34th Annual Meeting
The Florida Association of Aquatic Biologists

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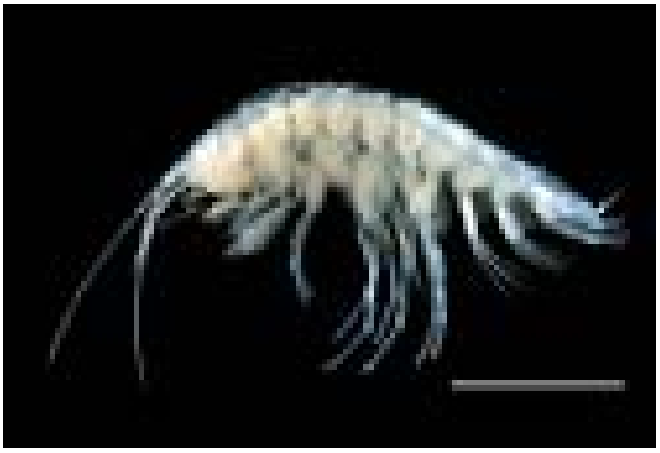
Virtual Meeting
December 1st– 2nd, 2020



On December 1, 2020, Executive Committee Members will meet at 9:30am

AGENDA

Florida Association of Aquatic Biologists 34th Annual Meeting
Virtual Meeting

December 1-2, 2020

MEETING AGENDA

Tuesday, December 1, 2020

9:30 AM - Executive Committee Meeting (virtual)

Wednesday, December 2, 2020

9:00 AM - Welcome; Shannon McMorrow, 2019-2021 President
9:30 - Kourtney Barber**; Chloroplast identification and feeding specificity of the sacoglossan photosynthetic sea slug *Elysia papillosa*
9:50 - Alexandra Nockengost**; How Diet Treatment on Kleptoplastic Slug species *Elysia Papillosa* Impacts Resultant Survivability and Duration of Photosynthesis
10:10 - Alexander B. Orfinger**; Systematics of the North American *Polycentropus sensu stricto* (Trichoptera: Polycentropodidae): Early Results and Ongoing Directions
10:30 - BREAK
11:00 - Daniela Gutierrez-Andrade**; Ceratal Autotomy of Sacoglossan Sea Slug *Placida kingstoni* as a Defensive Behavior Against Predators
11:20 - Robert Mattson; Setting Benthic Algal Abundance Targets to Protect Spring-Run Stream Ecosystems
11:40 - Dave Karlen; Twenty-five year trends in the benthic macroinvertebrate community of Tampa Bay

12:00 PM - LUNCH

1:30 - Annual FAAB Business Meeting
2:50 - Andrew Rasmussen; *Trichoptera Nearctica:* a web-based resource for information on the caddisfly (Trichoptera) fauna of North America, North of Mexico
3:10 - Doug Strom; Voucher Collections: Rationale and Future Trends
3:30 - Craig Duxbury; Dissolved oxygen and macroinvertebrates of central Florida: a mesocosms Experiment
3:50 - Announcement of Student Awards
4:00 - ADJOURN

** - Student Presentation

Program Session

ABSTRACTS:

Chloroplast identification and feeding specificity of the sacoglossan photosynthetic sea slug *Elysia papillosa*

Kourtney Barber[1*], Michael Middlebrooks[2], Susan Bell[1], Sidney Pierce[1,3]
[1]University of South Florida, [2]University of Tampa, [3]University of Maryland

Sacoglossan sea slugs are highly specialized marine herbivores that typically feed and live on siphonaceous green algae. These slugs are capable of sequestering the chloroplast from their algal hosts and are able to use them to photosynthesize; this stealing of chloroplast is known as kleptoplasty. *Elysia papillosa* is a small kleptoplastic, sacoglossan sea slug found in Florida and throughout the Caribbean. *Elysia papillosa* at Tarpon Springs, FL are typically found to inhabit two species of the siphonaceous green alga, *Penicillus capitatus,* and less frequently, with *P. lamourouxii.* In order to determine which algal species *E. papillosa* was consuming at this site, total DNA was extracted from 16 individual slugs and the species matching the gene sequence of the chloroplast genomic gene, *rbcL* (large subunit of ribulose bisphosphate carboxylase) was determined. The molecular data indicated that *E. papillosa* were consuming the same algal species from which they were collected. Additionally a laboratory feeding experiment was run to determine if alga food resource had any impact on growth of *E. papillosa*. Feeding trials were conducted over a three week period to measure growth of slugs (body length, cm) when feeding on *P. capitatus* compared to *P. lamourouxii. Elysia papillosa* that were fed *P. lamourouxii* achieved a mean body length that was 1.5-2X larger than recorded for slugs fed *P. capitatus*. Although *P. capitatus* is clearly more attractive to slugs when in natural settings these results suggest that *P. lamourouxii* can offer a nutritional advantage to slugs. It remains unclear why *E. papillosa* is primarily found associated with *P. capitatus* when they grow larger on *P. lamourouxii*.

How Diet Treatment on Kleptoplastic Slug species Elysia Papillosa Impacts Resultant Survivability and Duration of Photosynthesis

Dr. Michael Middlebrooks, John Ambrosio, Alexandra Nockengost*
University of Tampa Biology Department

Elysia papillosa is one of several species of marine sacoglossan sea slugs which can temporarily photosynthesize by sequestering functional chloroplasts from its green algal food source. The duration for which photosynthesis can be maintained varies for different sacoglossan species, however, diet has been shown to have a significant impact. To assess for an effect of diet on the duration of photosynthesis in *E. papillosa*, slugs were split into two diet treatment groups based on two closely related algal species *Penicillus capitatus* and *P. lamourouxii*, of which *E. papillosa* has been shown to herbivorize. In this study, a PAM fluorometer was used to collect in situ data on the live slug specimens as a proxy for photosynthesis. Survival data included longevity of vitality without food source recorded in days. Algae specimens *Penicillus capitatus* and *P. lamourouxii* were collected from the field and *Elysia papillosa* was resultantly collected as they emerged from the algae in the aquaria. Once slugs were randomly selected into treatment groups, they were fed exclusively one of the two algal species of interest. Prior to photosynthesis and survival measurements, slugs were allowed to feed on their assigned group ab libum for two weeks at which point food was then removed. Slugs were measured using a PAM fluorometer every two days as a proxy value for photosynthesis. *E. papillosa* fed *P. capitatus* had a faster decline in photosynthetic activity compared to *E. papiilosa* fed *P. lamourouxii*. Additionally, slugs fed *P. lamourouxii* survived longer in comparison than the slugs fed *P. capitatus*. These results are surprising because they do not align with our current field observations that support higher sightings of *E. papillosa* on *P. capitatus* more commonly than on *E. lamourouxii.* Whether this is a result of preferable taste, better cryptic refuge, larval dispersal stages, or perhaps easier herbivory in comparison to *P. lamourouxii* due to the smaller nature of the *P. capitatus* filaments, is unclear. Further research on *E. papillosa* ecology as well as plastid morphology shall be necessary to uncover the elements behind this seemingly mysterious selection. This considerable difference in plastid maintenance and survivability found in E. papillosa based on algal donor suggests maintenance of plastids could vary based on plastid morphology or other unassessed factors.

Systematics of the North American *Polycentropus sensu stricto* (Trichoptera: Polycentropodidae): Early Results and Ongoing Directions

Alexander B. Orfinger*
Entomology Program, Florida A&M University and University of Florida, Tallahassee, Florida

Early results and ongoing directions in the phylogenetic systematic revision of various Nearctic *Polycentropus sensu stricto* (Trichoptera: Polycentropodidae) caddisflies are discussed. Results thus far include successful molecular association of some larvae, initial phylogenetic results, preliminary morphological discrimination between larvae, and issues encountered using existing identification tools. Also discussed is the generation of a Barcode of Life Database project and associated data set, and the tools therein. Research hurdles and their (potential) solutions are then described. Finally, ongoing efforts including molecular sequence data generation, future sampling goals, and expanded efforts to treat larvae of Western Nearctic species are also discussed.

Ceratal Autotomy of Sacoglossan Sea Slug *Placida kingstoni* as a Defensive Behavior Against Predators

Daniela Gutierrez-Andrade* and Michael Middlebrooks.
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Autotomy is a defensive behavior in which an organism voluntarily detaches body structures at a predetermined breakage point in response to external stimuli that cause stress or compromise its well-being. Although the presence of autotomy in different species of sacoglossan sea slugs has been well documented, few studies have evaluated its effectiveness as a defensive mechanism against predatory attacks. *Placida kingstoni* is a small sacoglossan, native to Florida and the Caribbean, with the capacity of autotomizing long dorsal projections called cerata. The purpose of this study was to examine the relationship between the presence of ceratal autotomy of *P. kingstoni* and its survival against the attacks of a generalist predator. Due to its aggressive nature, habitat overlap, and diet, shrimp from the *Lysmata wurdemanni* species complex were selected as predators. Each sea slug was exposed to a starved shrimp for a ten-minute interaction. In most encounters, *P. kingstoni* was attacked by the shrimp, but most slugs autotomized cerata and survived. The slugs appeared to be palatable and were not rejected as a food source by the shrimp, however, autotomy was often accompanied by a mucus secretion that allowed the formation of cerata clusters that instead attracted the attention of the predators. This suggests that autotomy is an effective defensive mechanism of *P. kingstoni* against predation. Nonetheless, the effectiveness of the behavior might vary with different predators and future studies need to focus on organisms that exhibit alternative modes of attack. Additionally, the success of autotomy as a defensive strategy in other sacoglossan species should be explored because the behavior might not yield the same results for all sea slugs and might serve different purposes.

Setting Benthic Algal Abundance Targets to Protect Spring-Run Stream Ecosystems

Robert A. Mattson, CEP, CSE
St. Johns River Water Management District, Palatka, FL

The establishment of quantitative targets for algal abundance in lakes (usually expressed as water column Chlorophyll a in µg/L) is well-ensconced in lake management. Setting targets for abundance of benthic/attached algae in streams has not garnered as much attention in stream ecology and management. Establishment of targets for benthic algae in streams is in part dependent upon the particular attribute that is to be protected, including water withdrawal/water supply, aesthetics, recreation, or ecosystem protection. This presentation will review benthic algal abundance targets proposed in the existing stream literature and compare with epiphytic and macroalgal abundance measured in a 2015 study of 14 spring-run streams in Florida. Given the changes in benthic algal abundance seen in these types of streams over the past few decades, establishing targets for algal abundance to guide restoration attempts seems warranted. Abundance targets may be expressed as % cover, Chlorophyll a density (as mg Chl a per unit area) or standing crop (g dry weight or ash-free dry weight per unit area). Ecological considerations may include the interception of incident light by epiphytic burdens on macrophytes, habitat smothering by macroalgal mats, or effects on benthic macroinvertebrate or fish communities.

Various investigators have proposed quantitative targets based on either mean/median or maximum algal abundance. Efforts in temperate streams have suggested macroalgal targets of 20%-40% cover, 100-150 mg/m^2 chlorophyll a density, or 40 g/m^2 ash-free dry weight (AFDW). These targets were mainly based on aesthetics and recreational issues and may or may not be relevant for Florida spring-run or other streams, but they are a starting point. Nine (9) of the 14 streams sampled in 2015 had mats of macroalgae, and about half of those had mean and/or maximum macroalgal Chlorophyll a densities exceeding 150 mg/m^2 and most of these 9 streams had in excess of 20% macroalgal mat cover. Recent work in the Chassahowitzka River, a spring-run stream on the Florida Gulf Coast, proposed a maximum epiphyte load on leaves of *Vallisneria americana* of 4-5 mg dry weight/cm^2, which equates to 14-17.5 g/m^2 AFDW. This was based on the algal growth intercepting enough incident light to negatively affect the growth of the macrophyte. Maximum epiphytic loads in the Rainbow River and Gum Slough exceeded these targets, but 10 other streams fell below this target. Maximum epiphyte loads in more shaded conditions were lower, 0.4-0.8 mg dry weight/cm^2 (1.4-2.8 g/m^2 AFDW) and 9 of the 12 streams with macrophytes had epiphyte levels exceeding this threshold on at least one sampling site.

Twenty-five year trends in the benthic macroinvertebrate community of Tampa Bay

Karlen, David J*.; Dix, Thomas L.; Campbell, Kevin W.; Christian, Julie; Goetting, Barbara K.; Markham, Sara E.; Jernigan, Joette; Chacour, Anthony; Martinez, Kirsti
Environmental Protection Commission of Hillsborough County, Tampa, FL 33619

Tampa Bay is the largest open water estuary in Florida and is home to one of the largest ports on the east coast of the United States. The Environmental Protection Commission of Hillsborough County has been collecting sediment samples in Tampa Bay since 1993 to monitor sediment contaminants and long-term changes in the benthic macroinvertebrate community, as a measure of the Bays' ecological health. Over the 25-year period,1993-2017, a total of 1,791 samples were processed, and over 1,180 benthic macroinvertebrate taxa have been identified. Overall mean species richness was 39 taxa/sample with a mean abundance of 9,861 individuals/m^2. The most abundant species were the cephalochordate *Branchiostoma floridae* and the brachiopod *Glottidia pyramidata,* comprising 5.3% and 4.2% of the overall abundance respectively. Physical factors that most strongly influenced the community structure were salinity and sediment composition. Species richness increased from the upper to lower segments of the Bay, which corresponded to increasing salinity and decreasing silt+clay content. Temporal changes in the benthic community structure correlated with salinity. Decreases in species richness and changes in species composition were observed in lower salinity years. An overall increasing trend in the benthic species richness was apparent over the 25-year monitoring period, and reflects observed improvements in Tampa Bay's water quality and seagrass coverage.

***Trichoptera Nearctica*: a web-based resource for information on the caddisfly (Trichoptera) fauna of North America, North of Mexico**

Andrew K. Rasmussen
Florida A&M University, Center for Water Resources, Tallahassee, Florida

The mission of *Trichoptera Nearctica* (http://www.trichoptera.org/) is to serve as an informational resource on Trichoptera and to provide up-to-date information on the taxonomy and geographic distribution for all species of Trichoptera known to occur in the Nearctic region, North of Mexico. In addition to housing the *Distributional Checklist Nearctic Trichoptera*, a variety of other information on Trichoptera can be accessed, including listings of newly described species and recent publications, PDF downloads of publications on the Trichoptera of Florida, and links to other online databases and information outlets. My hope is that the website provides efficient access to taxonomic information and will facilitate research, conservation, and management of these fascinating creatures. This oral presentation will summarize the contents of the website and highlight the most recent update.

Voucher Collections: Rationale and Future Trends

Doug Strom
Water & Air Research

Voucher collections are an important part of the quality control system for any benthic macroinvertebrate laboratory. These documented specimens can serve as exemplars for specimens identified on a day to day basis as part of the process to ensure efficient and consistent accurate identifications of taxa. Reference collections for specific project work are often required to meet client's project quality assurance plans. Regulatory agencies may require reference collections with specimens verified by a recognized expert for the specific taxonomic group when working on that agency's projects, or when seeking certification for state-mediated sampling procedures, such as the Stream Condition Index or the Biorecon. In Florida examination of voucher collection records is part of the FDEP audit process to have a laboratory certified for benthic macroinvertebrate sample processing using those procedures. Voucher collections can also document historical specimens and data. Water & Air Research, Inc. (Water & Air) maintains freshwater and marine voucher collections for all of the above-stated purposes. Specimens in vials or jars are typical, but some pinned insects are maintained as well. These are kept in cabinets in a secure location. Specimen records are maintained using Microsoft Excel. The necessary information that should be recorded for each voucher specimen lot is presented. Future alternative methods for records maintenance is discussed. Audience participation is requested in a discussion of how others in FAB are managing their voucher collections.

Dissolved oxygen and macroinvertebrates of central Florida: a mesocosms experiment

Craig Duxbury
Wood Environment & Infrastructure Solutions, Inc.

Dissolved oxygen (DO) is a primary environmental factor that structures aquatic communities. Low DO waters have expanded worldwide in both marine and freshwaters, causing reductions in biodiversity. Most information on effects of DO has been from observational studies and single species tests. However, less information exists on effects of low DO on macroinvertebrate communities in systems with characterized by higher temperatures and lower DO. Experimental stream mesocosms were used to test the effects of low DO on a typical aquatic invertebrate community from a blackwater stream in central Florida that was naturally low in DO. We imposed DO at three different levels high (5.5 mg/L), medium (3.5 mg/L) and low (1 mg/L) with two different velocities. We collected aquatic invertebrates with artificial substrates colonized with a natural assemblage. The artificial substrates were then transferred to the experimental streams and subjected to the DO and velocity treatments for six days. A total of 7,782 invertebrates representing 78 taxa were identified. Number of individuals and taxa were reduced, from the high DO + high velocity to the low DO + low velocity treatments by about 70 and 60%, respectively. There was no difference in the overall macroinvertebrate community between the medium and high DO treatments; however, the low DO treatment community was significantly different. Water velocity did not appear to have any effect. Ephemeroptera appeared to be the most sensitive to DO and accounted for much of the dissimilarity between the low and the medium and high treatments. However, we did find that many taxa, including Ephemeroptera could survive even in the low DO treatment. Thus, it appears that the invertebrate assemblage in these streams did respond to low DO, but could survive for up to six days at DO at about 1 mg/L.