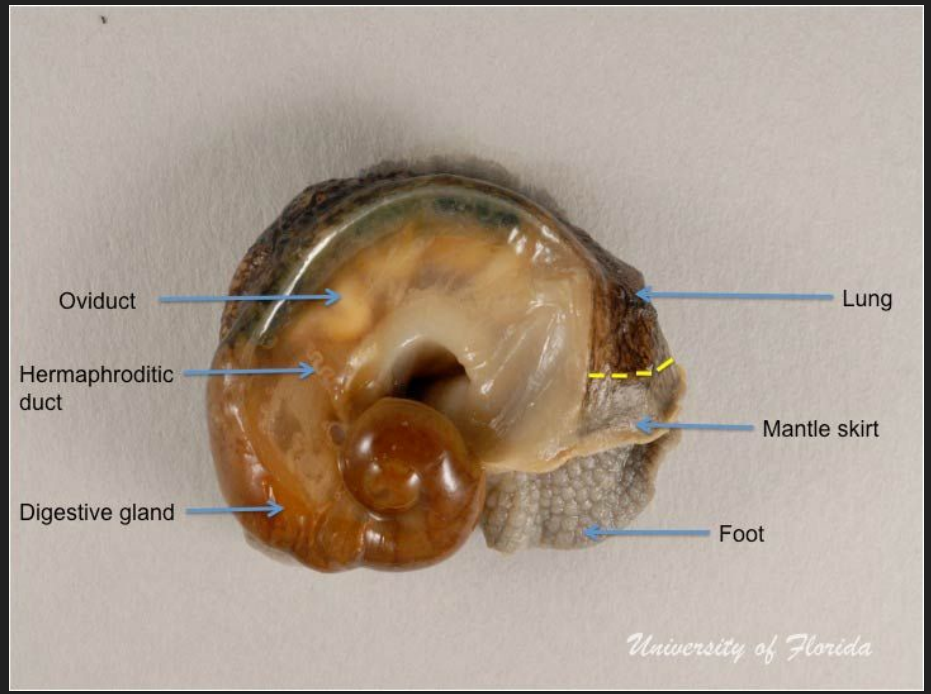
Lab 8: Macroparasite Aggregation + Behavioral Modification

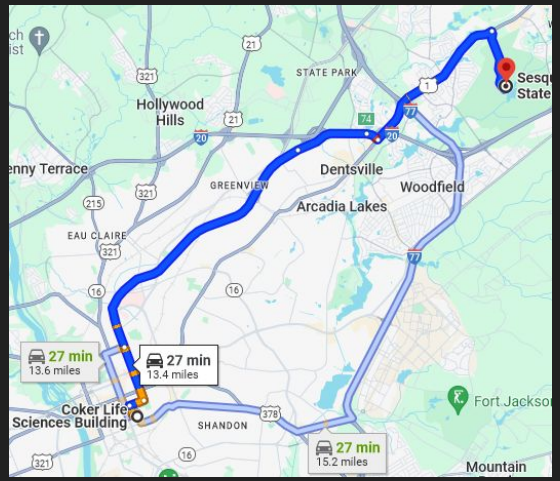
Today's Lab

1. Review System Biology
2. Behavioral assay of *I. obsoleta*
3. Dissection and trematode assay of *I. obsoleta* and M. *bidentatus*



Next Week:

1. Fieldtrip!
2. Meeting at Sesquicentennial State Park



Next Week:

1. At main gate; will be prepaid (tell them you're with USC Parasitology).
2. Meeting at Boat House Parking lot (exact google maps link will be sent out).
3. Wear long pants, long socks, and bug spray!
4. Reminder email with map link will be sent out

Two snails, Both alike in dignity

Eastern Mudsnail (Ilyanassa obsoleta)

Two-toothed Marsh Snail
(*Melampus bidentatus*)

Melampus bidentatus

Pulmonate snail (pallial lung instead of gills)

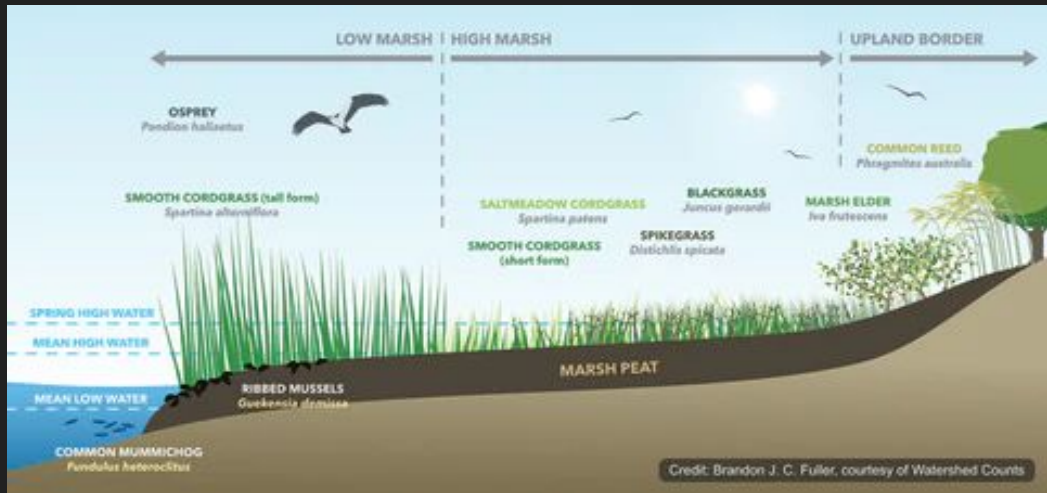
Living in high intertidal marsh zones across the East Coast

(less common/absent in lower *Spartina* flats)

Detritivore, mostly eating decomposing plant material

Color variation common

Aka “Coffee bean snail”



Ilyanassa obsoleta

Native to NW Atlantic down to Gulf of Mexico, but invaded Pacific Coast of North America in 1907 as a stowaway on Oyster shipments

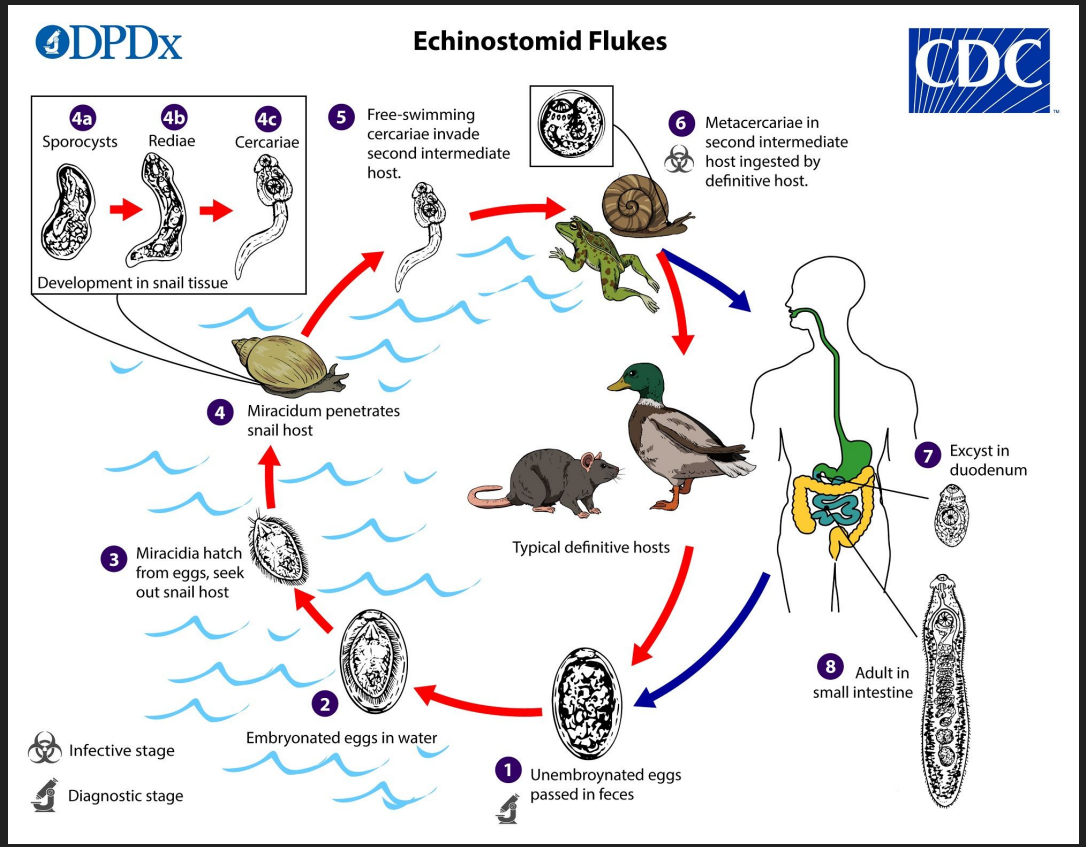
Marine snail found in intertidal mudflats and soft-sediment habitats

Tolerant to quite large ranges in salinity and temperature.

Opportunistic omnivore, feeding on algae in sediments, decaying macrophytic algae, carrion, etc.

Known host of a number of trematode parasites in native range; has carried at least 4 to its invaded range

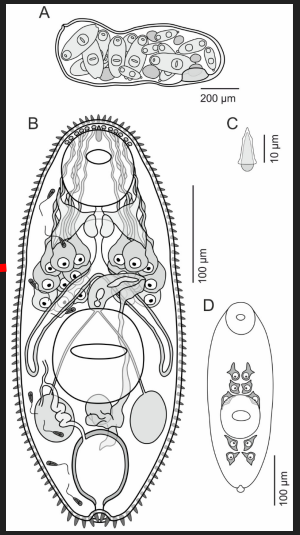
Reminder about Trematode Life cycles



Trematode Parasites of the Eastern Mudsnail

Table 2 Observed trematode species and average prevalence (± SE) of trematodes that infect *Ilyanassa obsoleta* and *Littorina saxatilis* in native and introduced subregions of North America. Subregion abbreviations refer to: SFB, San Francisco Bay; WB, Willapa Bay; BB, Boundary Bay.

Trematode species of *Ilyanassa obsoleta**	Native source	Native north	Native south	SFB	WB	BB
Zoogonus rubellus (*Zr*)[F]	7.79 (± 2.23)	13.00 (± 3.36)	7.95 (± 1.80)	1.43 (± 0.48)	0.09 (± 0.09)	0
Lepocreadium setiferoides (*Lse*)[F]	5.56 (± 1.29)	5.31 (± 1.69)	5.81 (± 2.22)	1.03 (± 0.46)	0	0
Stephanostomum tenue (*St*)[F]	3.56 (± 1.10)	7.08 (± 2.19)	0.54 (± 0.18)	0.36 (± 0.36)	0	0
Stephanostomum dentatum (*Sd*)[F]	3.73 (± 1.86)	4.14 (± 2.27)	0.82 (± 0.31)	0	0	0
Himasthla quissetensis (*Hq*)[B]	2.40 (± 0.69)	4.68 (± 1.63)	0.24 (± 0.12)	4.74 (± 3.65)	2.20 (± 2.20)	0.73 (± 0.32)
Austrobilharzia variglandis (*Av*)[B]	0.55 (± 0.14)	0.62 (± 0.35)	0.05 (± 0.05)	0.91 (± 0.74)	0.64 (± 0.44)	3.07 (± 2.37)
Gynaecotyla adunca (*Ga*)[B]	0.72 (± 0.28)	1.00 (± 0.39)	0.15 (± 0.11)	0	0	0
Diplostomum nassa (*Dn*)[B]	0.26 (± 0.12)	0.05 (± 0.05)	0	0	0	0
Pleurogonius malaclemys (*Pm*)	0	0	0.70 (± 0.27)	0	0	0
Bird-using trematodes[B]	3.95 (± 0.97)	7.72 (± 3.33)	0.44 (± 0.18)	5.65 (± 3.77)	2.84 (± 2.33)	3.80 (± 2.62)
Fish-using trematodes[F]	22.11 (± 4.75)	30.74 (± 8.28)	15.35 (± 3.35)	2.72 (± 1.19)	0.09 (± 0.09)	0



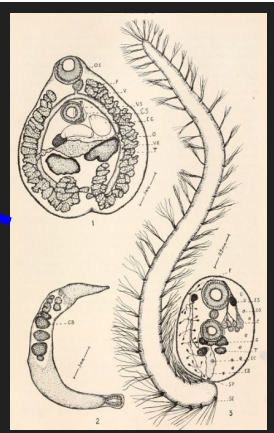


Table from Blakeslee et al. 2012

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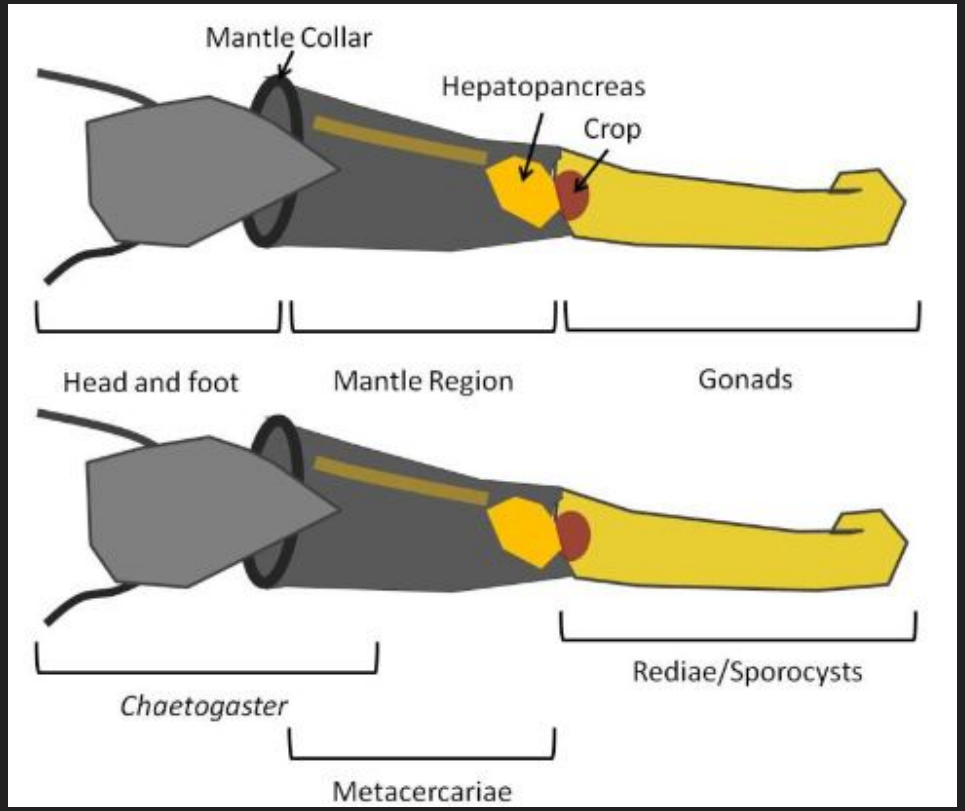
Can cause “Swimmer’s Itch” (Allergic reaction to cercarial penetration)

Trematode Parasites of the Two-Toothed Marsh Snail

We're Dissecting to Assay for Infection



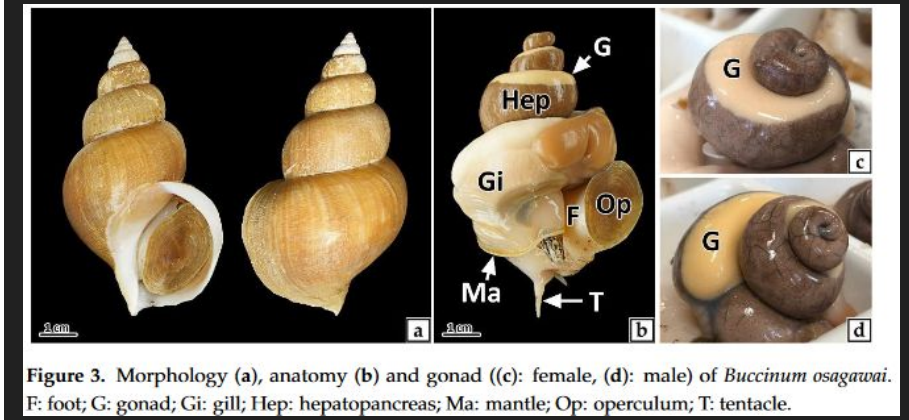


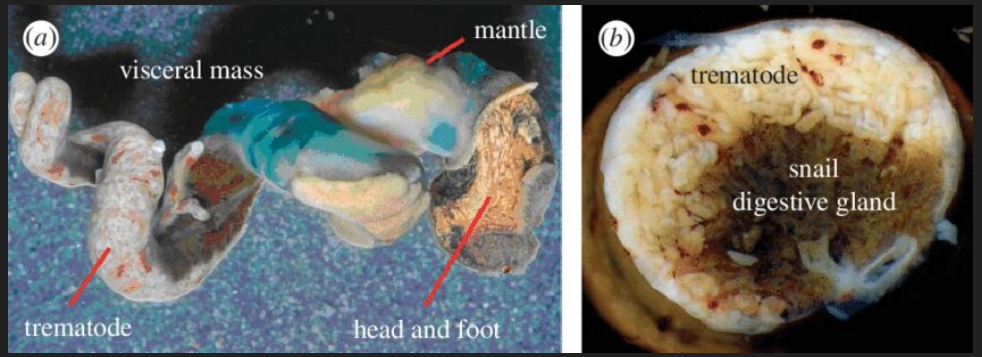
Figure 3. Morphology (**a**), anatomy (**b**) and gonad ((**c**): female, (**d**): male) of *Buccinum osagawai*. F: foot; G: gonad; Gi: gill; Hep: hepatopancreas; Ma: mantle; Op: operculum; T: tentacle.

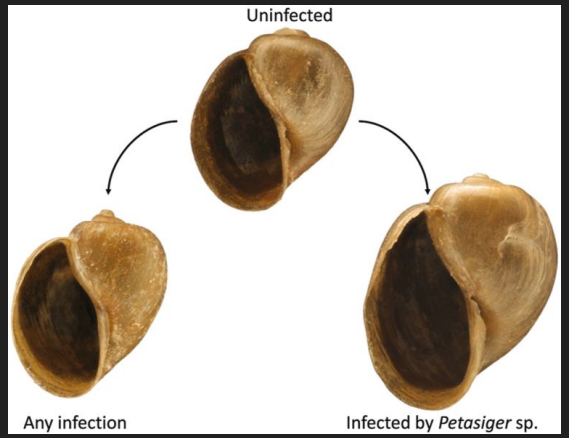
Effects of Trematodes on Host Snail Condition

Reduction of Host Fecundity (Parasitic castration)

Increased Host Mortality

Changes in host physiology or behavior





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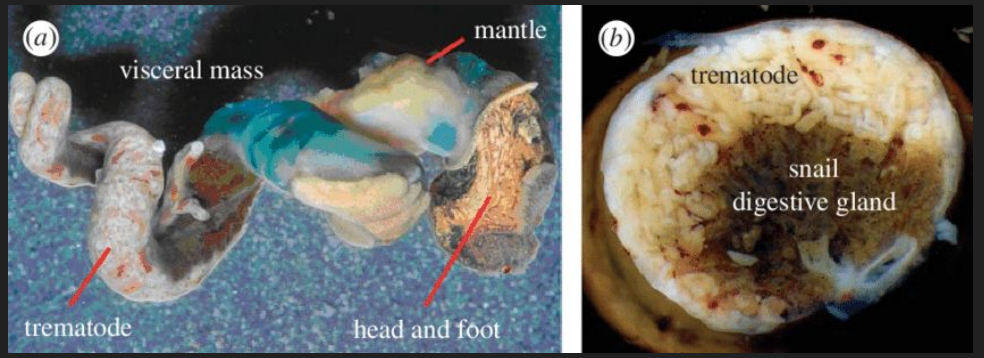

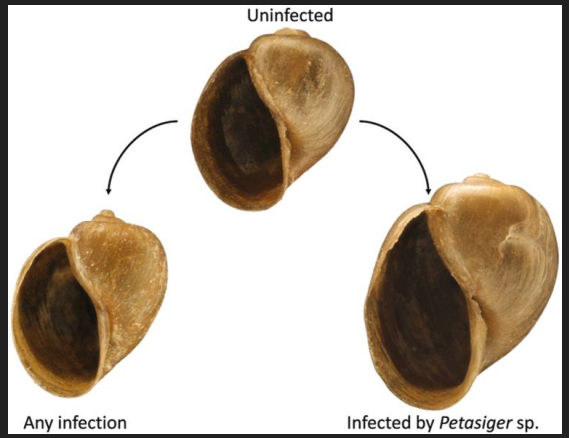

Our Research Questions Today:

1. What trematode species can we detect in each host species?
2. What's infection prevalence in each species?
3. Do we size an effect of body size on parasite burden?
4. Do we see an effect of parasite burden on motor performance?

Sources

Blakeslee, A. M., Altman, I., Miller, A. W., Byers, J. E., Hamer, C. E., & Ruiz, G. M. (2012). Parasites and invasions: a biogeographic examination of parasites and hosts in native and introduced ranges. *Journal of Biogeography*, *39*(3), 609-622.

Hammoud, C., Kayenbergh, A., Tumusiime, J., Verschuren, D., Albrecht, C., Huyse, T., & Van Bocxlaer, B. (2022). Trematode infection affects shell shape and size in Bulinus tropicus. International Journal for Parasitology: Parasites and Wildlife, 18, 300-311.

Shinagawa, K., Urabe, M., & Nagoshi, M. (2001). Effects of trematode infection on metabolism and activity in a freshwater snail, Semisulcospira libertina. Diseases of aquatic organisms, 45(2), 141-144.