

Reproduction in fishes



Alternative reproductive strategies

Alternative male strategies

- jacks (salmon and trout)
- sneakers (“SF”s) in bluegills, wrasses, sunfishes
evolutionarily stable strategy - if small, become SF,
avoid stress of being parental male

Alternative reproductive strategies

Alternative male strategies

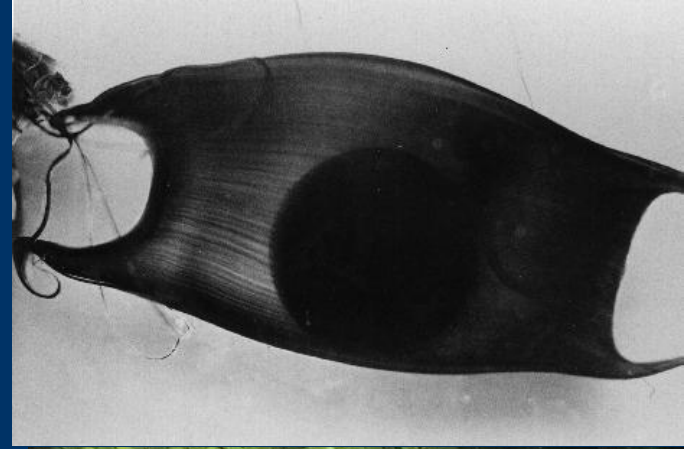
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evolutionarily stable strategy - if small, become SF,
avoid stress of being parental male
- satellite males (mimic females) in bluegills, hover near nest

DEVELOPMENT

Developmental stages

egg <math><0.5\text{ mm}</math> - 10 cm
variable shape, attachments
variable buoyancy
water hardening

skate
(5 cm)



lake trout
(5 mm)



yellow perch egg mass



round goby
(0.5 mm)



Developmental stages

egg

embryo - dependent on mother or yolk sac for food (free embryo)



Susan Middleton & David Liittschwager



Credit: Fly Anglers online

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Developmental stages

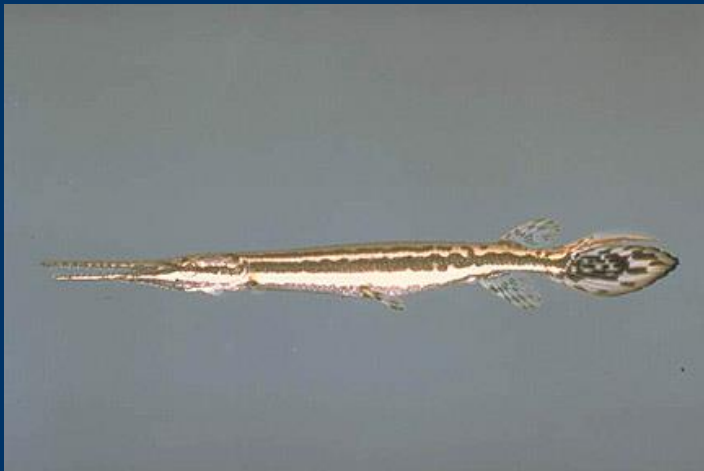
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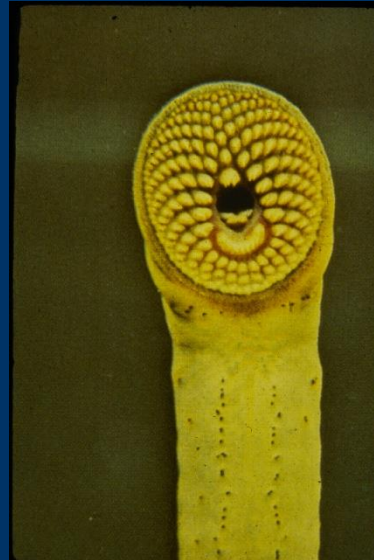
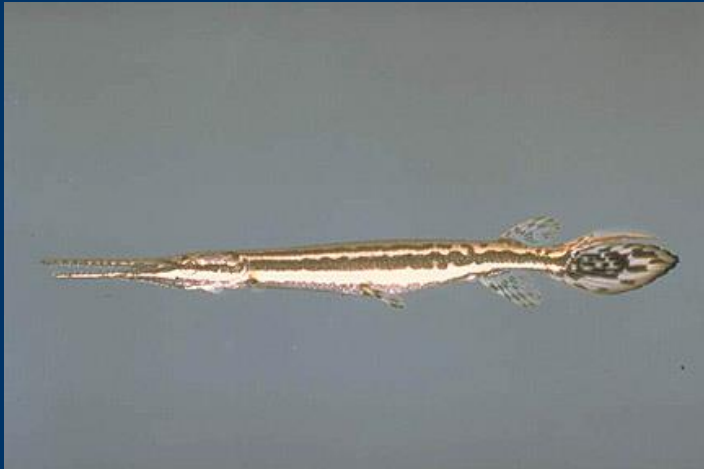
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Credit: USFWS, GLFC

indirect development (perch)

- larval stages go through trophic phases different from adults

intermediate (salmonids)

- embryonic stage with yolk; virtually no larval stage

direct development (gobies)

- juvenile is fully functional miniature of adults
(no larval stage)

Genetics

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Sex determination

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Polyploidy - more than two sets of chromosomes
critical difference between odd and even sets
- use of triploid grass carp



Genetics

Natural polyploids

- triploids - Cyprinidontiformes: Poeciliid triploids
- different solutions to the problem of triploid gametes....

Genetics

Natural polyploids

triploids - **Cyprinodontiformes**: Poeciliid triploids

tetraploids (autotetraploids vs. allotetraploids)

Acipenseriformes (sturgeons and paddlefish)

Salmonidae (all trouts - autotetraploid)

ancestral chromosome doubling event

Cypriniformes

some cyprinids

all catostomids are allotetraploid

Siluriformes

Corydoras catfishes

Perciformes

Only *Lucioperca sandra*: $2n = 24$ in Sweden

but $2n = 48$ in Finland

Genetics

Natural polyploids

triploids - Cyprinodontiformes: Poeciliid triploids

tetraploids (autotetraploids vs. allotetraploids)

hexaploids and octaploids (rare in carp)

Genetics

Natural hybrids

salmonids

centrarchids