatus* (Mathiak 1979, Berg et al., 2004). Anodontines reported from Turtle Creek or the adjoining Straight River include *Alasmidonta marginata*, *Anodontoides ferussacianus*, *L. complanata*, *L. compressa*, *L. costata*, *P. grandis*, and *S. undulatus* (Sietman 2003). Reference glochidia used for juvenile identification were from Minnesota streams, although we had enough *L. compressa* glochidia from Turtle Creek to identify *L. compressa*-*S. undulatus*-like unknown glochidia from that stream.

We collected glochidia and juvenile mussels from naturally infested fishes living with *Lasmigona compressa* in the Willow River or Turtle Creek, and compared glochidial shell outline and dimensions with reference material (Table 2). Juvenile *Anodontoides ferussacianus* and *L. compressa* were collected from *Hybognathus hankinsoni*, and juvenile *L. compressa* and *Strophitus undulatus* were collected from

Semotilus atromaculatus from the Willow River (Table 3). From Turtle Creek, we collected two *L. compressa* glochidia from five *H. hankinsoni*, and a *Strophitus undulatus* glochidium from 77 *Luxilus cornutus*. We also collected what appears to be an *Alasmidonta marginata* from a *L. cornutus* but discriminant function analysis results were not very conclusive for this individual. Past surveys of the Cannon River drainage, including Turtle Creek, did not reveal any live *A. marginata*, but live *Lasmigona costata* were found at multiple sites in the watershed (Davis 1987, Sietman *et al.*, 2013), which suggests this glochidium was probably a *L. costata*. Discriminant analysis of this glochidium using *L. complanata* and *L. costata* attributed a 94% likelihood the specimen was *L. costata*.

Table 2. Shell dimensions and standard deviations (sd) of reference Anodontine glochidia known to occur in the Willow River (WR), or Turtle Creek and Straight River (TC). Shell dimensions with different superscripts were significantly different (P<0.05).

Species grouped by similar outline	Height ± 1 sd (µ)	Length ± 1 sd (µ)	Hinge length ± 1 sd (µ)
1) <i>L. compressa</i> ^{TC, WR}	279 ± 6 ^b	328 ± 13 ^b	237 ± 11 ^b
2) <i>L. compressa</i> ^{TC}	256 ± 8 ^c	304 ± 10 ^c	216 ± 6 ^c
3) <i>S. undulatus</i> ^{TC, WR}	300 ± 10 ^a	366 ± 16 ^a	271 ± 18 ^a
1) <i>A. ferussacianus</i> ^{TC, WR}	320 ± 23 ^b	324 ± 22 ^b	247 ± 22 ^b
2) <i>P. grandis</i> ^{TC, WR}	369 ± 14 ^a	365 ± 13 ^a	274 ± 13 ^a
1) <i>A. marginata</i> ^{TC}	366 ± 26 ^b	331 ± 18 ^b	223 ± 15 ^b
2) <i>L. complanata</i> ^{TC}	325 ± 11 ^c	312 ± 12 ^c	207 ± 10 ^c
3) <i>L. costata</i> ^{TC}	391 ± 25 ^a	362 ± 19 ^a	249 ± 16 ^a

Table 3. Glochidial shell dimensions of mussels recovered from naturally infested fishes in Willow River (WR) or Turtle Creek (TC). (Af-*A. ferussacianus*, Lcl-*L. complanata*, Lcr-*L. compressa*, Lct-*L. costata*, Pg-*P. grandis*, Su-*S. undulatus*)

Recovered from	Height ± 1 sd (µ)*	Length ± 1 sd (µ)*	Hinge length ± 1 sd (µ)*	Predicted mussel species
Juvenile from <i>Hybognathus hankinsoni</i> (WR)	338	332	260	79% Af, 21% Pg
Juvenile from <i>H. hankinsoni</i> (WR)	287	340	243	67% Lcr, 33% Su
Juvenile from <i>Semotilus atromaculatus</i> (WR)	280	339	241	76% Lcr, 24% Su
Juvenile from <i>S. atromaculatus</i> (WR)	288	364	255	95% Su, 5% Lcr
Glochidium from <i>H. hankinsoni</i> (TC)	264	316	228	99% Lcr, 1% Su
Glochidium from <i>H. hankinsoni</i> (TC)	266	336	242	99% Lcr, 1% Su
Glochidium from <i>Luxilus cornutus</i> (TC)	379	348	229	60% Am, 37% Lct, 3% Lcl
Glochidium from <i>L. cornutus</i> (TC)	286	347	244	98% Su, 2% Lcr

Our results are consistent with other studies that show *Lasmigona compressa* likely uses a variety of glochidial hosts. Many fishes from several families, and *Necturus maculosus*, support glochidia metamorphosis in the laboratory (Tompa 1979, McGill *et al.*, 2002, Marr *et al.*, 2015, this study). *Lasmigona compressa* naturally infest cyprinids, gasterosteids, cottids, centrarchids, and percids (Kakonge 1972, Hove *et al.*, 2015, Marr *et al.*, 2015, this study). Additional work is needed to determine the extent to which the wide variety of suitable host species identified in laboratory studies are naturally infested with *L. compressa*.

Acknowledgements - This project was supported by the UMN Undergraduate Research Opportunities Program and Grantsburg High School.



Grantsburg High School and UMN researchers (photo by Greg Seitz, stcroix360.com).

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2015 Tennessee's Mollusk Recovery Program Achievements

Don Hubbs, Mollusk Recovery Program Coordinator

The Tennessee Wildlife Resources Agency (TWRA) is the regulatory body primarily responsible for conservation and management of Tennessee's mollusks and other biological resources.

2015 Restoration Activity Summary

In 2015, TWRA continued its reintroduction and recovery (R/A) efforts aimed at restoring freshwater mussel species diversity and distribution in Tennessee. A new population of one federal endangered mussel species (pale lilliput, *Toxolasma cylindrellus*) thought to be extirpated from Tennessee was discovered in the headwaters of Lick Creek, a tributary to the Duck River in southwest Williamson and northwest Maury counties, Tennessee. A new pale lilliput reintroduction site was established in the Duck River in Maury County at Hooper Island. Seven established R/A sites in five different rivers across Tennessee were augmented with additional stockings. Each site was visually monitored for persistence of previously released mussels during the 2015 stocking efforts. Four endangered Cumberlandian mussel species were stocked into established restoration sites in the Duck, Emory, and Nolichucky rivers. In all, 5,959 mussels of 12 species including seven federally endangered were collected, or propagated and stocked into these eight sites in Tennessee waters during 2015.

TWRA began annual mussel restoration activities in 2004, and during the last 12 years, we have stocked ~60,000 mussels of 35 species including 11 federal endangered mussel species into 20 different sites on 11 rivers. Greater than 50 percent of the stocked mussels were hatchery-produced progeny, most of which were provided by our state partners: Alabama Department of Wildlife and Freshwater Fisheries, Kentucky Department of Fish and Wildlife Resources, Virginia Department of Game and Fish, and Virginia Tech. Details of TWRA's mussel restoration activities are presented in an annual report pdf that is available by email request to tnmussels@aol.com.

2015 Duck River Quantitative Survey

During 2015, a total of 1,474 mussels representing 37 species were collected from five sites (Table 1), yielding a mean density of 14.74 mussels per m². During a similar survey conducted in 2010, a total of 2,091 mussels representing 37 species was collected from six sites with a mean density of 17.43 mussels per m². Five federal-listed endangered and one threatened mussel species were collected during the 2015 quantitative survey. The endangered birdwing pearl mussel was the most abundant species collected from the five sampled sites (N=223, 15.13%), followed by spike (N=219, 14.86%), purple wartyback (N=218, 14.79%), painted creekshell (N=110, 7.46%) and flutedshell (N=90, 6.11%).

The fluted kidneyshell, recently listed as a federal endangered species (in 2013), was extirpated from the river over a half century ago. Reintroduction and augmentation efforts over the past nine years using stock from the Clinch River have resulted in recruitment in the Duck River and density at the Lillard's Mill site has increased from 0.3 m² in 2010 to 1.3 m² in 2015. Translocated individuals of the endangered Cumberlandian combshell, and fanshell were not collected quantitatively during the 2015 survey but were observed in the Duck River at Lillard's Mill (D. Hubbs, personal observation).

Table 1. Numbers and percent abundance of each mussel species collected at the five Duck River sites during the 2015 quantitative survey.

Mussel Species	TB	LM	VS	HI	CD	Total	Percent Abundance
<i>Actinonaias pectorosa</i>					1	1	0.07
<i>Amblyma plicata</i>		38	13	1	17	69	4.68
<i>Arcidens confragosa</i>			1			1	0.07
<i>Cyclonaias tuberculata</i>	1	97	23	37	60	218	14.79
<i>Elliptio dilatata</i>	5	104	15	93	2	219	14.86
<i>Epioblasma ahlstedti</i> *E		15	15	9		39	2.65
<i>Fusconaia ebena</i>					3	3	0.20
<i>Lampsilis fasciola</i>	2	7	7	13	5	34	2.31
<i>Lampsilis ovata</i>	1	4	4	7	1	17	1.15
<i>Lampsilis teres</i>		1				1	0.07
<i>Lasmigona costata</i>	4	35	20	29	2	90	6.11
<i>Lemiox rimosus</i> *E		108	64	51		223	15.13
<i>Leptodea fragilis</i>		5				5	0.34
<i>Ligumia recta</i>					1	1	0.07
<i>Medionidus conradicus</i>		1		31		32	2.17
<i>Megalonaias nervosa</i>		4	1	2	1	8	0.54
<i>Obliquaria reflexa</i>		1				1	0.07
<i>Obovaria subrotunda</i>		9	26	19		54	3.66
<i>Pleurobema oviforme</i>	1	1	3	10		15	1.02
<i>Pleurobema rubrum</i>			5	8		13	0.88
<i>Pleuronaia barnesiana</i>	9	21	8	8	1	47	3.19
<i>Pleuronaia dolabelloides</i> *E		12	14	8	6	40	2.71
<i>Potamilus alatus</i>			1	1		2	0.14
<i>Ptychobranchnus fasciolaris</i>					3	3	0.20
<i>Ptychobranchnus subtentum</i> *E		26				26	1.76
<i>Pyganodon grandis</i>					1	1	0.07
<i>Quadrula c. cylindrica</i> *T		7	21	29		57	3.87
<i>Quadrula intermedia</i> *E		3	7	9		19	1.29
<i>Quadrula pustulosa</i>		29	8	15	22	74	5.02
<i>Quadrula qudrula</i>					1	1	0.07
<i>Quadrula verrucosa</i>		11	1		7	19	1.29
<i>Strophitus undulatus</i>	2	1	1			4	0.27
<i>Toxolasma lividus</i>		2		1		3	0.20
<i>Truncilla truncata</i>		8			13	21	1.42
<i>Villosa taeniata</i>	11	54	23	22		110	7.46
<i>Villosa iris</i>		1				1	0.07
<i>Villosa vanuxemensis</i>			2			2	0.14
Totals	36	605	283	403	147	1474	
Species	9	27	23	21	18	37	

Abbreviations: TB = Tarpley Bluff, LM = Lillard’s Mill, VS = Venable Spring, HI = Hooper Island, CD = Columbia Mill Dam *E = federal endangered *T = federal threatened

Species richness declined at all five comparable sites from 2010 to 2015: from 10 to 9 taxa at Tarpley Bluff, 29 to 27 at Lillard’s Mill, 25 to 23 at Venable Spring, 23 to 21 at Hooper Island, and 19 to 18 at Columbia Mill Dam (Table 2). Mean density also declined at four of the five comparable sites (Tarpley Bluff 4.5 to 1.8 m², Lillard’s Mill 37.4 to 30.26 m², Hooper Island 22.2 to 20.15 m², and Columbia Dam 10.5 to 7.4 m²). Only Venable Spring showed an increase, from 12.65 to 14.15 m².

Table 2. Mussel density and species richness measured at comparable Duck River sites, 1988 to 2015.

Survey	TVA 1988			Ahlstedt et al. 2004			TWRA 2010			TWRA 2015		
Site	Area (m ²)	Quadrats	Species	Area (m ²)	Quadrats	Species	Area (m ²)	Quadrats	Species	Area (m ²)	Quadrats	Species
Tarpley Bluff	NS			2.2	20	6	4.85	80	10	1.80	80	9
Lillard’s Mill	26.8	40	16	36.6	20	17	37.4	80	29	30.26	80	27
Venable Spring	7.81	21	11	19.6	30	16	12.65	80	25	14.15	80	23
Hooper Island	10.0	40	14	24.4	20	19	22.2	80	23	20.15	80	21
Columbia Mill Dam	NS			NS			10.5	80	19	7.4	80	18
Littlelot	NS			NS			17	80	17	NS		

NS = Not sampled

The overall results of the 2015 survey show a decline in the total mussel population at the five Duck river sites from levels sampled in 2010. Some sites and some species, however, increased from 2010 to 2015. It appears that the 2010 survey sampled peak population levels for several species, especially the endangered Duck River dartersnapper, *Epioblasma ahlstedti*. Additional details of this survey are presented in the full report pdf, also available by email request to tnmussels@aol.com.

Mussels Belonging to the Genus *Iphigenia* and *Profischeria* (Donacidae) in the National Mollusc Collections in Israel

Henk K. Mienis, National Natural History Collections, Berman Building, Hebrew University, Edmond J. Safra Campus, IL-9190401 Jerusalem, Israel, and The Steinhardt Museum of Natural History - Israel National Center for Biodiversity Studies, Tel Aviv University, IL-6997801 Tel Aviv, Israel.
mienis@netzer.org.il

Quite some time ago, I received for identification an interesting bivalve collected in Lake Togo, West Africa, by one of my longtime correspondents, the late Fritz Seidl (17 August 1936 - 8 July 2001), formerly of Braunau am Inn, Austria. The specimen was immediately recognizable as belonging to the genus *Profischeria* Dall, 1903, a group of freshwater mussels which has been considered for a long time part of

the genus *Iphigenia* Schumacher, 1817; however, species belonging to *Iphigenia* are restricted in their distribution to a marine habitat. Daget (1998) lists the African marine and freshwater species all under *Iphigenia*, but Huber (2010) separated them into two different genera on morphological reasons. Both genera belong to the family Donacidae and the opportunity was taken to revise the material from both genera in the Mollusc Collections of the National Natural History Collections of the Hebrew University of Jerusalem (HUJ), the Steinhardt Museum of Natural History, and Israel National Center for Biodiversity Studies of the Tel Aviv University (SMNH MO).

Family Donacidae

Genus *Iphigenia* Schumacher, 1817

Syn. *Procos* Gistel, 1848

Members of the genus *Iphigenia* are restricted in their distribution to West Africa, the western part of the Atlantic Ocean from Florida to Brazil, and the west-coast of America from southern California to Peru.

01 *Iphigenia altior* (Sowerby, 1833)

Syn.: *Iphigenia ambigua* Bertin, 1881

Costa Rica, Nicoya, ex-Parritt (HUJ 8326/2=Blok 5325).

General distribution: west coast of Central America.

02 *Iphigenia brasiliensis* (Lamarck, 1818)

Syn.: *Iphigenia media* Shuttleworth, 1856 (see Neubert & Gosteli, 2005: 20, plt. 17, figs. 1a-f and

Huber, 2010: 693)

Brazil (HUJ 8322/1=Coen 5380a); São Paulo, Itanhaem (HUJ 8323/1=Coen 5380b); Meaipe Esp. Santo, taken in mud at extremely low tide, leg. Locals, 01.03.2003 (SMNH MO 65455/2 = Ex-col. Z. Orlin, BR 7611).

West Indies, ex-Lawson (HUJ 8325/1=Blok 3527);

Antilles (HUJ 8324/1=Coen 5381).

General distribution: southern part of Florida, West Indies and Brazil.

Remarks: The specimens from the West Indies and the Antilles in the HUJ-collection show a pallial sinus which is more slender than that in specimens from Brazil. Unfortunately Warmke and Abbott (1962:202, plt. 42, fig. M) do not show the interior of specimens from Puerto Rico.

03 *Iphigenia laevigata* (Gmelin, 1791)

French Guinea, leg. I.F.A.N. (HUJ 8330/10).

General distribution: west coast of Africa.

Genus *Profischeria* Dall, 1903

Syn.: *Fischeria* Bernardi, 1860 (not Robineau-Desvoidy, 1830)

Members of the genus *Profischeria* are confined in their distribution to freshwater habitats in West and Central Africa (Huber, 2010: 693).

01 *Profischeria delessertii* (Bernardi, 1860)

Ivory Coast, Grand-Bassam, Comoé River, Assinie (HUJ 8283/1=Coen 5244);

Togo, Lake Togo, off Togoville, leg. F. Seidl, 13.02.1983 (HUJ 8283/1).

02 *Profischeria messengeri* (Preston, 1909)

Syn.: *Fischeria approximans* Preston, 1909

Senegal, Senegal River near Podor, leg. M. Messenger (HUJ 30094/1 = syntype of *Fischeria approximans* Preston, 1909).



Figure 1. *Profischeria delessertii* (Bernardi, 1860). Ivory Coast, Grand Bassam, Comoé River (HUJ 8282). Photo.: Oz Rittner.

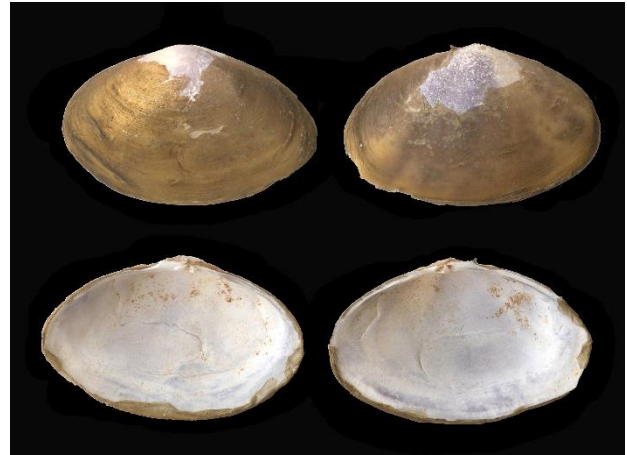


Figure 2. *Profischeria messengeri* (Preston, 1909). Senegal, Senegal River, Podor. Syntype of *Fischeria approximans* Preston, 1909 (HUJ 30094). Photo.: Oz Rittner.

Acknowledgement:

I like to thank my colleague Oz Rittner of the Steinhardt Museum of Natural History (Tel Aviv University) for his photographs of the *Profischeria* species.

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Additional Information Concerning the Conquest of Europe by the Invasive Chinese Pond Mussel *Sinanodonta woodiana*, 42. News from Austria, Italy, the Netherlands and Slovakia

Henk K. Mienis, The Steinhardt Museum of Natural History – Israel National Center for Biodiversity Studies, Tel Aviv University, IL-6997801 Tel Aviv, Israel, and National Natural History Collections, Berman Building, Hebrew University of Jerusalem, Edmond J. Safra Campus, IL-9190401 Jerusalem, Israel. mienis@netzer.org.il

Here again is some information concerning new and overlooked records of the invasive Chinese Pond mussel from Europe. This time the information comes from Austria, Italy, the Netherlands, and Slovakia.

Austria

Frank (2015) reported the discovery of the Chinese Pond mussel in the so-called "Stadtteich" (= Town or City-pond) in Zistersdorf, Lower Austria. This invasive mussel species had been discovered in the pond by Manfred Götz in August 2014.

During fieldwork carried out in the lower course of the river Kamp and the upper course of the river Thaya, Lower Austria, the Chinese Pond mussel was encountered in the Stockgraben near Theisz (Reischütz & Reischütz, 2016).

In the summer of 2015, the water level in the rivers March and Thaya (Lower Austria) had dropped considerably, which resulted in an extremely high rate of starvation among the large freshwater mussels (Fischer & Reischütz, 2016a). Among the victims everywhere were large numbers of *Sinanodonta woodiana*.

The Weidenbach, a stream in the region of Gänserndorf, Lower-Austria, has been cleaned by dredging it. This has resulted in a huge kill off among the large freshwater mussels living in that stream, in spite of the fact that the Unionidae are protected by law (Fischer & Reischütz, 2016b). Among the victims were also juvenile specimens of the invasive *Sinanodonta woodiana*.

Italy

The traces left by moving or resting specimens of the Chinese Pond mussel were studied in the margins of a lake and an impounded river in Umbria, Italy (Monaco *et al.*, 2016). These horizontal or vertical burrows were filled among others by rather fine sediments. They may explain certain features of sedimentation seen in fossil layers and may play an important role in the better understanding of the ichnology i.e. the study of fossilized tracks, trails, burrows, borings or other traces as left behind by organisms that produced them.

The Netherlands

Soes (2016) mentioned the find of a fresh, but empty doublet of *Sinanodonta woodiana* on the bank of the Lower-Rhine near Wageningen. No other finds of this invasive species in the river Rhine are known.

Slovakia

In an appendix to her report on the presence of *Sinanodonta woodiana* in Zistersdorf, Austria, Christa Frank (2015) mentioned two new localities for this mussel species in the Slovakian part of the Donau: Radvan nad Dunajom and Stúrovo.

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Confirmed Occurrence of the Native Mussel/ Naiad *Diplodon expansus* (Küster, 1856) (Unionoida: Hyriidae) in the Highlands Region of Santa Catarina State/ SC, Central Southern Brazil

A. Ignacio Agudo-Padrón, Project "Avulsos Malacológicos - AM",
P.O. Box 010, 88010-970 Centro, Florianópolis, Santa Catarina/ SC, Brazil
ignacioagudo@gmail.com ; <http://noticias-malacologicas-am.webnode.pt/>

The little native freshwater mussel/ naiad *Diplodon expansus* (Küster, 1856) is one of the 30 limnic bivalve forms (3 exotic and 27 natives) with confirmed occurrence in the Santa Catarina's State territory (Agudo-Padrón 2008:167-168, 2014b:19). Until now, it was formally confirmed for punctual locations of the Great Florianópolis, Itajaí River Valley and Southern regions (Figure 1), but in the state Highlands (Agudo-Padrón 2014 a: 20-Fig. 2, 22) only cited for unspecified "small streams" (Agudo-Padrón 2008: 168).

Recently (May 06 2016), however, we were able to "confirm" the presence of this species in the region. Biologist Emanuéli Marin Albino found a live specimen of *Diplodon expansus* in the Rio Marombas (Marombas River), "São Cristóvão do Sul" Municipal District (27°16'00" S ; 50°26'26" W), Highlands of Santa Catarina State/ SC (Figure 2). The mussel naiad was found in the course of rescue of ichthyofauna and macroinvertebrates (the region suffers environmentally, mainly from the "proliferation" of reservoirs and little hydroelectric power plants).

Figure 1.- Previous known distribution of the native naiad HYRIIDAE *Diplodon expansus* (Küster, 1856) in the territory of Santa Catarina State/ SC



Figure 2. Rio Marombas (Marombas River), "São Cristóvão do Sul" Municipal District (27°16'00" S ; 50°26'26" W – Map, red color), Highlands region of Santa Catarina State/ SC, Central Southern Brazil and the specimen of *Diplodon expansus*. Photographs by Emanuéli Marin Albino, Xanxeré, SC

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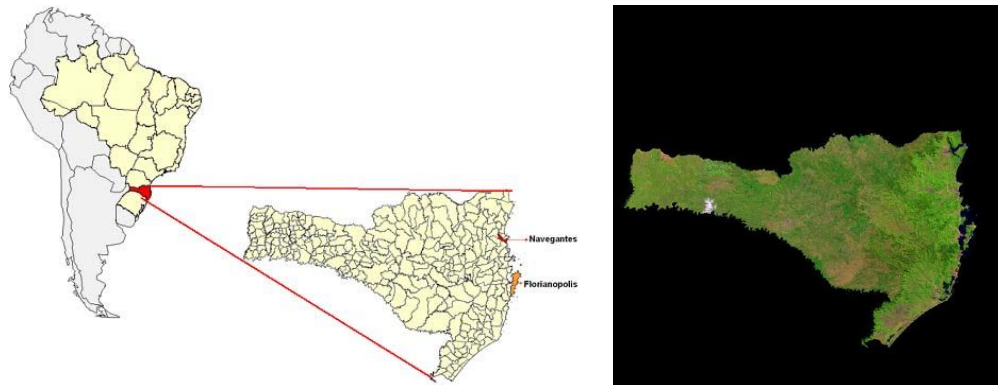
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**The Mollusk Fauna of Santa Catarina State/ SC, Central Southern Brazil:
a Final General Balance after Two Decades of Research,
with Special Emphasis on the Freshwater Species**

A. Ignacio Agudo-Padrón, Project “Avulsos Malacológicos - AM”
P.O. Box 010, 88010-970 Centro, Florianópolis, Santa Catarina/ SC, Brazil
ignacioagudo@gmail.com ; <http://noticias-malacologicas-am.webnode.pt/>

As of May 2016, and in spite the regional research barriers (Agudo-Padrón 2015 b: 379, 2016 b: 20), the general inventory of malacofauna occurring in the State of Santa Catarina/ SC (Agudo-Padrón 2014 b, 2015 a), the smallest central portion of the southern Brazil region (Figure 1), includes a total of 1009 continental and marine species and subspecies (Table 1).

Figure 1. Continental territory of Santa Catarina's State/ SC, Central Southern Brazil region.



Among them, the limnic/ freshwater mollusks include 70 forms (30 bivalves and 40 gastropods) (Agudo-Padrón 2016a) corresponding to seven percent of the total. Unfortunately, this small portion of the fair regional malacofauna is the most threatened/ vulnerable to the increasing human activities that occur within the State (Agudo-Padrón 2014a) due to the physical restraint of its continental aquatic habitats (Figure 2). In additional consequence of the regional “research barriers” previously characterized (Agudo-Padrón 2015b:379, 2016b:20), its future seems more uncertain than all other continental and marine forms inventoried.

Table 1. Register of the mollusk species occurring in the State of Santa Catarina/ SC, central southern region of Brazil, as of May 2016.

Groups of Mollusks	Species	Genera	Families
Freshwater Bivalves	30	11	5
Freshwater Gastropods	40	19	8
Terrestrial Gastropods *	154	68	22
Marine/Estuarine Species **	785	422	165
Totals	1009	520	200

* -- Including the two amphibious (freshwater) forms known for the State (Agudo-Padrón 2016a:33-34)

** -- Recently added to the inventory (Agudo-Padrón 2015a) other 114 species, 57 genera and 13 families (Agudo-Padrón 2016 . contribution in progress)

Figure 2. The six great malacological regions of Santa Catarina's State/ SC. The numbers in each region refer to the following descriptions.



1.- Great Florianópolis region: coastal and mountainous

Freshwater species registered: 25 (18 gastropods, 7 bivalves).

Major regional environmental problems:

Chaotic urbanization, drainage of flooded areas, plumbing and pollution of natural waterways.



2.- Northern region:

Freshwater species registered: 11
(7 gastropods, 4 bivalves).

Major regional environmental problems:
increasing land use, urban and industrial pollution of natural springs, suppression of riparian vegetation.



3.- Western region:

Freshwater species registered: 42
(18 gastropods, 24 bivalves)**.

Major regional environmental problems:
proliferation of reservoirs and great hydroelectric power plants, pollution from agricultural and livestock activities on a large scale, suppression of riparian vegetation.

**As reported in the literature (Agudo-Padrón 2008:150, 2014b:21), the region of the “Uruguay River Basin” has always been the territory of greatest occurrence of freshwater bivalves in the State.



4.- Highlands region:

Freshwater species registered: 15
(9 gastropods, 6 bivalves).

Major regional environmental problems:
proliferation of agribusinesses, pollution of natural springs by the indiscriminate application of pesticides and other agrotoxics, proliferation of reservoirs and little hydroelectric power plants.



5.- Southern region:

Freshwater species registered: 23
(15 gastropods, 8 bivalves).

Major regional environmental problems:
intensive coal mining; pollution and acidification of springs, rivers and lakes by coal wastes; irrigated rice monocultures.



6.- Itajaí River Valley region:

Freshwater species registered: 27

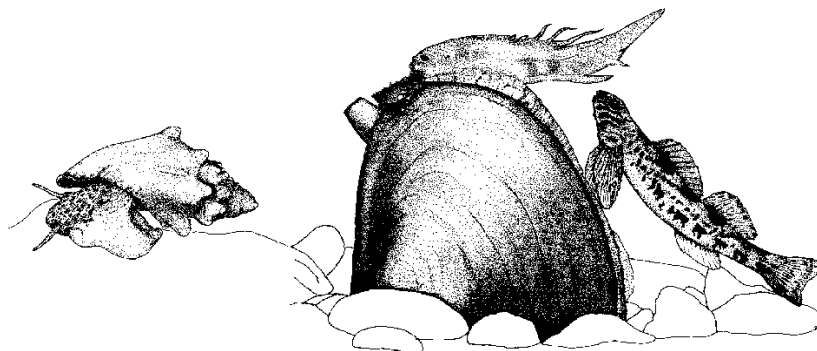
(19 gastropods, 8 bivalves).

Major regional environmental problems:

increasing land use, urban pollution of springs and rivers, suppression of riparian vegetation, irrigated rice monocultures

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Obituary

Artie Lou Metcalf 1929 -- 2016

Artie Lou Metcalf, 86, formerly of Dexter, Kansas, and El Paso, Texas, died Jan. 31, 2016, at Presbyterian Manor, in Arkansas City, Kansas.

Artie was born July 5, 1929, near Dexter, Kansas, to Art and Lucile Metcalf. Artie was a highly educated yet a very humble man. He started his teaching career in 1949 at Glenwood, a rural school near Dexter, Kansas. He joined the Air Force in the early 1950s and served his country in England and Germany.

Artie completed his undergraduate work in 1956 at Kansas State University, where he earned a Bachelor of Science in Education/Zoology. In 1957, he followed this with a Master of Arts in Zoology also from Kansas State, after which he studied in Hamburg, Germany, for a year as a Fulbright Scholar. In 1964, he earned a Ph.D. from the University of Kansas, majoring in Zoology (with specialization in Ichthyology) and minoring in Geology. Artie was a life-long learner; in 1990, he also earned a Master of Arts in Spanish at The University of Texas at El Paso (UTEP).

In 1962, Dr. Metcalf started his professional career as a professor at UTEP. His research interests included the distribution, ecology and systematics of mollusks, both freshwater and terrestrial, especially as related to the biology and geology of the Quaternary and the biogeography of the southwestern United States. Nearly 40 years of field notes and approximately 6,000 lots of shells attest to the time he spent in the field collecting terrestrial snails and freshwater mussels. The specimens are complemented by a collection of snail shell and genitalia illustrations that Dr. Metcalf drew himself. In addition, he provided many additional specimens to the education collection at UTEP, and those specimens are still used by students in Invertebrate Zoology classes.

Dr. Metcalf was a quiet person with a great sense of humor, many talents and interests. He was an avid birder in his later years and knew the plants of the southwest deserts well. Still, he was so involved in the world of mollusks that colleagues at UTEP often referred to him as Artie Snailcalf. He would get so focused on getting to the field to "snail," that he nearly always left the gas cap on top of the pump when filling up. You knew he had been in the field when he drove up with a sock stuck in his gas tank.

Dr. Metcalf retired from UTEP in 1999 and, upon his retirement, was honored with the title of Professor Emeritus in the Department of Biological Sciences. He was Curator of Mollusks in the UTEP Biodiversity Collections until 2010.



1963 UTEP Faculty Photograph

Artie Metcalf Publications (compiled by UTEP Biodiversity Collections):

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2015 Freshwater Mollusk Bibliography

Kevin S. Cummings

The following are papers on freshwater mollusks that have been published up to and including 2015 that have not appeared in previous FMCS bibliographies. These citations are split into five groups for the convenience of researchers: Unionoida, Sphaeriidae, Corbiculidae, Dreissenidae & other freshwater bivalves, and Gastropoda. Papers that include taxa from more than one of the above categories are included under each group. A web searchable database of over 24,000 references on freshwater mollusks (including all previous FMCS bibliographies on freshwater mollusks) can be found at: <http://ellipse.inhs.uiuc.edu:591/mollusk/biblio.html>.

To insure that papers are cited correctly, researchers are encouraged to send pdf's or reprints to: Kevin S. Cummings, Illinois Natural History Survey, 607 E. Peabody Dr., Champaign, IL 61820. email: kscummin@illinois.edu.

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FMCS Officers

President

Teresa Newton

U.S. Geological Survey
Upper Midwest Environ. Science Center
2630 Fanta Reed Road
LaCrosse, WI 54603
608-781-6217
tnewton@usgs.gov

President Elect

Heidi L. Dunn

Ecological Specialists Inc.
1417 Hoff Industrial Park
O'Fallon, MO 63366
636-281-1982; Fax: -0973
Hdunn@ecologicalspecialists.com

Secretary

Janet Clayton

West Virginia Division of Natural Resources
PO Box 67
Elkins, WV 26241
304-637-0245
Janet.l.clayton@wv.gov

Treasurer

Emily Grossman

Ecological Specialists Inc.
1417 Hoff Industrial Park
O'Fallon, MO 63366
636-281-1982
egrossman@ecologicalspecialists.com

Past President

Patricia Morrison

U.S. Fish and Wildlife Service
Ohio River Islands NWR
3982 Waverly Road
Williamstown, WV 26187
304-375-2923 x 124
patricia_morrison@fws.gov

Ellipsaria is posted on the FMCS web site quarterly: around the first of March, June, September, and December. This newsletter routinely includes Society news, abstracts, meeting notices, pertinent announcements, informal articles about ongoing research, and comments on current issues affecting freshwater mollusks. Anyone may submit material for inclusion in *Ellipsaria* and all issues are accessible to anyone on the FMCS website (<http://molluskconservation.org>).

Information for possible inclusion in *Ellipsaria* should be submitted via e-mail to the editor, John Jenkinson, at jjjenkinson@hotmail.com. Those 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 about 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 questions about possible submissions or transmission concerns.

FMCS Standing Committees and Their Chairs/Co-chairs

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

Awards

W. Gregory Cope
North Carolina State University
greg_cope@ncsu.edu

Teresa Newton
Upper Midwest Environ. Science Center
tnewton@usgs.gov

Emy Monroe
Midwest Fisheries Center
emy_monroe@fws.gov

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

Nathan Whelan
Auburn University
nwhelan@auburn.edu

Jeremy Tiemann
Illinois Natural History Survey
jtiemann@illinois.edu

Genetics

David J. Berg
Miami University
bergdj@miamioh.edu

Curt Elderkin
The College of New Jersey
elderkin@tcnj.edu

Guidelines and Techniques

Mary McCann
HDR, Inc.
mary.mccann@hdrinc.com

Ryan Schwegman
EnviroScience, Inc.
RSchwegman@EnviroScienceInc.com

Information Exchange

Journal -- G. Thomas Watters
OSU Museum of Biological Diversity
Watters.1@osu.edu

W. Gregory Cope
North Carolina State University
greg_cope@ncsu.edu

Newsletter -- 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
U.S. Fish and Wildlife Service
Megan_Bradley@fws.gov

Jennifer Archambault
North Carolina State University
jmarcham@ncsu.edu

Propagation, Restoration, & Introduction

Dan Hua
Tennessee Wildlife Resources Agency
Dan.Hua@tn.gov

Rachael Hoch
North Carolina Wildlife Resources
Commission
rachael.hoch@ncwildlife.org

Symposium

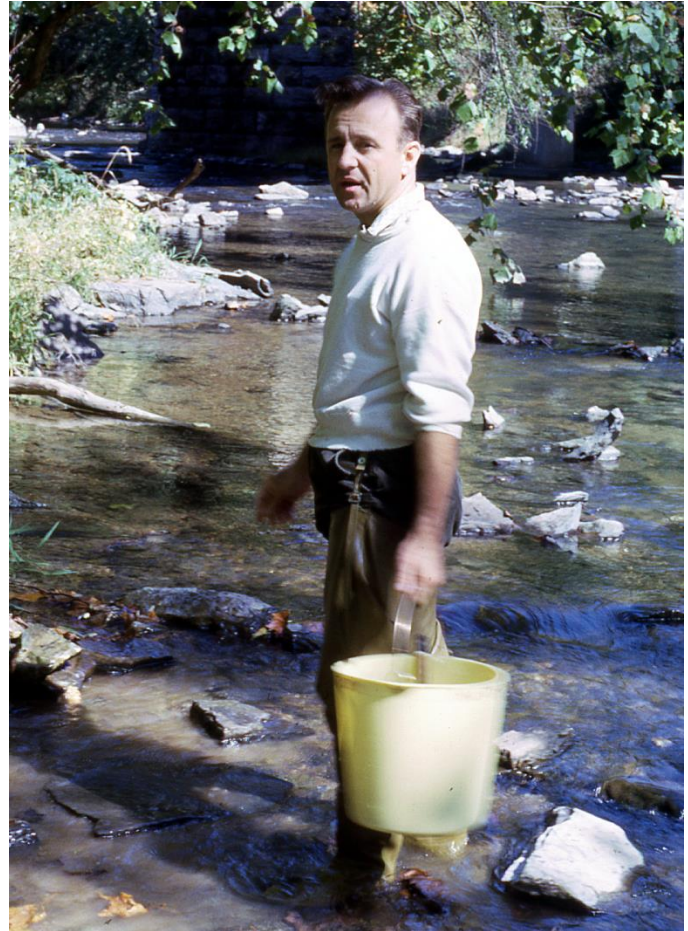
Heidi L. Dunn
Ecological Specialists Inc.
Hdunn@ecologicalspecialists.com

Parting Shot

Many Society members have heard of Dr. David Stansbery, former Curator of Mollusks at the Ohio State University Museum of Biological Diversity, but very few younger members have had the opportunity to meet him or, rarer yet, to be in the field with him. In this 1965 photograph, Dr. Stansbery is standing in the upper Clinch River during his first extended collecting trip on that stream. He has his typical stream collecting equipment: hip waders, a 5-gallon bucket, and a seive for collecting snails. Mussels were found along the shore, in muskrat middens, and by looking for siphons in shallow water.

The extensive collecting that Dave Stansbery did in the 1960s and 1970s, along with the advice and identification service he provided to just about anyone interested or curious enough to ask, helped rekindle widespread appreciation of native freshwater mussels and concern for their survival in the United States.

On May 5, 2016, Dr. Stansbery celebrated his 90th birthday at his home in Columbus, Ohio. Photograph by John Jenkinson.



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.