

**WETLAND ANIMALS**

INVERTEBRATES – FRITZ REID 11/3/04

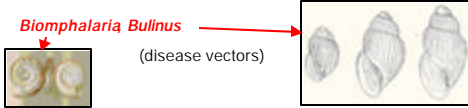
But:

**Aquatic Snails**

A) Lung-breathing; Pulmonata  
non-operculated; terrestrial origin



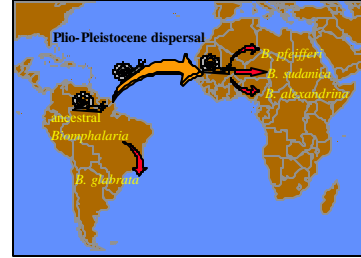
**Biomphalaria Bulinus**  
(disease vectors)



mutualistic relationships with submersed plants

Freshwater snails genus *Biomphalaria* - most important & widely distributed intermediate hosts of the blood fluke *Schistosoma mansoni*

Schistosomiasis - debilitating & eventually fatal disease



\* Snyder & Loker (2000) *J. of Parasitology*, 46, 629-641.  
Morgan et al. (2001) *Parasitology*, 123, S211-S224.

- West to east dispersal of S. American *glabrata*-like taxon (e.g. eggs on legs of migrating birds; rafting on vegetation mats washed out of the Amazon), giving rise to all African taxa
- African Plio-Pleistocene derivatives become hosts for schistosomes (\*2-5Mya) coincident with arrival of *S. mansoni*)
- *B. glabrata* evolved *in situ* in New World with other S. American taxa

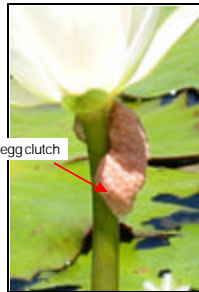
B) Gill-breathing; Prosobranchia – important pests

*Pomacea* (apple snail) – the gill/lung combination as an adaptation to oxygen poor conditions

*Pomacea flagelata*



- feed on aquatic vegetation
- several reproductive cycles, egg clutches
- periods of aestivation (anaerobic respiration)



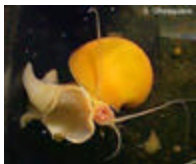
Predators: birds, turtles, fishes, insects and crocodiles

Protection: closing the shell; camouflage; drop-off and burial



Egg protection:

Humans who tasted the eggs described them as "completely tasteless at first, but after chewing them for about half a minute, an overwhelming bitter-nauseating flavour assaulted the rear portion of the palate" (Snyder & Snyder, 1971)

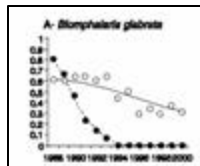
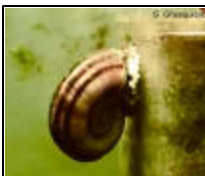


*Pomacea canaliculata* – golden apple snail

Introduced to Asia in 1980 as a protein source, invaded rice fields, Philippines (the cost of control > US \$ billion/year); health problems - lungworm

(Guadeloupe and Suriname)  
*Ambio* 25:443, 1996

*Marisa cornuarietis* – a freshwater prosobranch from Venezuela used for biological control of *Biomphalaria glabrata* on the island of Guadeloupe (Pointier and David, *Biol. Contr.* 29: 81, 2003)



**Amphibians and Reptiles:**

Frogs - change from aquatic to terrestrial form suited to seasonal wetland environments

Salamanders

- Crocodylians
  - remnants of great age of reptiles, Mesozoic era, 200 mil. years of evolutionary history
  - extremely well adapted to their environment (poikilothermic)
  - energy efficient metabolism (60% stored as fat); buoyance effect
  - mostly freshwater but some saltwater – salt glands on the tongue
  - top predators
  - keep the waterways open, "gator holes"

THREATS: hunting, pollution deforestation, habitat loss

Captive breeding

### Alligators

American alligator,  
*Alligator mississippiensis*



- elevated nest from aquatic plants (snakes and turtles use these nest, ex. egg clusters of red-bellied turtle, *Pseudemys nelsoni*, found in 30% alligator nests)

### Crocodiles

- American crocodile, *Crocodylus acutus*
- Morelet's crocodile, *C. moreletii* **endangered**
- Nile crocodile, *C. niloticus*
- Orinoco crocodile, *C. intermedius* **endangered**
- Australian crocodile, *C. johnstoni*



Nile crocodile - > 5 m, one of the most aggressive

### Caymans

- Black caiman, *Cayman yacare*, Panamal
- Baba caiman, *Cayman crocodylus*, the smallest



Water snakes  
Turtles – omnivores; some endangered

### Fish

- any wetland that has a connection to permanent source of water will have fish

Seasonal wetlands (tropical floodplains, African papyrus swamps)

- water level fluctuation
- hypoxia

Adaptations - air breathing organs, airblader lung (some catfish, *Clarias*)

- aquatic surface respiration (guppies, *Poecilia* and *Rivulus* spp.)
- metabolic adaptations – short-term anaerobic respiration, heamoglobin adapted to function at very low oxygen concentrations
- aestivation by encysting in a cocoon in drying mud
- survival in an egg stage in mud (arrested development)

Herbivorous fish – biological control of aquatic weed

- grass carp, *Ctenopharyngodon idella*, inefficient in digestion of cellulose

Mosquito fish, *Gambusia* spp. – mosquito control

Fruit-eating fish, tambaqui, *Colossoma* spp., Amazon floodplain

Mud-skippers, *Periophthalmus* spp. amphibious fish, specialized group of gobies; mangroves of the Old World; in Asia mudskippers are often a source of food:



<http://members.ozemail.com.au/~thebobo/mud.htm>

Floating bubble nest

Catfish – *Hoplosternum littorale*

Most preferred fish in Suriname

In danger of extinction

Nest- guarding fish

Bubble nest- provides oxygen-rich environment for eggs development

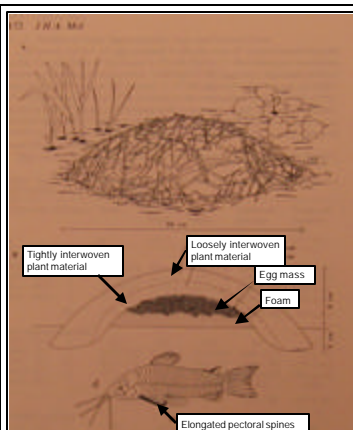
Water depth – 25 cm; December – July

Nest building – late evening/night; oviposition next day (nest shaking); about 20,000/nest; eggs hatch in – 3 days

Males protect the nests

Rich fauna of aquatic invertebrates (~ 1000 ind./nest)

Foam – protection from contact with low oxygen water; extreme temperatures; predation



## Mammals

Rodents:

### Beaver - *Castor canadensis*

largest of North American rodents; range extends from central Alaska across Canada and N.A. to north Florida; listed endangered in Mexico;

60-400 million individuals before the arrival of Europeans; fur trade, by 1900 almost extinct, today increasing rapidly (6-12 million individuals); ex.: Kabetogama Peninsula in Minnesota increased habitat use from 71 dams in 1940 to 835 in 1986.

(Naiman & Johnston: BioSci. 38:753)  
modification of stream morphology and hydrology:

Stream=>open water =>marsh =>wet meadow  
changes in nutrient cycling (redox)



### Beaver - invasive species in Tierra del Fuego

20 pairs introduced to Argentina in 1940' by the Secretary of the Navy

~ 6 km/year; now >> 100,000

*Nothofagus* forest damage



Beaver lodge



PNTF- beaver dam



### Muskra - *Ondatra zibethicus*



-medium sized, native and widespread in North America, endangered in Mexico

- introduced to Europe early in the 20. cent.; great ecological importance

- introduced to Tierra del Fuego in 1940's from Canada, tunneling activities and dam damages

wetland herbivores that **destroy** much more than they consume

role in succession: preference for *Typha*, destruction of *Typha* marshes followed by colonization by *Phragmites*, old houses in *Phragmites* with corridors to *Typha*

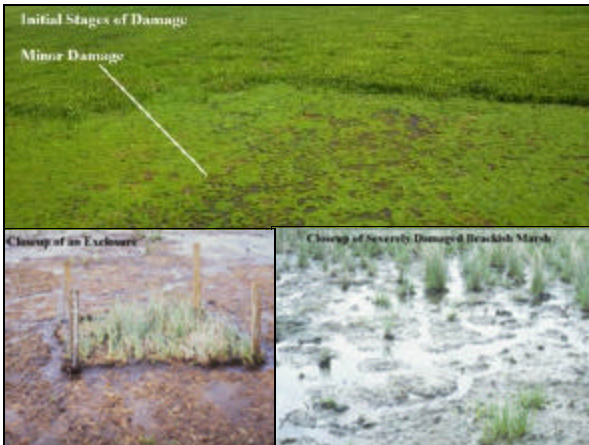
grass houses (lodges, mounds) to provide a dry nest; "eat-outs"; accelerated decomposition in mounds compost piles (fresh vegetation exposed to warm moist conditions) mounds usually last about 1 year



**Nutria - *Myocastor coypus***

- large rodent, almost equal in size to beaver
- native in South America, introduced to North America (early 1930's) and Europe (England - marshes converted to open water)
- Louisiana - 1938 20 nutrias purchased from Argentina and arrived to Avery Island; in two years nutria became well established in marshes around
- rumor spread that it will eat aquatic weeds, valuable furs did not live to the expectations
- damage to agricultural crops (sugar cane, rice), damage to levees
- 1955-59 - 20 millions nutrias in LA chewing away foundations of LA marshes, greatest damage in marshes on peat foundations cattails replaced by alligator weed, water hyacinth
- June 1957 hurricane Audrey; 1962 great freeze
- competition with muskrats: nutria at the more brackish end
- factor in establishment of vegetation on the newly created islands in the Atchafalaya Delta

**Nutria - *Myocastor coypus*; damage in Louisiana, ~ 10,000 ha**



**Capybara , carpincho - *Hydrochoerus hydrochoeris***

- largest rodent: weights as much as 100 kg
- South America; riverine swamps seasonally flooded Pantanal, Amazon Basin
- hunted for meat and leather, economic benefits of commercial utilization



most of growth and reproduction occurs in the rainy season: two breeding cycles a year, average number of litter is 4

1.6 animals/ha - steady state with respect to vegetation: 3 animals/ha - destruction

most effective herbivorous mammals in SA wetlands



***Phoberomys* – the largest extinct rodent**

skeleton found in the Miocene deposits in Venezuela

Mice – 30g; rats – 300g; capybara – 50,000g; *Phoberomys* – 700,000g !!

Lived in wetlands; grazed on aquatic vegetation: WHY EXTINCT??



**Moose , European elk - *Alces alces*: northern temperate region peatlands aquatic vegetation during the summer (particularly fond of water lilies and *Menyanthes*), higher ground in winter**

**Reindeer** – *Rangifer tarandus* ssp. *playrhyinchus* – Svalbard reindeer; beg. 20. century almost extinct, now ~ 10,000



Hippopotamus - *Hippopotamus amphibius*

- tropical regions, "trail braker" , not much grazing because of low protein content and high fiber content of papyrus swamp vegetation
- input of nutrients to water as feces

Similar role: Water buffalo; Elephants; India feed on cattails

Tapir - *Tapirus terrestris* (South America), *T. bairdii* (C.Am.)

- large mammal; 150-300 kg diet consists of buds, fruits and leaves
- trails between resting sites and foraging places
- rivers, swamps, lagoons, humid forests endangered

Manatee, Sea cow - *Trichechus inunguis* - Amazon manatee;

*T. manatus* - West Indies Manatee,

Florida, once abundant along the Gulf and Caribbean coast, now only small populations in coastal lagoons and somewhat inland in the rivers; about 5,000 estimated in Mexico - endangered

*T. senegalensis* - African manatee

distantly related to elephants

-consumes about 45 kg plant material/day *Eichhornia*, aquatic grasses

Otter - *Lutra canadensis* - Nearctic River Otter;

Historically this otter would range from arctic Alaska to the southern United States of Florida and Texas, inhabiting lakes, streams, coastal saltmarshes and even rocky sea coasts in some areas. Today, their range and number are reduced because of environmental pressures particularly hunting and trapping for fur

*L. longicaudis* - South River Otter - on the verge of extinction; loss of nesting riparian habitats

*L. lutra* - European Otter, carnivore, rivers, lagoons, coastal marshes

