



Newsletter of the Freshwater Mollusk Conservation Society
 Volume 21 – Number 1 March 2019

Cover Story 1
 Society News 4
 Society Business
 Items 6
 Announcements 11
 Regional Meetings . . . 13
 Upcoming Meetings . . 16
 Contributed Articles . . 17
 Obituary 28
 FMCS Officers 29
 Committee Chairs
 and Co-chairs 30
 Parting Shot 31



Are You Ready to Experience Texas?

Hopefully, by now you have taken advantage of the Early Registration rate and are looking forward to attending the 11th Biennial FMCS Symposium in at the Hyatt Regency San Antonio Riverwalk, in downtown San Antonio, Texas, USA, on April 14 - 18, 2019. If you missed the Early Registration cut-off (February 28), you can still register at the Symposium page on our website: https://molluskconservation.org/EVENTS/2019SYMP/OSIUM/2019_FMCS-Symposium.html If you have not yet reserved your room at the hotel, you *really* need to

do so **by March 18** to take advantage of the Symposium rate of **\$149/night for a room with two double beds**. [All of the contracted number of rooms with king size beds already have been reserved.] If you wait to book after March 18, you will have to pay full price at the Hyatt Riverwalk which, depending on the type of room, can cost several hundred dollars per night. Standard internet is included in the Symposium rate. Reservations can be made online at <https://www.hyatt.com/en-US/hotel/texas/hyatt-regency-san-antonio-riverwalk/satrs> or by calling (210) 222-1234. If you book online, make sure to use Group Code **G-FMCS**. If you call, be sure to say, **“I want the 2019 FMCS/Symposium April 2019 rate.”** Currently, overnight valet parking is \$43 with “in and out” privileges, and overnight self-parking is available for \$31 plus tax.

The theme for this Symposium is **Life on the Edge: Reconciling Human Needs and Freshwater Mollusk Conservation** and the intent is to focus on ways in which humans and freshwater systems can coexist to ensure the long-term persistence of freshwater mollusks. The Local Committee has lined up a group of incredible keynote speakers who are sure to engage and inform, not only on mollusk conservation, but also on the great state of Texas and the urgent need to conserve its incredible and unique natural resources. All of this is in addition to our usual diversity of poster and platform presentations, Society business sessions, field trips, and informal events. The Symposium pages on our website include much more information about the details of this event.

Symposium Schedule

The recent temporary shutdown of much of the U.S. federal government has caused delays in the abstract submission deadline for this meeting and other uncertainties that are still affecting the scheduling of papers and sessions for this Symposium. The following schedule includes times for events on Sunday (April 14) and for the evening events; however, it excludes details about what will occur during each of the meeting days. Once the daytime schedules are set, a revised schedule will be posted on the Symposium website page.

Sunday April 14	Monday April 15	Tuesday April 16	Wednesday April 17	Thursday April 18
Registration	Registration	Registration	Registration	Breakfast (on your own)
Breakfast (on your own)	Breakfast (on your own)	Breakfast (on your own)	Breakfast (on your own)	
Workshop (8:00-5:00)	Plenary Session	Plenary Session	Plenary Session	Field Trips
	Morning Sessions	Morning Sessions	Morning Sessions	
	Committee Meetings (lunch provided for attendees)	Committee Meetings (lunch provided for attendees)	Business Meeting and Awards (lunch provided)	
Board Meeting (4:00-6:00)	Afternoon Sessions	Afternoon Sessions	Afternoon Sessions	
	Dinner (on your own)	Dinner, Auction (6:00-11:00)	Dinner (on your own)	
Student/Mentor Mixer (6:00-7:00)	Poster Session (6:00-7:30)		Mixer and Music (7:00-10:00)	
Welcome Mixer (7:00-9:00)	Social -Roadmap Brewing Co. (7:30-10:00)			

Committee Meeting Schedule

FMCS Standing and Ad-hoc committees also will hold their own meetings during this week in San Antonio. Most Standing Committees will meet during lunch on either Monday or Tuesday; however, some groups will need to meet at other times. The following table lists which committees will be meeting on each day. Unfortunately, this schedule could change slightly so please be sure to periodically check the Symposium website for updates. Specific meeting locations will be announced at the registration table and during the Symposium sessions.

Sunday	Monday	Tuesday	Wednesday
	At Breakfast Diversity & Inclusiveness		At Breakfast Mollusk Valuation
After the Board Meeting Names subcommittee (~6:00)	At Lunch Environmental Quality & Affairs Gastropod Status Information Exchange Propagation & Restoration Ecosystem Services Chapters/International	At Lunch Awards Genetics Guidelines & Techniques Mussel Status Outreach Professional Certification Symposia	

Workers Needed

Trying to find a way to be more involved in FMCS? Here’s your opportunity! The 2019 Symposium Planning Committee is looking for workers to help at the registration table. Workers will be compensated \$20 per 2-hour work period. If you are interested, contact Susan Oetker (susan_oetker@fws.gov) or Daelynn Woolnough (wooln1d@cmich.edu).

Auction and Raffle Items Needed, Too!!

Please donate items for the “World-Famous” FMCS auction and raffle to be held during the San Antonio Symposium. Past items have included rare and unusual things, field equipment, books, clothing, art, photographs, jewelry, fishing gear, food, beverages, and more -- including river booty. Proceeds from the auction and raffle are used by FMCS for student travel awards.

Since many people will be flying, you can easily pack small items in your suitcase. Once you arrive, you can drop off items at the registration desk or give them to Charles Randklev, Lisie Kitchel, or auctioneer Greg Zimmerman. [Greg will be filling in for infamous auctioneer Steve Ahlstedt this year, so let’s make Steve proud and bring lots of items!] Be sure to label your item with your name/organization if you would like to be recognized for the donation.



Item too big to pack? Can’t attend? You can still donate! Ship that big ol’ box of goodies to Attention: FMCS Auction, c/o Roel Lopez, 1919 Oakwell Farms Parkway, Suite 100, San Antonio, Texas 78218. If shipping, please clearly label that the item is for the FMCS auction and indicate if a receipt is desired. If you have any questions, give Lisie Kitchel a call at 608-220-5180 or e-mail her at Lisie.Kitchel@wi.gov .

ONE LAST THING! - Send Us Your Photos!!

This has been a big hit at the last few meetings. We will run a PowerPoint presentation when possible during the mixers, etc., showing FMCS members doing their things. So, send your field photos, lab photos, etc., to show off what you do at work or when just having fun! Send photos to Jennifer Khan, Jennifer.Morton@ag.tamu.edu . It would help if you would use “FMCS Photos” as the subject line.

The planning committee looks forward to seeing you in San Antonio. If you have any questions, please feel free to send us an email. Also, if you represent a state or federal agency, private firm, or an individual wanting to help defray the cost of the meeting, then don't forget about sponsorships.

Charles Randklev, 2019 Symposium Co-Chair (crandklev@ag.tamu.edu)

Clint Robertson, 2019 Symposium Co-Chair (Clint.Robertson@tpwd.texas.gov)

Susan Oetker, 2019 Symposium Co-Chair (susan_oetker@fws.gov)

Heidi Dunn, FMCS President (HDunn@ecologicalspecialists.com)

Jeremy Tiemann, FMCS President-elect (jtiemann@illinois.edu)

Society News

FMBC and BioOne Complete Have Teamed-Up

Beginning in January 2019, the FMCS Journal *Freshwater Mollusk Biology and Conservation* became a member of the journal holdings of BioOne Complete. This means that our journal is now part of the marketing power held by BioOne and is accessible through libraries world-wide. BioOne Complete is a database of more than 200 subscribed and open-access titles in the biological, ecological, and environmental sciences. It is the new flagship product of the nonprofit publisher BioOne. BioOne Complete provides libraries with cost-effective access to high-quality, curated research, and independent society publishers with a dynamic, community-based platform and global distribution. The current and all back issues of our journal published through our Society can be found on their website at <https://bioone.org/> .

Society members and others may also continue to access the current and back issues of the Journal through the FMCS publications website at <https://molluskconservation.org/FMBC-journal.html> . To view the holdings through BioOne Complete, simply navigate to their website and browse by Publishers or Titles, hit F for Freshwater Mollusk Conservation Society (publisher) or *Freshwater Mollusk Biology and Conservation* (Titles) to get to our journal.

Unio List-serve Reminder

If you are interested in participating on the Unio list-serve and have not already joined the **new site**, you can sign up for this free service by sending a blank email to unio-join@fws.gov and follow the instructions you receive in a response. Please note that some of our members have reported issues using their institutional email address but were successful in joining using a personal e-mail account.

Call for Information – Mussel Reintroduction, Augmentation, and Translocation Techniques

The FMCS Propagation and Restoration Committee is completing an updated review of mussel reintroduction/translocation techniques, including techniques associated with post-release monitoring. The last large-scale review of these techniques was carried out in 1995 by Greg Cope and Diane Waller, so it's time for an update! We would like YOUR help to make sure this review is as comprehensive as possible. We are interested in any results, reports, papers, observations, or protocols -- including negative results -- that describe how releases have been made. We are also interested in reviewing which techniques are currently in use and their relative success or failure, post-release monitoring evaluation, and any other related information.

In order to standardize responses and aid in the analysis, we have produced a spreadsheet to facilitate data collection. Please email Louise Lavictoire (llavictoire@fba.org.uk) to receive the spreadsheet and to share any electronic reports and papers. We look forward to hearing from you!



Margaritifera margaritifera released in the River Irt in Cumbria, United Kingdom.

Attention Regional Groups!

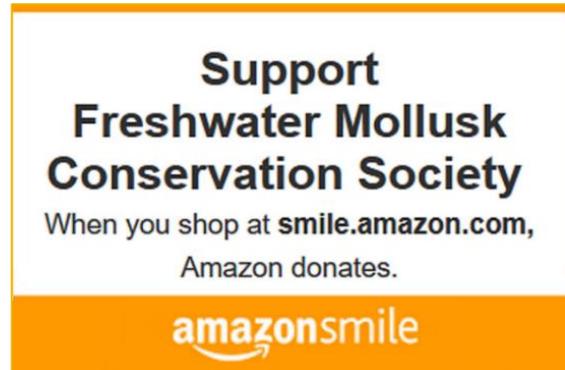
The FMCS Board recently voted to establish an ad hoc committee to develop a framework for recognizing watershed or regional Chapters. We are thinking that Chapter status would be sought most often by existing watershed or regional mussel and snail discussion groups that want a formal affiliation with FMCS.

We are currently in the process of identifying: 1) groups that might want to pursue being FMCS Chapters, and 2) individuals who would be willing to serve on the ad hoc committee to form the framework for chapter recognition. If you coordinate the activities of a regional or watershed mollusk group, please contact Heidi Dunn at Hdunn@ecoanalysts.com. She would like to compile a list of those groups along with their contact information. The first step in the process will be to poll these groups to see how much interest there is in forming chapters.

If there is enough interest, the ad hoc committee will continue to develop a framework for accepting chapters. Present committee members Greg Cope, Celeste Mazzacano, and Art Bogan have compiled some information from other Societies that could be used as a starting point. We need some additional folks to review what has been collected and help develop a structure that would work for FMCS. If this process goes forward, the committee would develop a minimum Chapter structure that would be included in our by-laws, and some guidelines that groups would use to form their FMCS Chapters. International chapters could be formed the same way (example FMCS Europe, FMCS Asia, etc.).

Free Money for FMCS !

If you buy things from the online retailer Amazon, you can support FMCS by shopping through the AmazonSmile program. When you shop at <https://smile.amazon.com> and select the Freshwater Mollusk Conservation Society as your charity of choice, the AmazonSmile Foundation will donate 0.5% of the purchase price of eligible items to FMCS. Millions of products on Amazon are eligible for these donations, they are marked “Eligible for AmazonSmile donation” on their product detail page. If you already have an Amazon account, you can shop on AmazonSmile using your existing account information.



Amazon pays all expenses of the Foundation – the operating expenses are not deducted from the donation amounts generated by purchases – so there is no cost to FMCS or members to participate. At present, the funds generated through AmazonSmile are being recorded and held for future uses.

Society Business Items

Business Meeting Agenda

The biennial FMCS Business Meeting will be held at the San Antonio Symposium during lunch on Wednesday. Please plan on attending because, in addition to the usual activities, we have two important items to be voted on:

1. Acceptance of the updated By-laws. – The proposed changes to our By-laws were posted in the December 2018 issue of *Ellipsaria*. They also are posted on the FMCS website under The Society/About us/By-laws: <https://molluskconservation.org/ByLaws.html>
2. Develop a Professional Certification Program. – The FMCS Membership will be asked to vote on the proposed FMCS Certified Mollusk Professional Program, an education-based certification that would support the mission of FMCS and the Society’s education strategy. See the September 2018 issue of *Ellipsaria* for additional information. If you would like to know more about the proposed program in advance of the vote, members of the Ad-hoc Committee will provide an overview of the proposed program, an outline of the criteria, and the certification process during the Poster Session.

The more usual items on our Business Meeting agenda include:

- Highlights from 2017 and 2018
- Student and Professional Awards
- Plans for the 2020 Workshop
- Plans for the 2021 Symposium
- Results of the Officer Election
- “Passing the Hat”

Also, please plan on attending at least one Standing or Ad-hoc Committee meeting to be held, typically during lunch on Monday and Tuesday (See schedule on Page 3). Agendas for these meetings are presented below. These committees are the heart of our society and many important tasks are being worked on that could benefit from your input.

I look forward to (re)connecting with everyone in San Antonio!
Heidi Dunn, President

Standing and Ad-hoc Committee Meeting Agendas

Ecosystem Services Ad hoc Committee

Meets at Lunch on Monday

Current members are Carla Atkinson, Jennifer Archambault, Traci Dubose, Danielle Kreeger, Brian van Ee, Caryn Vaughn

1. Defining research directions for future research integrating freshwater mollusks into an ecosystem services framework
2. Discussing potential outreach products and materials for disseminating the value of mollusks to society. This will be done collaboratively with the Outreach Committee.
3. Discuss a potential ecosystem services themed meeting for the future.

The goals of the committee include: 1) Engaging society members and help society members connect their work to an ecosystem services framework; 2) Engaging with scientists and other professionals (e.g. economists, social scientists) outside the society on how best to determine the ecosystem services provided by mollusks; 3) Enhancing the public's knowledge about freshwater mollusks by working closely with the outreach committee on developing materials to engage citizens on the uniqueness of these organisms and their ecosystem functions. 4) Aim to strive to develop a list of research info gaps relevant to mollusk conservation and ecosystem services.

Environmental Quality and Affairs Committee

Meets at Lunch on Monday

Steve McMurray and Braven Beaty

1. Important items from Board Meeting
2. Old Business (from 2017 Symposium):
 - EQAC e-mail
 - Issue Statements/Letters Status
 - Climate Change
 - Outreach
 - Economics
 - CASS update
3. New Business
 - Upcoming Issues/Statements
 - Committee Membership Database/Skills
 - Initiating/maintaining a list of Congressional/Government bills/actions/etc., that affect mollusks, to be published in *Ellipsaria*
 - Nomination/Election of Committee Co-chairs:

- Proposal:
 - Committee Co-chairs be elected during the biennial symposium held in odd numbered years
 - Committee Co-chairs serve at least two but no more than three consecutive terms
 - The longest-serving Chair will be replaced beginning in 2019, ensuring continuity

Gastropod Status and Distribution Committee

Meets at Lunch on Monday

Nathan Whelan

1. Update on the names subcommittee.
2. Discuss interest in participating in status update to Johnson et al. (2013).
3. Open discussion about directions and potential activities for the committee.
4. Nominations and election of new chair(s)

Genetics Committee

Meets at Lunch on Tuesday

Kevin Roe and Dave Zanatta

Old business

- Update on the FMCS SSA workshop

New Business

- Sampling guidelines document
 - Discussion
 - Need volunteers to lead on this
- Other 1-pager documents ?
- Elections??
- Review and update the committee's mission statement and goals outlined during the 10th biannual Symposium
 - Vote on goals and mission statement

Guidelines and Techniques Committee

Meets at Lunch on Tuesday

Ryan Schwegman and Lisie Kitchel

- 1) Photo guidelines
 - FMCS "official" guidance
- 2) Update Existing and New Guidelines
 - updated guidance or newly developed guidance – send out request and reminder, update website
- 3) Survey Workshop 2020
 - Looking at Henry Horton State Park near Nashville, on the Duck River
 - Field and lab component
 - Need field equipment for attendees
 - Need sampling site
 - **Looking for interested persons to assist**
- 4) Coordination with other Committees
 - Propagation Techniques
 - Other Committees?

Mollusk Monetary Valuation Ad hoc Committee**Meets at Breakfast on Wednesday**

Megan Bradley

1. AFS/National Conservation Training Center web course
 - a. What we know
 - b. Intentions
 - c. Potential
2. What data is being gathered by the Propagation and Restoration Committee regarding mollusk values?
3. Identify potential sources of gastropod values.
4. Develop list of Pros and Cons of continuing to partner with AFS/Southwick and Loftus based on what was learned in USFWS NRDA/small spills information development meeting.
5. Have details been gleaned from NC course? Discussion if more information known.

Mussel Status and Distribution Committee**Meets at Lunch on Tuesday**

Arthur E. Bogan and John L. Harris

1. Call to Order
2. Old Business
 - J. D. Williams et al. Conservation assessment of freshwater mussels of US, Canada and Mexico Update
 - Development of Mussel ID App Update
 - Atlas of Freshwater Mussels of North America Update
 - Scientific and Common Names Subcommittee (Committee)?
3. New Business
4. Nomination and Election of Chairperson(s)

Outreach Committee**Meets at Lunch on Tuesday**

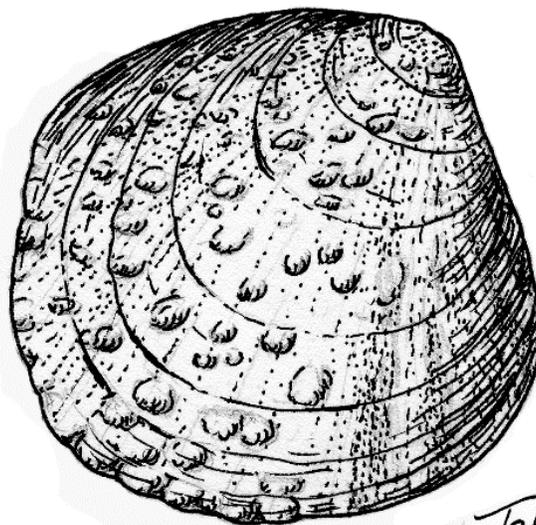
Jennifer Archambault and Kimberly Horndeski

1. Brief review of committee activity since 2019 Symposium
2. Proposed By-laws changes related to Outreach
 - a. Listed as a 'functional committee' with example duties of 'website, social media, event tools'. "Functional committees will take care of the day to day functions of the Society."
3. Updates from April 2019 FMCS Board Meeting
4. Website updates
5. Student-mentor mixer update
6. Goals for 2019-2021
 - a. Directed efforts
 - b. Partnership with Ecosystem Services ad-hoc committee
 - c. Other partnerships?
 - d. Member input
7. Co-chair and social media administrator opportunities

Propagation and Restoration Committee**Meets at Lunch on Monday**

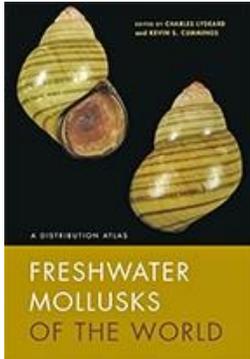
Rachael Hoch and Tim Lane

1. Review of old business
2. Review and approve 10th Biannual Symposium Meeting notes
3. Provide update on the AFS monetary values publication and process
4. New Business
5. Nominations and elections
6. Update on current committee structure
7. Database updates
 - a. Updates and distribution
 - b. Publicizing facilities database on FMCS website
8. Review and update the committee's mission statement and goals outlined during the 10th biannual Symposium
 - a. Vote on goals and mission statement
9. Updates on review and best management document(s)
 - a. Propagation
 - b. Biosecurity and handling techniques
 - c. Restoration
 - d. Genetics
 - e. Health and disease
10. Other discussion



Cyprogenia stegaria (Rafinesque, 1820)

Announcements



Charles Lydeard is a professor and the chair of biology at Morehead State University. He is the editor-in-chief of *Malacologia*.

Kevin S. Cummings is a senior research scientist and the curator of mollusks at the Illinois Natural History Survey, University of Illinois at Urbana-Champaign, and a coauthor of *Field Guide to Freshwater Mussels of the Midwest*.

Be sure to mention the code **HTWN** to receive your 20% discount.

Forthcoming from

JOHNS HOPKINS UNIVERSITY PRESS

Special
20%
Discount

Freshwater Mollusks of the World

A Distribution Atlas

edited by **Charles Lydeard and Kevin S. Cummings**

There are more species of freshwater mollusks—well over 5,000—than all the mammal species of the world. Freshwater mollusks are also arguably the most endangered fauna on the planet. Yet few references exist for researchers, shell enthusiasts, and general readers who are interested in learning more about these fascinating creatures. In *Freshwater Mollusks of the World*, Charles Lydeard and Kevin S. Cummings fill that void with contributions from dozens of renowned mollusk experts.

Contributors: Christian Albrecht, Rüdiger Bieler, Bert Van Bocxlaer, David C. Campbell, Stephanie A. Clark, Catharina Clewing, Robert H. Cowie, Kevin S. Cummings, Diana Delicado, Hiroshi Fukuda, Hiroaki Fukumori, Matthias Glaubrecht, Daniel L. Graf, Diego E. Gutiérrez Gregoric, Kenneth A. Hayes, Yasunori Kano, Taehwan Lee, Charles Lydeard, Nathaniel T. Marshall, Paula M. Mikkelsen, Marco T. Neiber, Timea P. Neusser, Winston Ponder, Michael Schrödl, Alena A. Shirokaya, Björn Stelbrink, Carol A. Stepien, Ellen E. Strong, Maxim V. Vinarski, Amy R. Wethington, Thomas Wilke

"An excellent guide documenting distribution of the 42 freshwater mollusk families found throughout the world. The family accounts represent a succinct distillation of extensively published literature for each group. Highly recommended for students and professionals interested in freshwater malacology and biogeography."

—James Williams, Florida Museum of Natural History

ORDER

Order **978-1-4214-2731-7** in hardcover at the **special reduced price of \$100.00** (reg. \$125.00)

Online: Visit jhupbooks.press.jhu.edu and enter the promotional code **HTWN** when checking out.

Phone: Call HFS at **1-800-537-5487**. Be sure to mention the code **HTWN** to receive your 20% discount.

Johns Hopkins University Press c/o Hopkins Fulfillment Service P.O. Box 50370 Baltimore, MD 21211-4370

World Congress of Malacology

The World Congress of Malacology will take place on August 11–16, 2019, at Asilomar Conference Grounds, Pacific Grove, California, USA. One of several symposia on the scientific program is: **The Evolution of Molluscan Weirdness — mechanisms and tempos of phenotypic diversity**. The goal of this symposium is to discuss both deep time and shallow time aspects of molluscan morphological disparity. Investigations focused on molluscan body plan evolution, phylogeny, rapid phenotypic changes, and adaptations are absolutely welcomed. In addition, integrative approaches leading with genomics, fossil record, and morphology are also of great contribution to explore mechanisms and patterns of molluscan evolution.

More information about this week-long Congress is available at the conference website: <https://calacademy.org/world-congress-of-malacology-2019> Reduced registration fees are available until April 15, and the deadline for abstract submissions is April 30, 2019.

The Snuffbox Mussel Song

Jo Ann Dent was one of several Missouri Department of Transportation staff members involved in a recent bridge replacement project that affected a population of snuffbox mussels, *Epioblasma triquetra*. During that project, Jo Ann learned a lot about the snuffbox mussel and was inspired to write this most excellent song [Sung to the tune of **Jukebox Hero**]:

*Chilling in the pool, with the foot buried low,
Couldn't get a host, there was nowhere to go.*

*Heard the roar of the crane, he could picture the scene,
Valves were agape, then like a distant scream,
He heard falling rocks, nearly washed him away,
He saw stars in his eyes, and the very next day,*

*There was still no silt fence, on either shore.
Didn't know how to escape it, but he knew for sure,
Getting out fast was his best chance, didn't take long to understand,
That scuba diver, collection bag in tow,
Was a one-way ticket, only one way to go.
So he started praying, for the siltation to stop,
Gotta keep on prayin', not to get buried in the rock!*

He's a....

*Snuffbox mussel, got spawning on his mind.
Snuffbox mussel, only a few left of his kind.
Snuffbox mussel, needs swift water to survive.
Snuffbox mussel, it's endangered, so keep it alive.
Snuffbox mussel, to do a survey, we must dive.
Snuffbox mussel, they need protection that's no jive.*

Regional Meetings

Chesapeake Bay Freshwater Mussel Workgroup Summary

On February 5th, state, interstate and federal representatives of the workgroup met to discuss actions related to the conservation of mussels, particularly *Alasmidonta varicosa*, in the Potomac River basin. The meeting originally was planned to be a two-day Structured Decision-Making workshop facilitated by the Brook Floater Working Group, but was scaled back in scope due to the federal government shutdown. The status of *A. varicosa* throughout the Potomac River basin is diverse. Robust populations exist in a few sub-watersheds, the status is unknown in many, and they are likely extirpated from some sub-watersheds. Implementing measurable conservation actions will require coordinated effort among states due to the cross-boundary nature of many sub-watersheds and distribution of *A. varicosa* populations. The group also had a brief discussion about future meetings of the Chesapeake Bay Freshwater Mussel Workgroup and Chapter status with FMCS.

During the morning session, each state representative discussed recent survey results, status and trends by sub-watersheds, survey gaps, and survey plans. A population status map for the region from the US Fish and Wildlife Service Species Status Assessment was used as a reference. The results of recent captive propagation and culture efforts at Harrison Lake National Hatchery were discussed. In each state, some specific areas of larger tributaries to the Potomac basin have not been surveyed in 10 or more years. There is a considerable gap of information on population demographics for the Potomac River and local habitat occupancy. Other states pledged assistance to West Virginia in order better understand the extent and size of the *A. varicosa* population in the Cacapon River due to its importance for basin level conservation efforts. The group agreed that upcoming propagation work might benefit from assessing host suitability for fish that co-occur with *A. varicosa* since that could inform conservation planning.

During the afternoon session, the group discussed research needs for implementing conservation actions, including assessment of potential propagation broodstock, monitoring of sentinel populations, coordinating reintroduction and augmentation suitability studies, metrics to prioritize streams by habitat quality, and concern over increasingly frequent cyanobacteria blooms. The data underlying the SSA status maps seems like a good starting point, but would need to include more information (e.g., EO rank, water quality trends, etc.) to make it useful for conservation planning. The river basin commission is adept at managing ecological data from multiple states and offered to take on the task of aggregating and managing the information.

Consensus among the group was that they did not see enough benefit to seeking Chapter status with FMCS given the additional bureaucratic hurdles within their own agencies that were likely to be created. As previously proposed to all Chesapeake Bay Freshwater Mussel Workgroup participants, the format of future meetings was agreed upon as the following: objective oriented, small group meetings will take place during odd numbered (FMCS Symposium) years and symposium style, large group meetings will take place during even numbered (FMCS Workshop) years. It is hoped this will encourage presentations from a wider audience, including students, while avoiding redundancy with FMCS. While relatively little research is done at the undergraduate and graduate level on freshwater mussels in the Chesapeake Bay watershed, everyone agreed that more outreach to academic institutions is needed to increase their participation.

Twelfth Annual Meeting of Ohio River Valley Unified Malacologists

Submitted by Timothy A. Pearce

On Saturday, 13 October 2018, the twelfth annual meeting of the Ohio (River) Valley Unified Malacologists (OVUM) was hosted by Tim Pearce at Carnegie Museum of Natural History, Pittsburgh, Pennsylvania. Eleven participants enjoyed eight presentations and lively discussions on topics ranging

from modern and fossil land snails to unionid mussels. Brief abstracts of the presentations are given below in the order in which they were presented. The presenter's names are underlined.

After the meeting, some participants worked in the Section of Mollusks research collection.

Land snails in tornado-altered forest in Western Pennsylvania.

Timothy A. Pearce¹, William B. Rabuse², J. Mason Heberling¹ – ¹Carnegie Museum of Natural History, Pittsburgh; ²University of Pittsburgh.

Some snails prefer forests, others prefer meadows, but contrary to expectations, overall snail abundance and species richness did not decline after tornado blow downs. Snail community structure, however, was altered by salvage logging. Of 13 species sufficiently numerous to analyze, five appeared unaffected and four decreased with blow downs, but four species increased in abundance and occurrences after blow downs.

Anthropogenic and environmental drivers of land snail diversity in Southwestern Ohio.

Nora Soto¹, Yurena Yanes¹, Timothy A. Pearce², Arnold Miller¹ – ¹University of Cincinnati, ²Carnegie Museum of Natural History

We studied land snail diversity in three forests along an urban to rural gradient. Results suggest that snail richness increased with increasing distance from a major urban center in southwestern Ohio. Ordination showed three distinct snail communities from each forest despite habitat similarities among them.

Landscape models of the freshwater mussel distributions in the upper Ohio River basin.

Mary Walsh, Christopher Tracey, Molly Moore – Pennsylvania Natural Heritage Program

To elucidate environmental predictors of freshwater mussel (Unionidae) occurrences, Random Forest models are being developed for 21 species in the Upper Ohio River basin. Preliminary models use landscape and watershed variables to map potential habitats. Variables with greatest importance in, for example, the *Epioblasma rangiana* model, included elevation, stream temperature, scarce lawns, and low housing density.

Studying the land snails found in excavations at a prehistoric village site located in Westmoreland County, Pennsylvania.

Kathy J. Rygle – Westmoreland Chapter #23, Society for Pennsylvania Archaeology.

Land snail shells often occur in archaeological sites; however, they are underexploited as diagnostic artifacts. To date, from 15-years of excavation at the Consol archaeological site (36Wm100) in Westmoreland Co., Pennsylvania, 25 snail species have been identified from among over 10,000 larger shells from feature fill and thousands of smaller shells from flotation samples. These shells, particularly micro snails, will be used to assess seasonality of occupation and environmental conditions during site occupation over a 2,200-year time period. Context within features and shell attributes/modifications are being studied to determine whether shells were cultural refuse (e.g., remains of meals) or if they crawled in without human assistance.

No Small Task: Two Massive Pennsylvania Mussel Salvages.

Nevin Welte, Jordan Allison, Ken Anderson – Pennsylvania Fish and Boat Commission

The Pennsylvania Fish and Boat Commission and its partners recently salvaged and relocated freshwater mussels from two Allegheny River project disturbance areas - Hunter Station Bridge in Forest Co. and Line Q pipeline in Warren Co., Pennsylvania. Over 150,000 mussels, including ~97,000 state and federally endangered species (primarily *Epioblasma rangiana* and *Pleurobema clava*) were salvaged and relocated to facilitate federal and Pennsylvania restoration efforts. Pennsylvania restoration sites included Dunkard Creek (14,985 common mussels), Clarion River (36,587 common mussels), Shenango River (5,640 endangered mussels), and Conewango Creek (5,760 endangered mussels). Growth, survival, and movement monitoring is ongoing at all sites.

Can pretty *Bulimulus* spp. land snails become problematic for agriculture and local ecology in the USA?

Francisco J. Borrero – U.S.D.A, Animal and Plant Health Inspection Service, The Academy of Natural Sciences, Philadelphia.

Bulimulus spp. are originally from Central and South America, and the Caribbean, but not from North America. At least two species have become established at locations in six southern states in the Continental USA. At some locations, populations are rapidly expanding, prompting the consideration of their potential ecological and agricultural impacts. Currently, these species are not considered agricultural pests.

Crooked Lake's *Lampsilis siliquoidea* population: a quick summary of some fresh data.

Warren Pryor – Biology Department, University of Saint Francis, Fort Wayne

My undergraduate students and I have tagged 126 individuals of *Lampsilis siliquoidea* since 2011 and have recaptured, reweighed, and remeasured 45 of them at least once. Preliminary analysis suggests that specimens ranging from 80-90 mm long are growing little, if at all. Rapid growth evidently occurs during the first four years of life.

Pleistocene-Holocene aquatic freshwater gastropods from Southern Spain.

Yurena Yanes¹, Gonzalo Jimenez-Moreno², Jon Camuera², María J. Ramos-Román², Antonio García-Alix², R. Scott Anderson³ – ¹University of Cincinnati, ²Universidad de Granada, ³Northern Arizona University.

The freshwater snail *Radix balthica* was recovered from lake cores in the Padul Wetland in southern Spain. This remarkable deposit contains peat >100 m thick, representing the past ca 1 million years. Stable isotopes of oxygen (temperature) and carbon (productivity) demonstrate colder climate with enhanced productivity ca 14 ka BP, with a warmer climate and reduced productivity during the early to middle Holocene, 7-4 ka BP.



Participants at the OVUM 2018 Meeting. From left to right, front row: Yurena Yanes, Tim Pearce, Francisco Borrero; back row: Steve Pederson, Kathy Rygle, Warren Pryor, *skeleton*, Mary Walsh, Nevin Welte. Photograph by Steve Pederson. Attendees not in this picture: Ellen Pryor, Chris Tracey, Adelbert Yarroll.

Upcoming Meetings

March 7 – 11, 2019 – National Shellfisheries Association and World Aquaculture Society joint meeting, New Orleans Marriott, New Orleans, Louisiana, USA. Theme: *Aquaculture – The Big Easy Choice!*
<https://www.was.org/meetings/pdf/AQ2019RegBro.pdf>

April 14 – 18, 2019 – FMCS 11th Biennial Symposium, Hyatt Regency, San Antonio, Texas, USA. Theme: *Life on the Edge: Reconciling River Management.*
https://molluskconservation.org/EVENTS/2019SYMPOSIUM/2019_FMCS-Symposium.html

May 19 – 23, 2019 – Society for Freshwater Science Annual Meeting, Salt Palace, Salt Lake City, Utah, USA Theme: *Translational Ecology in Freshwater Science* <http://sfsannualmeeting.org/>

August 11 – 16, 2019 – The World Congress of Malacology, Asilomar Conference Grounds, Pacific Grove, California, USA <https://calacademy.org/world-congress-of-malacology-2019>

September 29 – October 3, 2019 – Joint Meeting of the American Fisheries Society and the Wildlife Society, Reno-Sparks Convention Center, Reno, Nevada, USA Theme: (not yet announced)
<http://afstws2019.org/>

October 27 – 30, 2019 – Southeastern Association of Fish and Wildlife Agencies 73rd Annual Conference, Hilton Head Marriott Resort, Hilton Head, South Carolina., USA.
<http://www.seafwa.org/conference/overview/>

July ? – ?, 2020 – Society for Conservation Biology North American Sectional Meeting, [Date, Site, and theme not yet posted] <http://conbio.org/groups/sections/north-america/meetings/>



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.

Revisiting the Dwight W. Taylor Collection of Mollusks: Curation and Cataloging of Invertebrate Specimens in the Bell Museum

Alex Franzen and **Andrew Simons**, Bell Museum, University of Minnesota,
100 Ecology Building, 1987 Upper Buford Circle St. Paul, Minnesota 55108
corresponding author – franz325@umn.edu

The Bell Museum at the University of Minnesota is the state of Minnesota's official natural history museum (Chapter 30, 1872 General Laws), and the Mollusk and Crustacean collection there contains approximately 23,000 specimens (lots), some of which date from 1875. Many specimens are freshwater mollusks from Minnesota and represent an important collection of Upper Midwest material. The collection contains both dry specimens and specimens preserved in 95% ethyl alcohol (EtOH).

Dwight Willard Taylor was a prominent malacologist and paleontologist who studied the systematics and biogeography of freshwater gastropods. Early in his career, Taylor was affiliated with the US Geological Survey and subsequently the University of Michigan and Arizona State University (Kabat, 2008). Taylor described 132 species of gastropods, mostly Hydrobiidae (54) and Physidae (39). He collected many specimens in the Western United States and Coahuila, Mexico, throughout the 1960's, 70's, and 80's. His collection is comprised of over 8,000 dry lots and over 10,000 EtOH preserved lots. Taylor donated his collection to the Bell Museum in the late 1980's or early 1990's (Kabat, 2008). He was a colleague of Dr. Robert Bright, former Bell Museum curator of invertebrates, and Bright accompanied Taylor on several collecting trips in the 1980's (Taylor and Bright, 1987).

Taylor's material is a significant collection of specimens from the Western United States and Northern Mexico. The collection was underused despite its significant biological and historical value until 2008 when much of it was lent to Dr. Robert Hershler, a research zoologist at the Smithsonian Institution. Dr. Hershler used the Taylor collection as he revised some taxonomy and described new species (Hershler et al., 2016; Hershler et al., 2017). The collection was returned to the Bell Museum in January 2018 when we began curating the lots to make the collection more accessible to malacologists. A majority of the lots required taxonomic updates, fresh EtOH, and new labels. Locality information, taxonomic determination, collection date, and other available information for the uncatalogued lots was entered into the museum database and specimens were transferred to appropriate jars, labeled, filled with 95% EtOH, and shelved. While approximately 14,000 lots have been cataloged and curated, about 4,000 lots are still uncatalogued and not yet in the museum database. Curation of the collection is still in progress and the entirety of the Taylor Collection will likely be made available by the end of 2019.

The D.W. Taylor Collection contains a vast amount of natural history information related to the paleogeography of the Western United States and Northern Mexico. We encourage malacologists to make use of the D.W. Taylor Collection and other Bell Museum collections, which can be accessed in person or at <http://bellatlas.umn.edu/collections/index.php>.

References:

- Hershler, Robert, Hsiu-Ping Liu, Cynthia Forsythe, Peter Hovingh, and Kevin Wheeler. 2017. Partial revision of the *Pyrgulopsis kolobensis* complex (Caenogastropoda: Hydrobiidae), with resurrection of *P. pinetorum* and description of three new species from the Virgin River drainage, Utah. *Journal of Molluscan Studies*. 83:161-171. 10.1093/mollus/eyw051.
- Hershler, Robert, Hsiu-Ping Liu, Caitlin Babbitt, Michael G. Kellogg, and Jeanette Howard. 2016. Three new species of western California springsnails previously confused with *Pyrgulopsis stearnsiana* (Caenogastropoda, Hydrobiidae). *ZooKeys*. 601. 1-19. 10.3897/zookeys.601.9040.

- General Laws. 1872. Chapter 30, 14th Minnesota Legislature. Regular Session.
<https://www.revisor.mn.gov/laws/1872/0/General+Laws/Chapter/30/pdf/>
- Kabat, Alan K. 2008. Dwight Willard Taylor (1932–2006): His Life and Malacological Research. *Malacologia* 50:175-218.
- Taylor, D. W. and R. C. Bright. 1987. Drainage history of the Bonneville Basin. Utah. *Geological Association, Publication*, 16:239–256 [paper presented at symposium “Cenozoic Geology of Western Utah”, Lake City, Utah, 23–26, 1987].

Host Use by Two Mississippi River Mussels, *Amblema plicata* and *Obliquaria reflexa*

Christopher Rounds¹, Mark Hove¹, Bernard Sietman², Elizabeth Slaikeu¹, Alex Franzen¹, Alia Benedict³, Zeb Secrist², Anna Scheunemann², Tricia Anderson², Maddeline Pletta², Rachel Pell², Emma Ceplecha², and Daniel Hornbach³ Corresponding author: mark_hove@umn.edu

¹ University of Minnesota, St. Paul, 55108,

² Minnesota Dept. of Natural Resources, Center for Aquatic Mollusk Programs, Lake City, 55041,

³ Macalester College, St. Paul, Minnesota 55105

Species management is frequently strengthened with natural history knowledge. Although a variety of studies involving *Amblema plicata* (Say, 1817) and *Obliquaria reflexa* (Rafinesque, 1820) have been conducted, glochidia host analyses for these species are incomplete. *Amblema plicata* appears to be a host generalist while *O. reflexa* seems to utilize few fish species (reviewed in Watters *et al.* 2009). To improve our understanding of these species' host requirements, we conducted laboratory trials on a variety of previously tested and untested fish species.

We followed standard methods to identify suitable glochidia hosts (Hove *et al.* 2016). Gravid *A. plicata* were collected from Turtle Creek, Freeborn County, and the Cedar River, Dodge County, Minnesota; and gravid *O. reflexa* were collected from the Mississippi River near Red Wing, Minnesota. Trials were conducted between 21–23 °C. Mussel and fish nomenclature follow Williams *et al.* (2017) and Page *et al.* (2013), respectively.

Of the 34 fish species inoculated with *A. plicata* glochidia, 28 facilitated metamorphosis (Table 1). The number of juveniles released ranged from 1 to 6,013.

We did not observe glochidia of *A. plicata* metamorphose on the following fishes [number of trials, number of survivors, glochidia attachment period (d)]: *Carassius auratus* (1, 4, 3), *Cyprinella spiloptera* (1, 1, 4), *Cyprinus carpio* (2, 8, 3–10), *Pimephales vigilax* (1, 10, 5), *Etheostoma caeruleum* (1, 1, 4), and *Etheostoma nigrum* (1, 1, 8).

None of the following sixteen fish species inoculated with *O. reflexa* glochidia facilitated metamorphosis [number of trials, number of survivors, glochidia attachment period (d)]: *Lepisosteus osseus* (1, 1, 3), *Cyprinella spiloptera* (2, 2, 2–3), *Notemigonus crysoleucas* (1, 1, 3), *Notropis atherinoides* (1, 1, 3), *N. hudsonius* (1, 1, 2), *Semotilus atromaculatus* (1, 2, 4), *Ictiobus bubalus* (1, 1, 3), *Moxostoma macrolepidotum* (1, 1, 3), *Noturus flavus* (1, 1, 3), *Aphredoderus sayanus* (1, 8, 4), *Micropterus dolomieu* (1, 4, 3), *M. salmoides* (1, 2, 3), *Pomoxis nigromaculatus* (1, 1, 4), *Percina evides* (1, 1, 3), and *Aplodinotus grunniens* (1, 1, 3).

Results from our study are generally consistent with previously observed patterns. We found that *A. plicata* use a wide range of potential hosts in Catostomidae, Centrarchidae, Percidae, and other families as described in earlier studies (summarized in Watters *et al.* 2009). This study does add 20 new suitable host species for *A. plicata* (Howard 1914, Stein 1968 reported in Watters *et al.* 2009, Coker *et al.* 1921).

Table 1. *Amblema plicata* host suitability trials results. † Denotes newly identified suitable host species.

Fish species	Trial	Number inoculated	Number of survivors	Number of juveniles recovered	Juvenile release/glochidia attachment period (d)*
<i>Lepisosteus platostomus</i>	1	4	4	406	9-19
	2	1	1	416	12-32
<i>Hiodon alosoides</i> †		6	6	6013	10-33
<i>Macrhybopsis storeriana</i> †		1	0	6	11-14**
<i>Hypentelium nigricans</i> †		8	8	85	10-15
<i>Ictiobus bubalus</i> †		1	1	9	10-15
<i>Moxostoma macrolepidotum</i> †		1	1	3	10
<i>Ameiurus melas</i> †		3	3	22	10-13
<i>Ameiurus natalis</i> †	1	1	1	102	10-14
	2	10	10	0	4
<i>Ictalurus punctatus</i> †	1	4	4	30	10-14
	2	2	2	0	4
<i>Noturus flavus</i> †	1	4	4	9	10-15
	2	4	4	0	4
<i>Pylodictus olivaris</i> †		1	1	1	10
<i>Esox lucius</i> †	1	5	0	155	10-15**
	2	2	2	772	10-24
<i>Fundulus diaphanus</i> †		30	30	1177	9-19
<i>Fundulus sciadicus</i> †		2	1	13	14
<i>Lepomis cyanellus</i>	1	8	5	420	10-19
	2	2	2	1104	10-26
<i>Lepomis gibbosus</i>		11	9	138	10-19
<i>Lepomis gulosus</i>		1	1	227	10-26
<i>Lepomis humilis</i> †	1	6	3	54	10-19
	2	3	3	718	10-26
<i>Lepomis macrochirus</i>	1	15	14	260	10-15
	2	4	4	455	10-27
<i>Micropterus salmoides</i>		2	1	128	9-19
<i>Micropterus dolomieu</i> †	1	1	1	18	10-18
	2	5	5	0	8
<i>Pomoxis nigromaculatus</i>	1	1	1	67	9-19
	2	2	2	1640	12-25
<i>Perca flavescens</i>	1	2	0	221	10-15**
	2	4	4	675	11-25
<i>Percina caprodes</i> †	1	6	4	14	10-13
	2	5	5	0	8
	3	8	8	0	8
<i>Percina evides</i> †		1	1	3	10-15
<i>Sander canadensis</i> †		4	4	1846	9-19
<i>Sander vitreus</i> †		13	0	2192	10-19**
<i>Aplodinotus grunniens</i> †	1	1	1	1	11
	2	1	1	0	3

*Range of days juvenile mussels or glochidia (trials where no juveniles were produced) were recovered.

**Fish died during the juvenile release period

Conversely, relatively little host research has been conducted on *O. reflexa*. Of the 19 fish species (10 cyprinids) exposed to *O. reflexa* glochidia by various researchers, only *Luxilus cornutus*, *Notropis buccatus*, and *Rhinichthys cataractae* produced juveniles (1-3 juveniles/species) (Watters et al. 1998). Although our cyprinid trials did not produce juveniles, our tests did not include the three previously identified host species. *Hiodon alosoides* is the only species reported to be naturally infested with *O. reflexa* (Barnhart and Baird 2000). Additional host suitability trials would clarify the breadth of fish species useful for juvenile propagation efforts, and identification of natural hosts would reveal ecologically meaningful hosts for these two mussel species.

We thank landowner Jim Fleming for access to Turtle Creek and the Competitive State Wildlife Grants program, grant F19AP00119, in cooperation with the U.S. Fish and Wildlife Service, Wildlife and Sport Fish Restoration Program for project funding.

Literature Cited

- Barnhart, M. C. and M. S. Baird. 2000. Fish hosts and culture of mussel species of special concern: annual report for 1999. Annual report to US Fish and Wildlife Service. Columbia, Missouri. 39 pp.
- Coker, R. E., A. F. Shira, H. W. Clark, and A. D. Howard. 1921. Natural history and propagation of fresh-water mussels. *Bulletin of the Bureau of Fisheries* 37:75-181.
- Hove, M. C., B. E. Sietman, M. S. Berg, E. C. Frost, K. Wolf, T. R. Brady, S. L. Boyer, and D. J. Hornbach. 2016. Early life history of the sheepsnose (*Plethobasus cyphus*) (Mollusca: Bivalvia: Unionoida). *Journal of Natural History* 50(9-10):523-542.
- Howard, A. D. 1914. Experiments in propagation of fresh-water mussels of the Quadrula group. *Report of the U.S. Commissioner of Fisheries for 1913*. Appendix 4:1-52 + 6 plates. [Issued separately as U.S. Bureau of Fisheries Document No. 801].
- Page, L. M., H. Espinosa-Pérez, L. T. Findley, C. R. Gilbert, R. N. Lea, N. E. Mandrak, R. L. Mayden, and J. S. Nelson. 2013. *Common and scientific names of fishes from the United States, Canada, and Mexico*, 7th edition. American Fisheries Society, Special Publication 34, Bethesda, Maryland.
- Stein, C. B. 1968. *The life history of Amblema plicata (Say, 1817) the three-ridge naiad (Mollusca: Bivalvia)*. Ph.D. Dissertation. Ohio State University. Columbus, Ohio.
- Watters, G. T., S. H. O'Dee, S. Chordas, and J. Rieger. 1998. Potential hosts for *Lampsilis reeviana brevicula*, *Obliquaria reflexa*. *Triannual Unionid Report* 16:21.
- Watters, G. T., M. A. Hoggarth, and D. H. Stansbery. 2009. *The freshwater mussels of Ohio*. The Ohio State University Press, Columbus, Ohio. 421 p.
- Williams, J. D., A. E. Bogan, R. S. Butler, K. S. Cummings, J. T. Garner, J. L. Harris, N. A. Johnson, and G. T. Watters. 2017. A revised list of the freshwater mussels (Mollusca: Bivalve Unionida) of the United States and Canada. *Freshwater Mollusk Conservation and Biology* 20(2):33-58.

New Records of Salamander Mussel, *Simpsonaias ambigua* (Say, 1825) in Western Pennsylvania

Ryan Schwegman¹ and Nevin Welte²

¹ EnviroScience, Inc., 5070 Stow Rd. Stow, Ohio, 44224 rschwegman@enviroscienceinc.com

² Pennsylvania Fish and Boat Commission (PFBC), Centre Region Office, 595 E. Rolling Ridge Dr., Bellefonte, Pennsylvania 16823 c-nwelte@pa.gov

A.E. Bogan and D.D. Locy (2009) described the distribution of *Simpsonaias ambigua* in Pennsylvania based upon a review of museum collections, literature review, and personal communications. At that time, extant occurrences were limited to the Allegheny River (navigational pools 3, 5, 6 and 7) and Dunkard Creek. French Creek occurrences were represented by two fresh dead specimens collected in 1985 and 1995 (C.W. Bier, personal communication), but no live individuals had ever been found despite intensive mussel surveys (e.g., Ortmann 1919; Smith and Crabtree 2010). In 2010, the Pennsylvania

Fish and Boat Commission (PFBC) listed *S. ambigua* as Pennsylvania state endangered after the presumed extirpation of the Dunkard Creek population in 2009 (PFBC, 2018).

In the spring of 2015, EnviroScience, Inc. was completing PennDOT-funded survey work on French Creek near Cambridge Springs in Crawford County, Pennsylvania, when four live *Simpsonaias ambigua* were located during a quantitative sampling event (EnviroScience, Inc. 2015). A randomly placed quadrat landed on a manhole cover; removal of the manhole cover revealed four individuals in fine silts and clays (Figure 1). These live individuals were the first live *S. ambigua* collected from French Creek and first observation of the species in 20 years. Previously, fresh dead specimens were collected by C.W. Bier downstream near the town of Venango in Crawford County, PA, (CM 162373, 162374).

In the summer of 2018, EnviroScience, Inc. was completing another PennDOT survey on Cussewago Creek, a tributary of French Creek near Meadville in Crawford County, Pennsylvania, when two live and one weathered dead *Simpsonaias ambigua* were collected (Figure 2). These individuals, accompanied by an adult mudpuppy (*Necturus maculosus*), were found in the fine silts and clays under two large flat rocks that each were approximately three feet in diameter.



Figure 1. *Simpsonaias ambigua* found in 2015 in French Creek near Cambridge Springs, Crawford County, Pennsylvania



Figure 2. *Simpsonaias ambigua* found in 2018 in Cussewago Creek near Meadville, Crawford County, Pennsylvania

A.E. Ortmann, despite his intensive survey efforts, was unable to find *Simpsonaias ambigua* in western Pennsylvania. Ortmann noted that he “hunted for it in vain” in the Pennsylvania portion of the Mahoning River and could not find it in Pennsylvania’s portion of the Monongahela river system (e.g., Dunkard Creek) despite having observed it in the West Fork River in West Virginia (Ortmann 1919). He concluded that *S. ambigua* “being thus present in two rivers, which run into our state, it might have once existed here, or else it accidentally may have escaped detection.”

Live records of *Simpsonaias ambigua* first appeared in Pennsylvania in 1969 and 1970 in Pool 5 of the Allegheny River (OSUM 22295 and 26309) and the increased detection / expanding range of the species was reviewed by Bogan and Locy in 2009. Despite its inherent reputation for evading detection, new records have continued to expand the species known range (Figure 3). The recent French Creek drainage *S. ambigua* discoveries provide optimism for species recovery.

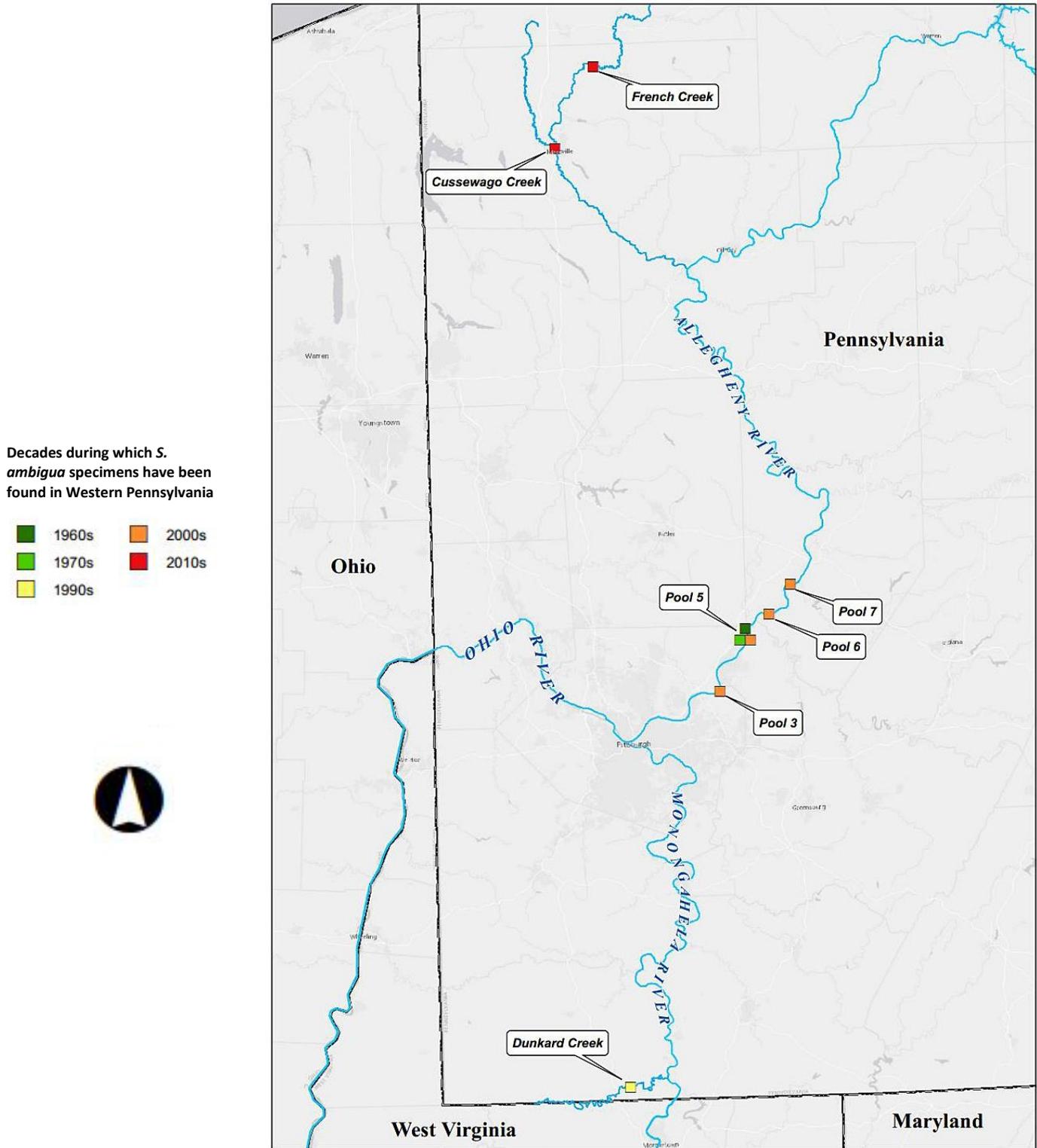


Figure 3. The expanding range of *Simpsonaias ambigua* over the past five decades in western Pennsylvania.

New occurrence records and ongoing conservation efforts by PFBC, the Western Pennsylvania Conservancy (WPC), and others are contributing towards the goal of securing *Simpsonaias ambigua* and eventually removing it from the list of endangered species (PFBC 2015). Two WPC studies (DCNR Wild Resources Conservation Program grants 016550 and 18589) are gathering baseline information on the known Allegheny River *S. ambigua* population and its mudpuppy host, as well as conducting *S. ambigua* and mudpuppy surveys in the Ohio River. The Ohio River surveys seek to connect the dots between known West Virginia occurrences near Brilliant (EnviroScience, 2013 (OSU 84854)) and Williamstown (Morrison 2012) and the Allegheny River population. Additional conservation efforts are underway in Allegheny River Pool 5 to examine the use of artificial habitat by mudpuppies and *S. ambigua* (D.D. Locy, personal communication). Dunkard Creek mussel restoration efforts continue with the goal of restoring common mussel species before consideration of an *S. ambigua* stocking effort.

Literature Cited:

- Bogan, A.E., and D.D. Locy. 2009. Current distribution of the Salamander Mussel, *Simpsonaias ambigua* (Say, 1825). Pennsylvania. *Ellipsaria*, 11:11-12.
- EnviroScience, Inc. 2013. *Freshwater Mussel and Hellbender Surveys at Ohio River Mile 76.1 for the Proposed Bridge Between Wellsburg, Brooke County, West Virginia and Brilliant, Jefferson County, Ohio*, June 2013
- EnviroScience, Inc. 2015. *Phase I and Phase II Endangered Mussel Surveys for the Main Street Bridge (SR 6-B18 Cambridge Springs Truss) Replacement over French Creek in Cambridge Springs, Crawford County, Pennsylvania*, May 2015
- Morrison, P. 2012. New record for *Simpsonaias ambigua* in the Ohio River mainstem in West Virginia. *Ellipsaria* 14(1):7.
- Ortmann, A.E. 1919. A monograph of the najades of Pennsylvania. Part III: systematic account of the genera and species. *Memoirs of the Carnegie Museum* 8(1):1-384, 21 plates.
- Pennsylvania Fish and Boat Commission. 2015. *Species Action Plan: Salamander Mussel (Simpsonaias ambigua)*. Pennsylvania Fish and Boat Commission. Bellefonte, PA 16823. 9 pages.
- Pennsylvania Fish and Boat Commission, Division of Environmental Services. 2018. *A Field Guide to Pennsylvania's Freshwater Mussels*. Pennsylvania Chapter American Fisheries Society Mussel Identification Workshop. 1-196.
- Smith, T.A. and D. Crabtree. 2010. Freshwater mussel (Unionidae: Bivalvia) distributions and densities in French Creek, Pennsylvania. *Northeastern Naturalist* 17(3):387-414.

First Confirmed Record of the Limnic/Freshwater Native Mussel/Naiad Hyriidae *Diplodon charruana* (d'Orbigny, 1835) in Santa Catarina State/ SC, Central Southern Brazil

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

Until recently, the family Hyriidae of native freshwater bivalves was represented in Santa Catarina State/ SC by nine species, eight of them in the genus *Diplodon* Gray, 1866 (Agudo-Padrón 2018a:57, 2018b:40-Table 1). In December 2018, the second author of this report (F.C.) sent some photographs of curious little limnic mussels/naiads (Figure 1) to be identified.

The specimens were found in the Rio Benedito microbasin (Figure 2), located in the Benedito Novo Municipal District (domain of the Itajaí Basin Valley in the Blumenau Micro-region -- 26°47'05.991"S; 49°25'21.375"W), Malacological Region Number six of Santa Catarina State/ SC, Central Southern Brazil (Agudo-Padrón 2018 a:58), a part of the State with great interest (Agudo-Padrón and Carneiro (2018). These bivalves were found in a rocky environment with a sandy substrate with the aid of Surber Sampler for Benthos, during a biotic sampling campaign held in the area of the two local Small Hydroelectric Power Plants (Pequenas Centrais Hidrelétricas - PCHs), called "Alto Benedito Novo – ABN" (ABN & ABN 1).



Figure 1. Young (left) and free post-larval state specimens (right) of the native limnic/ freshwater mussel/ naiad Hyriidae *Diplodon charruana* (d'Orbigny, 1835) found during 2018 in the Rio Benedito hydrographic microbasin. All photographs by Francisco Carneiro.



Figure 2.- Spatial localization (map – red color) of the “Benedito Novo” Municipal District in the Itajaí Basin Valley region of Santa Catarina State/ SC, and general environmental aspect of the collection area in Benedito River (Rio Benedito) Microbasin.

These specimens were identified as the native limnic/freshwater mussel/naiad Hyriidae *Diplodon charruana* (d'Orbigny, 1835), a typical species with a parasitic glochidium cycle on fishes (Figure 1). The specimens have been deposited in the Malacological Collection of the Regional University Foundation of Blumenau - FURB, Blumenau/ SC (~ vouchers FURB MO 357 – young and FURB MO 358 – post-larval).

Other malacofauna occurring in the locality included the limnic exotic little gastropods Physidae *Physella* (-*Physa*) *acuta* (Draparnaud, 1805) and Lymnaeidae *Galba* (-*Lymnaea*) *truncatula* (Müller, 1774), as well as the native freshwater bivalve/naiad Hyriidae *Diplodon expansus* (Küster, 1856) (Figure 3), a species previously verified in the State (Agudo-Padrón 2018a, 2018b; Agudo-Padrón and Carneiro 2018).

This is the first confirmed record of *Diplodon charruana* (d'Orbigny, 1835) in the geographical territory of Santa Catarina State/ SC. It raises to ten the number of known freshwater mussels/naiads of the family Hyriidae Swainson, 1840, to 21 the total of Unionoida Stoliczka, 1871 species listed (Agudo-Padrón 2018 b), and to 242 the total number of continental/non-marine mollusks known from Santa Catarina State (Agudo-Padrón 2018a).



Figure 3.- Native limnic/ freshwater mussel/ naiad Hyriidae *Diplodon expansus* (Küster, 1856) found in riverside of the Rio Benedito hydrographic microbasin, June 25 2018.

References:

- Agudo-Padrón, A.I. 2018a. Revised and updated systematic inventory of non-marine molluscs occurring in the State of Santa Catarina/SC, Central Southern Brazil region. *Advances in Environmental Studies*, 2(1): 54-60. Available online at: <http://scholarlypages.org/Articles/environmental-studies/aes-2-007.pdf?jid=environmental-studies>
- Agudo-Padrón, A.I. 2018b. The freshwater bivalve mollusks of Santa Catarina State/ SC, Central Southern Brazil: current state of our knowledge after 22 years of research. *Ellipsaria*, 20(1):39-42.
- Agudo-Padrón, A.I. and Carneiro, F. 2018. First confirmed record of the freshwater exotic snail Lymnaeidae *Galba truncatula* (Müller, 1774) in Santa Catarina State/ SC, Central Southern Brazil. *Ellipsaria*, 20(4):52-53.

Confirmed Record of the Neotropical Freshwater Primitive Snail *Chilina rushi* Pilsbry, 1896 (Pulmonata: Chiliniidae) in the Caí River Basin, Canela, Rio Grande do Sul State/ RS, Southernmost 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 family Chiliniidae Dall, 1870 is endemic to southern South America, and is represented by the single genus *Chilina* Gray (1828), a group of little air-breathing freshwater snails. The species inhabit streams, fast-flowing rivers (rapids and waterfalls), lakes, lagoons, and brackish waters below the Tropic of Capricorn in several countries of the region. *Chilina* belongs to the most primitive Basommatophora, a subject of study as to its origin, phylogeny, and biogeography (Agudo-Padrón and Silva 2012, 2013; Ishikawa 2018).

On January 8, 2019, Amanda Perin Marcon, a local professional biologist, requested the identification of a small limnic gastropod mollusk illustrated in field photographs (Figure 1). Several individuals were observed by her on the rocks at the edge of the waterfall in the Cascata do Arroio Caçador [Waterfall of the Hunter Stream], a 420m deep canyon located in the Parque da Ferradura [Horseshoe Valley Park] natural reserve (Figure 2), with fairly rugged relief at 837 meters above sea level in the Rio Caí Basin, in the Araucárias Plateau region of Rio Grande do Sul State/ RS. In its superior course, this river receives the name Santa Cruz in the Canela Municipal District (29°21'56"S & 50°48'56"W). This is the domain of

Atlantic Forest formation, with large Araucaria groves and humid subtropical climate characteristic by summers with mild temperatures, around 20° Celsius, and winters with temperatures below 0° Celsius, strong frost and occasional snow.

The specimens were immediately confirmed as typical representatives of the primitive native pulmonate snail *Chilina rushi* Pilsbry, 1896, especially given the typical apex of the shell. This taxonomic determination was based on the fundamental contribution of Simone (2006), with additional assistance from the unpublished material illustrated by Ishikawa (2018). These specimens add another biogeographic record of the species for the southern region of Brazil.



Figure 1. Specimen of the native freshwater primitive pulmonate snail *Chilina rushi* Pilsbry, 1896 found on the rocks at the edge of the waterfall at Cascata do Arroio Caçador, Horseshoe Valley Park, Cai River Basin, in Canela Municipal District, Araucárias Plateau region of Rio Grande do Sul State/ RS. Photographs by Amanda Perin Marcon.

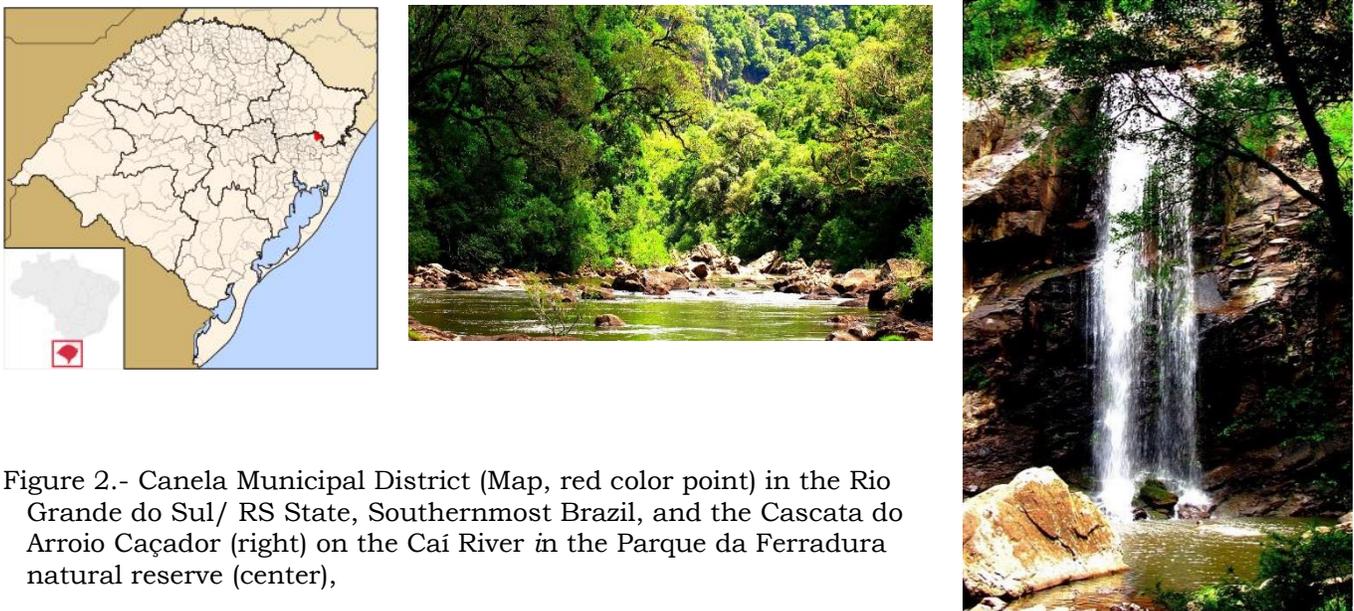
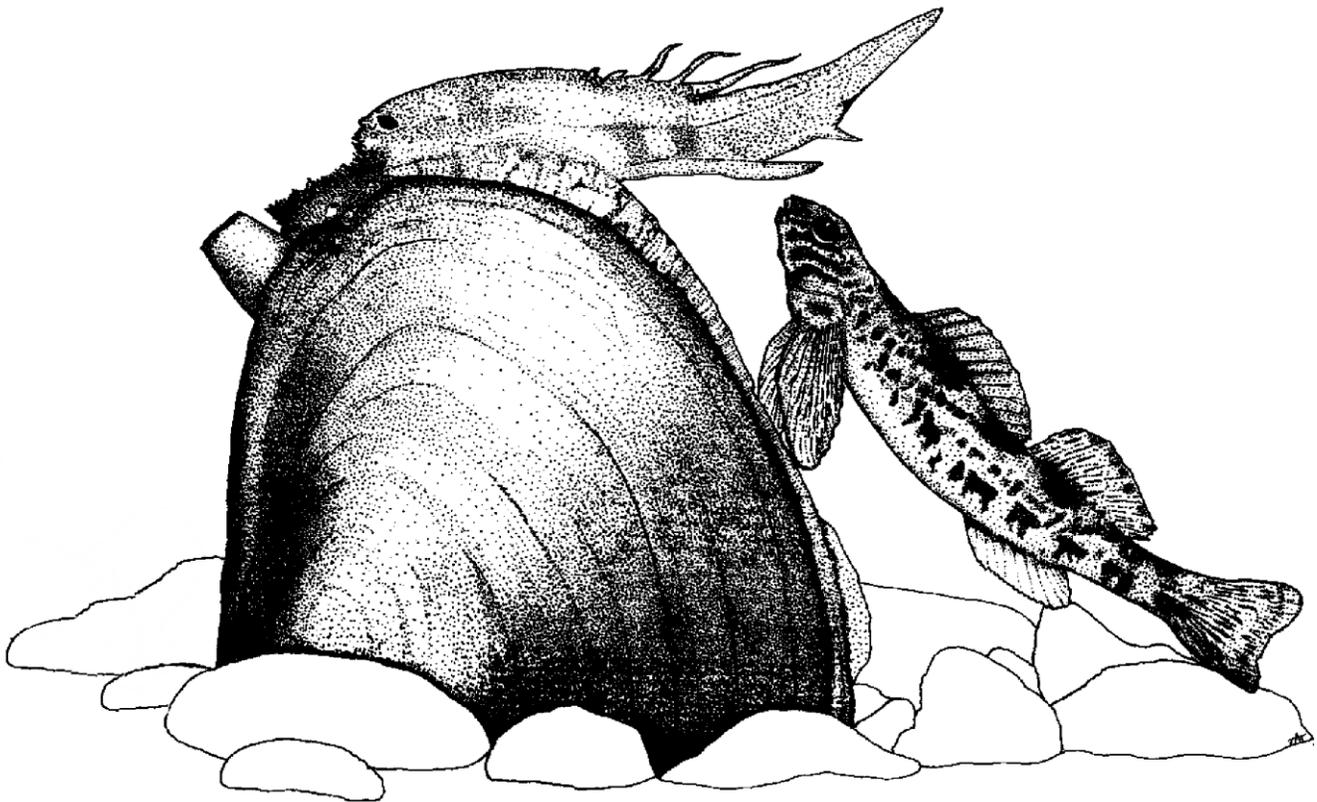


Figure 2.- Canela Municipal District (Map, red color point) in the Rio Grande do Sul/ RS State, Southernmost Brazil, and the Cascata do Arroio Caçador (right) on the Cai River in the Parque da Ferradura natural reserve (center),

References:

- Agudo-Padrón, A.I. and Silva, P.F. da. 2012. New geographical record of *Chilina parva* Martens, 1868 (Pulmonata: Chiliniidae) from Osório Municipal District, Rio Grande do Sul State/ RS, Southernmost Brazil. *Boletín de la Asociación Argentina de Malacología*, 2(2):15-18. Available online at: http://malacoargentina.com.ar/blog/wp-content/uploads/2016/02/Boletin_2012-2.pdf
- Agudo-Padrón, A.I. and Silva, P.F. da. 2013. First geographical record of the neotropical freshwater snail *Chilina parva* Martens, 1868 (Pulmonata: Chiliniidae) for the “Caraá River Basin”, Osório, Rio Grande do Sul State/ RS, Southernmost Brazil. *Ellipsaria*, 15(1):15-16.
- Ishikawa, W. 2018. Chilina. In: *Planeta Invertebrados Brasil*, WebPage. Available online at: http://www.planetainvertebrados.com.br/index.asp?pagina=especies_ver&id_categoria=27&id_subcategoria=0&com=1&id=243&local=2
- Simone, L.R.L. 2006. *Land and freshwater molluscs of Brazil*. São Paulo, SP: FAPESP, 390 p.



Obituary

Paul Yokley, Jr. 1923 - 2018

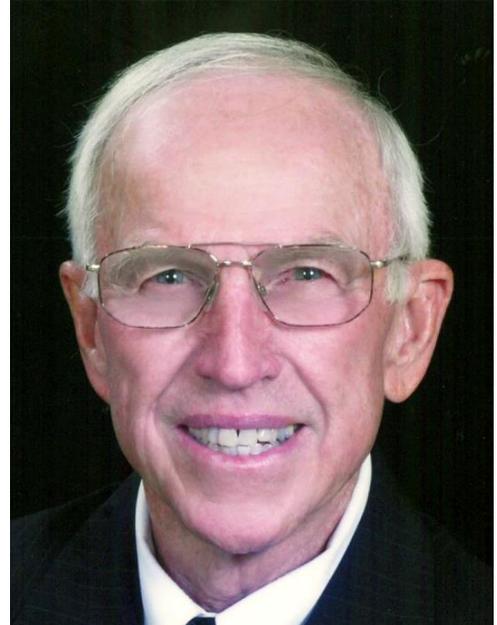
Dr. Paul Yokley, Jr., passed away November 22, 2018 in Florence, Alabama, at the age of 95. He was a professor of biology at Florence State Teachers College -- later the University of North Alabama (UNA) -- for 43 years before retiring in 1993. Paul earned his B.S. and M.S. degrees from George Peabody University, and was one of David Stansbery's first doctoral students at Ohio State University. His 1968 dissertation, "*A Study of the Anatomy of the Naiad Pleurocera cordatum (Rafinesque, 1820) (Mollusca: Bivalvia: Unionoida)*" provided the most detailed anatomical description of what was then an important commercial mussel species. The doctoral study led to further investigations on the life history of *P. cordatum*, funded by the Tennessee Valley Authority, during which Paul determined its glochidial host and timing of annual reproductive events. This study resulted in the often-cited "Life History of *Pleurobema cordatum* (Rafinesque, 1820) (Bivalvia: Unionacea)" published in *Malacologia* in 1972.

With TVA Biologist Billy Isom, Paul also published a series of mussel surveys in Tennessee River tributaries in north Alabama and central Tennessee that provided an important snapshot of those faunas as they were in decline in the late 1960s and early 1970s.

Undoubtedly, though, Dr. Yokley's greatest contribution was the knowledge, enthusiasm, love of science, and appreciation for nature that he imparted on countless students. A well-rounded biologist, Paul taught such varied courses as field zoology, ornithology, and entomology, along with general biology. He taught anatomy and physiology for many years, which helped form the educational base for many students who later became nurses and doctors, quite a few of whom informed him that what they learned eased their burden in anatomy and physiology classes at medical school. Paul was also founder and was advisor for the UNA chapter of Beta Beta Beta Biology Honor Society and served as the national vice president of that organization from 1978 to 2015. Paul's love for science in general, biology in particular, and the students whom he taught was obvious to all who interacted with him. His influence on a generation of biologists will continue to have a great and lasting impact.

On a personal level, I will forever be indebted to Dr. Yokley for the individual time he spent with me as an undergraduate student, especially once I showed interest in aquatic mollusks. I recall a field zoology lecture in 1986 when he recommended that we all choose an animal group and learn everything there is to know about it. He suggested freshwater snails because hardly anyone was working on them at the time. The suggestion of studying such a lowly group of animals got a chuckle from the class, including from me. But, a few weeks later, I borrowed a dipnet and started scooping snails from the streams of northwest Alabama. To encourage my enthusiasm and make it easier for me to learn about them, Paul moved his entire personal mollusk library into a small unused office in the UNA science building so I would have it at my disposal. Had he not done that, and had I not spent so much of my spare time with his journals and books, it is very likely that my career would have taken a different trajectory and I would now spend my time on animals far less interesting and more mundane than aquatic mollusks. For this I am, and shall always remain, extremely grateful.

Jeffrey T. Garner
Mussel Management Supervisor
Alabama Division of Wildlife and Freshwater Fisheries
Florence, Alabama



FMCS Officers

President

Heidi L. Dunn

EcoAnalysts, Inc.
1417 Hoff Industrial Park
O'Fallon, Missouri 63366
636-281-1982; Fax: -0973
HDunn@ecoanalysts.com

President Elect

Jeremy Tiemann

Illinois Natural History Survey
1816 South Oak Street
Champaign, Illinois 61820
jtiemann@illinois.edu

Secretary

Janet Clayton

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

Treasurer

Emily Grossman

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

Past President

Teresa Newton

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

Emy Monroe
Midwest Fisheries Center
emy_monroe@fws.gov

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

Teresa Newton
Upper Midwest Environ. Science Center
tnewton@usgs.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
U.S. Fish and Wildlife Service
Nathan_Whelan@fws.gov

Genetics

Dave Zanatta
Central Michigan University
zanat1d@cmich.edu

Kevin Roe
Iowa State University
kjroe@iastate.edu

Guidelines and Techniques

Ryan Schwegman
EnviroScience, Inc.
RSchwegman@EnviroScienceInc.com

Lisie Kitchel
Wisconsin Dept. Nat. Resources
lisie.kitchel@wisconsin.gov

Information Exchange

Newsletter

John Jenkinson
Clinton, Tennessee
jjjenkinson@hotmail.com

Information Exchange (continued)

Journal

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

Wendell R. Haag
U.S. Forest Service
whaag@fs.fed.us

Dave Berg
Department of Biology, Miami University
bergdj@miamioh.edu

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

Jennifer Archambault
North Carolina State University
jmarcham@ncsu.edu

Kimberly Horndeski
Texas Comptroller of Public Accounts
kimberly.horndeski@cpa.texas.gov

Propagation, Restoration, & Introduction

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

Tim Lane
Virginia Dept. of Game & Inland Fisheries
tim.lane@dgif.virginia.gov

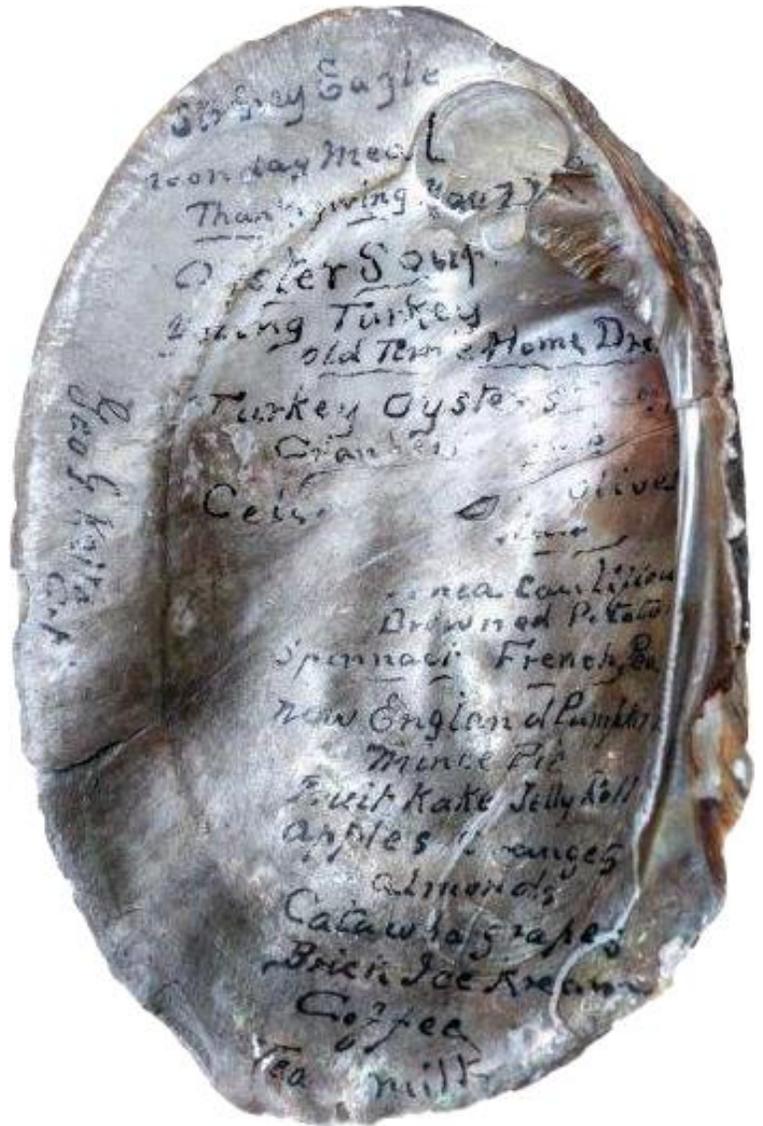
Symposium

Jeremy Tiemann
Illinois Natural History Survey
jtiemann@illinois.edu

Parting Shot

During the 19th and early-20th centuries, packet and excursion steamboats on the big western rivers in North America often provided extravagant dining experiences to passengers paying luxurious cabin passage. This ~1902 menu, inscribed on the valve of a washboard mussel, *Megalonaias nervosa*, shows that Captain George Keith treated his noonday Thanksgiving diners on the *Str. [Steamer] Gray Eagle* to turkey and dressing, cranberry, cauliflower, potato dishes, fresh fruit, mince and pumpkin pie, and ice cream. And, of course, oyster soup.

This shell menu is one of many Mississippi River mussels connecting natural history and cultural history that will be included in the *Mighty Mississippi* exhibit at the Missouri History Museum in St. Louis, Missouri, on display from November 23, 2019 through April 18, 2021. Photograph by Cary Horton and submitted by David Lobbig, both at the Missouri History Museum.



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.

