

Exotic:
Houston, TX





Native:
Uruguay



A Tale of Two Snails:
Comparing and contrasting the ecological roles of a natural versus exotic population of Pomacea

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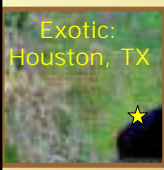





Overarching Research Objective


To compare life history traits in an exotic versus a native population of *Pomacea*

Exotic:
Houston, TX



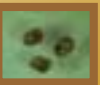
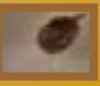


Species of Concern	Not on anyone's radar
Brackish waters	Freshwater lakes
<i>P. insularum</i> *	<i>P. canaliculata</i> *
Pink egg clutches	Pink egg clutches
Large adults	Large adults
Plant-eaters?	Grazers?
Role of predation?	Avian predators

Native:
Uruguay




	URUGUAY	TEXAS
Habitat	Native	Invasive
Oviposition		
Egg number		
Egg size		
Predictive Ability		
Hatching %		
Size at Hatching		
Clutch Variation		
Food Preference		
Chemically Deterred		
Predation Important		
Abiotic Tolerances	Unknown	Salinity sensitivity?
Genetics	<i>P. canaliculata</i>	<i>P. insularum</i>
Maximum Size	55 g	150 g
Of Concern	No	Yes

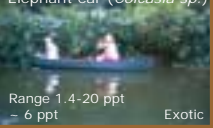





Methods: Field Collection & Observation

• Armand Bayou, TX
– May/Sept. 2005




Elephant ear (*Colcasia sp.*)

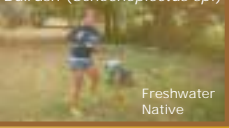


Range 1.4-20 ppt
– 6 ppt Exotic

• Uruguay (2 sites)
– December 2005



Bulrush (*Schoenoplectus sp.*)



Freshwater Native



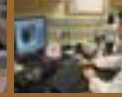
Methods: Laboratory

- Weigh clutch
- Place clutch in 1 M NaOH solution to release eggs
- Count and/or measure eggs
- Regression

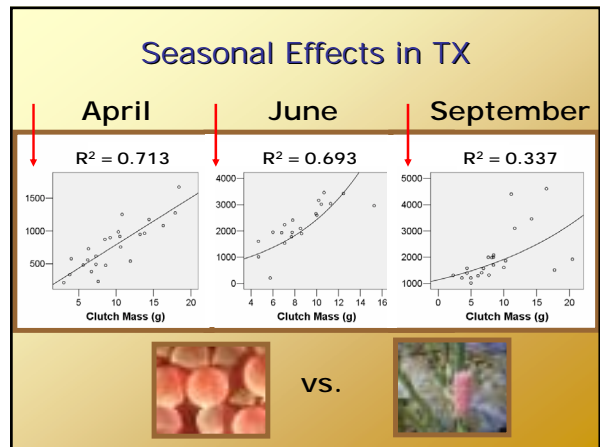
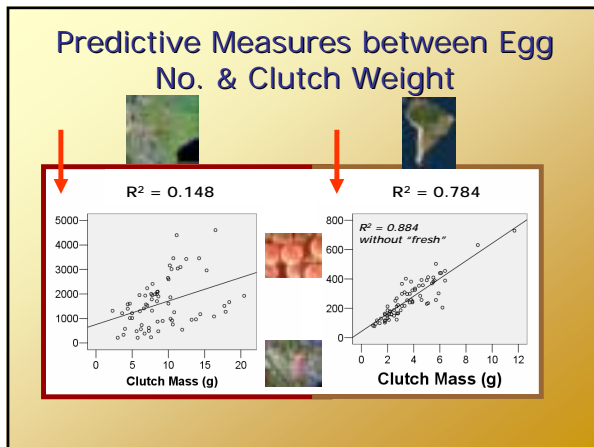
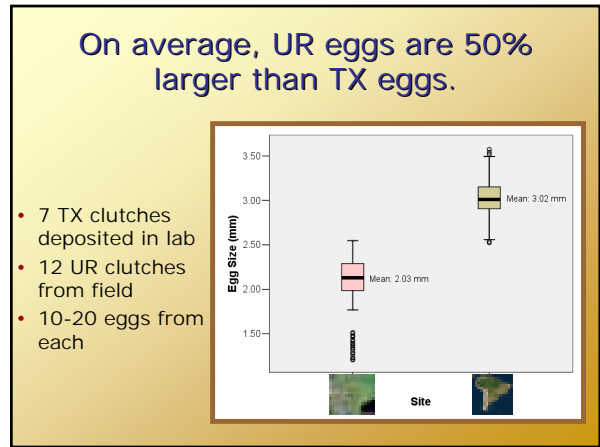
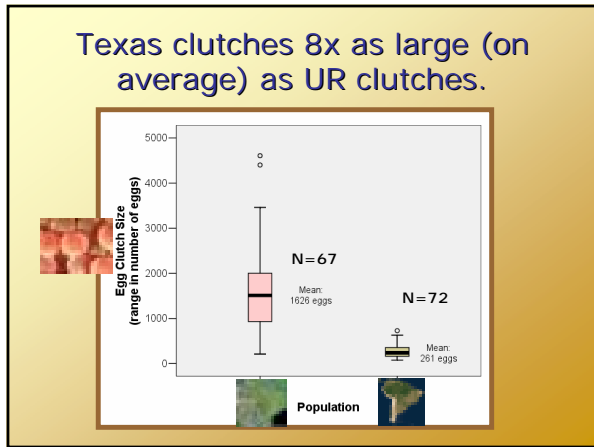
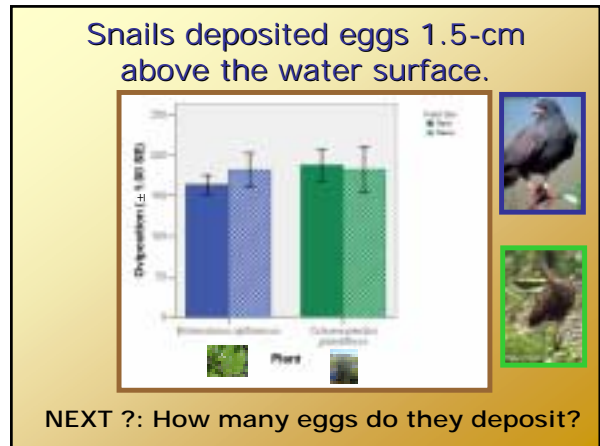
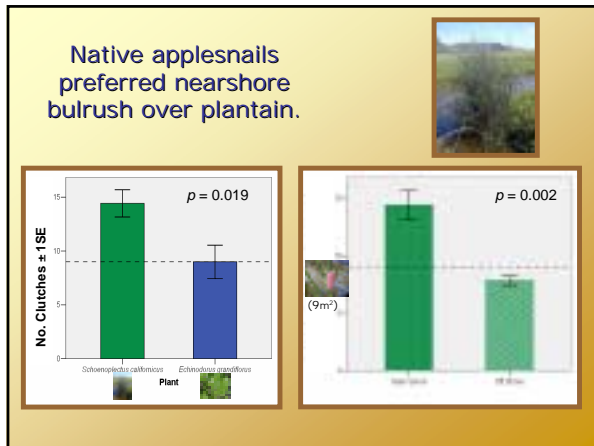
Hatching Efficiency:

$$\left(\frac{\text{Total Hatchlings}}{\text{Hatchlings} + \text{Remaining Eggs}} \right) \%$$

Selected 11 clutches from each population to compare with *t*-test

Data collected in Texas and Uruguay



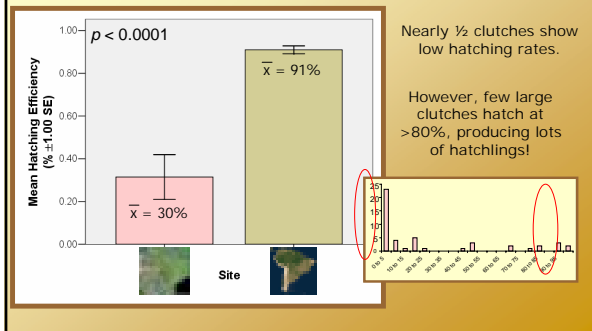
Summary: Fecundity

- Considerable variation occurs in TX clutch size (less in UR by observation).
- Larger eggs occur in UR vs. TX.
- Markedly better clutch size/egg number relationships exist in UR.
 - Considerably more eggs in TX population
 - Seasonal effects need to be considered
- UR snails lay ≥ 1 clutch m^{-2} , with a preference for bulrush found nearshore.
 - Future work will compare with TX population

	URUGUAY	TEXAS
Habitat	Native	Invasive
Oviposition	Bulrush	Random?
Egg number	Low	High
Egg size	Larger	Smaller
Predictive Ability	Strong	Seasonal
Hatching %		
Size at Hatching		
Clutch Variation		
Food Preference		
Chemically Deterred		
Predation Important		
Abiotic Tolerance	Unknown	Salinity sensitivity?
Genetics	<i>P. canaliculata</i>	<i>P. insularum</i>
Maximum Size	55 g	150 g
Of Concern	No	Yes

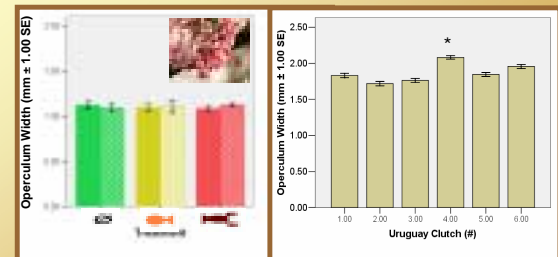


Uruguayan clutches demonstrated significantly higher hatching efficiency.

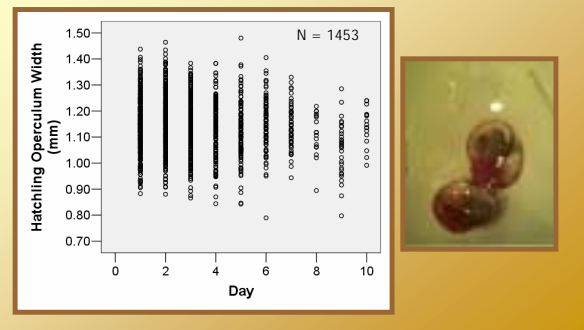


Threshold size for hatching in TX is 1.1 mm and shows no clutch effects.

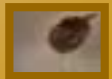
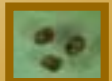
Threshold size for hatching in UR is 1.9-mm and varies with clutch.



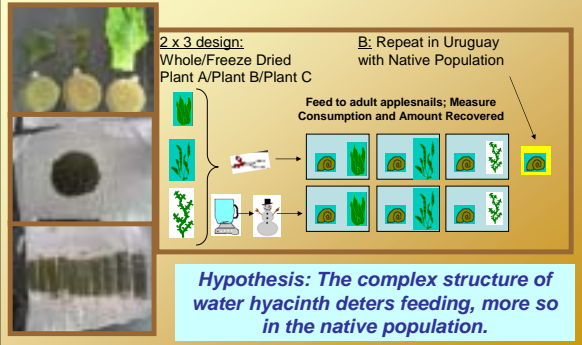
Over a 10-day period, all hatchlings emerged with 1.1-mm operculums.



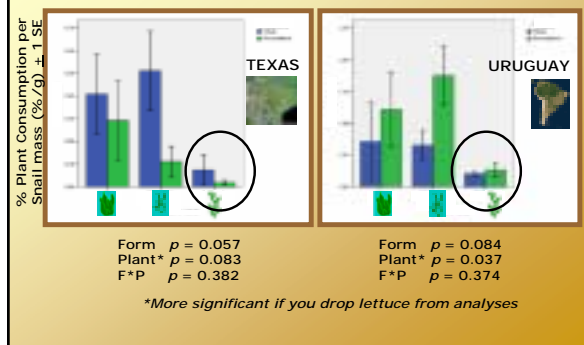
	URUGUAY	TEXAS
Habitat	Native	Invasive
Oviposition	Bulrush	Random?
Egg number	Low	High
Egg size	Larger	Smaller
Predictive Ability	Strong	Weaker: Seasonal
Hatching %	High	Low
Size at Hatching	Larger	Smaller
Clutch Variation	Low	High
Food Preference		
Chemically Deterred		
Predation Important		
Abiotic Tolerances	Unknown	Salinity sensitivity?
Genetics	<i>P. canaliculata</i>	<i>P. insularum</i>
Maximum Size	55 g	150 g
Of Concern	No	Yes



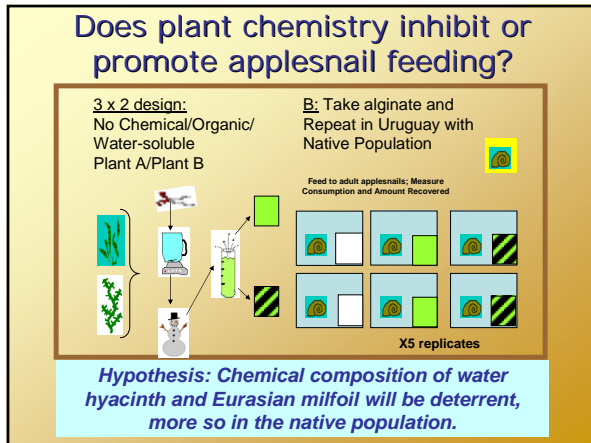
Does the structure of the plant inhibit or promote applesnail feeding?



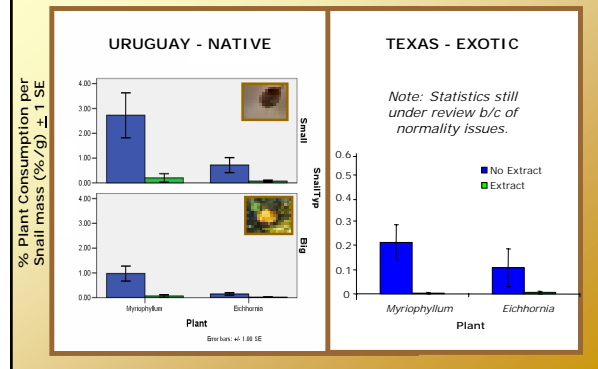
Trends indicate alternate preferences between populations, although lettuce yields odd result.



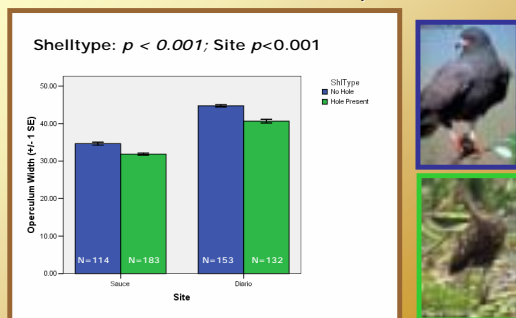
Does plant chemistry inhibit or promote applesnail feeding?



Both populations exhibit feeding deterrence, with minimal *Eichhornia* consumption.



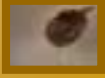
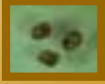
Larger snails suffered predation by removal of entire operculum; smaller snails exhibited hole in top of shell.



Summary: Predation & Herbivory

- Native population experiences size selective predation.
- Preliminary evidence for contrasting ecological roles.
 - UR snails tended to consume less of the whole plants.
 - Neither population consumed *Eichhornia*.
- Chemical extracts partially mediate feeding preferences in both populations.
 - Only considered "bulk" extracts for now.

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Predictive Ability	Strong	Weaker; Seasonal
Hatching %	High	Low
Size at Hatching	Larger	Smaller
Clutch Variation	Low	High
Food Preference	Reconstitute	Whole Plant
Chemically Deterred	Yes	Yes
Predation Important	Yes	Unknown
Abiotic Tolerances	Unknown	Salinity sensitivity?
Genetics	<i>P. canaliculata</i>	<i>P. insularum</i>
Maximum Size	55 g	150 g
Of Concern	No	Yes



Take Home Messages

- Exotic snails can warrant serious ecological and economic concerns.
- Snail may experience "fast" invasions due to fecundity.
- Research that provides insights into the basic ecological roles of similar organisms provide or tools for management.

