## Fish Reproduction - Anything Goes! Chap 20

- Male vs. female reproductive effort:
- Female gametes costly - female reproductive success limited by \# gametes she produces
- Male reproductive success - limited by number of available mates
- When is it better to be male or female?
- What type of males are likely to be monogamous?
- When are males likely to give parental care?
- Why do female fishes give less parental care?




## Gender Roles in Fishes

- 1) Most Fish = Gonorchoristic (sex fixed at maturation) - elasmobranchs, lungfish, sturgeons, clupeiforms, cyprinids, salmonids



## Mating Systems

- Promiscuous - herring, damselfish, wrasses, surgeonfish, sticklebacks - no mate choice



## Mating Systems

- Polygamous - 3 types
- A) Polygyny - sculpins, sunfish, darters, cichlids, anglefish, damselfish, wrasses, etc.
- 1) males defend territories/nests damselfishes, some cichlids
- 2) males have harem of females- bluehead wrasse
- 3) leks- display areas Cyrtocara eucinostomus



## Mating Systems



- Polygamous - 3 types
- B) Polyandry - anemone fish (sometimes)
- C) Monogamy - bullheads, pipefish, jawfishes, damselfishes, butterflyfishes, blennies, etc.


## Gender Roles in Fishes



- 2) Hermaphroditic
- Simultaneous - Rivulus, Serranus, hamlets


## Gender Roles in Fishes



- 2) Hermaphroditic
- Sequential
- Protandrous - male-female - anemonefish, Lates, moray eels
- Protogynous - female-male - Anthias, wrasses


## Gender Roles in Fishes

Why Sequential hermaphrodites:
Protandrous- size advantage hypothesis indeterminate growth, greater fecundity with size therefore females should be larger

- Example = anemonefish- small males which are psycho-physiologically castrated
Protogynous - more common, competition gives a size advantage: expect large territorial males


## CASE STUDY: Caribbean bluehead wrasse Thalassoma bifasciatum

- Initial phase coloration mostly yellow female
- Terminal males = distinct coloration, territorial, get 40-100 spawns/day
- Sneaker males rush females in group aggregations typically get 1-2 dilute matings/day;
- Small vs large reefs



## Gender Roles in Fishes

- 3) ParthenogenicMexican livebearers, Poeciliopis spp. need sperm to activate fertilization, some sperm incorporated, others the male genes are lost in the
 next generation


## Gender Roles in Fishes

- 3) Parthenogenic - Mexican livebearers, Poeciliopis spp.- P. monacha and lucida
- Gynogenesis = Triplod female (MLL) - sperm from L activates - offspring $=$ MLL
- Hybridogenesis - Diploid ML produes only haploid M eggs (with maternal only) BUT sperm from L produces ML offspring


## Secondary Sexual Characteristics

- Monomorphic
- Sexually Dimorphic
- Permanent
- Seasonal
- Polymorphic


## SPAWNING Site

- Water column- often in large groups, many eggs released
- Substrate- males territorial
- Sperm released immediately-paternity assured
- Lots of sites for nests: hard substrate, algae, shells, grunion, spraying characin


## Parental Care

- Parental care in 90 of 420 bony fish families includes: making a nest, burying eggs, chasing predators, oxygenating, cleaning, carrying eggs inc. live birth and oral brooding, trophic provisioning (some catfishes and cichlids)
- Males are often primary caregivers
- No paternal care when internal fertilization
- How does external fertilization promote paternal care? Paternity assurance, males can get multiple mates, females prefer males with eggs, caring is costly-less foraging, predatory attacks, fewer eggs

- CASE STUDY- male reproductive strategy in bluegill sunfish Lepomis macrochirus
- Large old males make nests, guard eggs
- Sneaker males - small dart though nest depositing sperm, become satellite males which are female mimics;


## Alternative Tactics

- CASE STUDY- similar pattern in Coho salmon Oncorhynchus kisutch with conservation consequences


