

## AMPHIBIAN LIFE CYCLES

**ANURA (Greek) / SALIENTIA (Latin): Frogs**



Nearly worldwide except few above Arctic Circle and none in Antarctica

**URODELA / CAUDATA: Salamanders**



Mostly north temperate; Plethodontidae to Amazon Basin

**GYMNOPHONA / APODA: Caecilians**



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## SEASONALITY

**Primary Cues:** Induce production and release of reproductive hormones and responsiveness of target organs

Temperature  
Moisture  
Day Length

Some amphibians, especially in temperate zones, have definite reproductive seasons (late winter/early spring, summer, fall), especially in temperate zones

Some amphibians, especially in aseasonal tropical environments, breed year-round, although breeding may be more intense in periods of greater or lesser precipitation or, possibly, longer day length

Most species breed once a year, but some breed only every other year

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## MATE ATTRACTION and RECOGNITION

**ANURA**

Females attracted to species-specific call of males

Primary recognition by females associated with call of male; primary recognition by males associated with female behavior



**URODELA**

Recognition based on olfactory cues and courtship rituals



**GYMNOPHONA**

Unknown

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FERTILIZATION

EXTERNAL

1. Most frogs: Amplexus - Inguinal (waist: ancestral), Axillary (behind front legs), cephalic; others (e.g., no amplexus)
2. A few salamanders (Cryptobranchidae, Hynobiidae)

INTERNAL

1. A few frogs (*Eleutherodactylus jasperi* and *E. coqui* [Leptodactylidae] in Puerto Rico; *Mertensophryne micranotis* [Bufonidae] in Africa; some *Nectophrynoides* [Bufonidae] in Africa)
2. Most salamanders - Spermatophores
3. Caecilians - phalodeum (modified cloaca)




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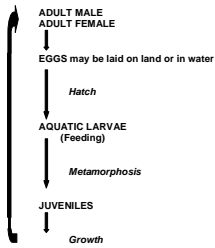
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A

"TYPICAL" LIFE CYCLE - occurs in Anura, Urodela, Gymnophiona




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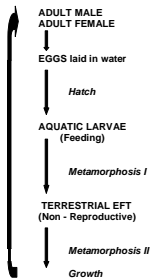
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B

*Notophthalmus viridescens* (Salamandridae) LIFE CYCLE  
High - Elevation Populations




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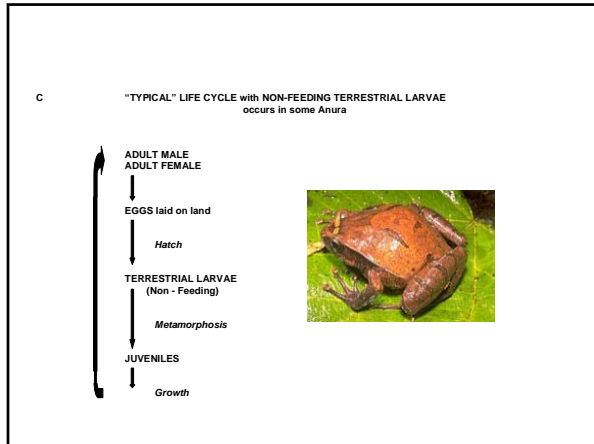
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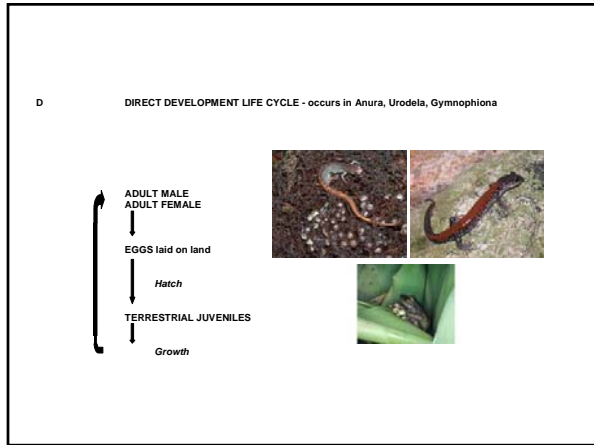
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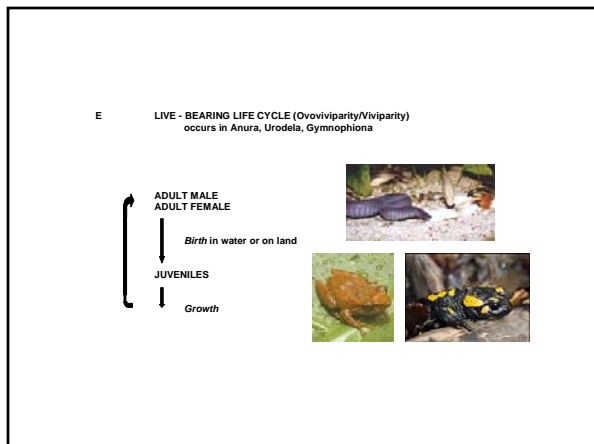
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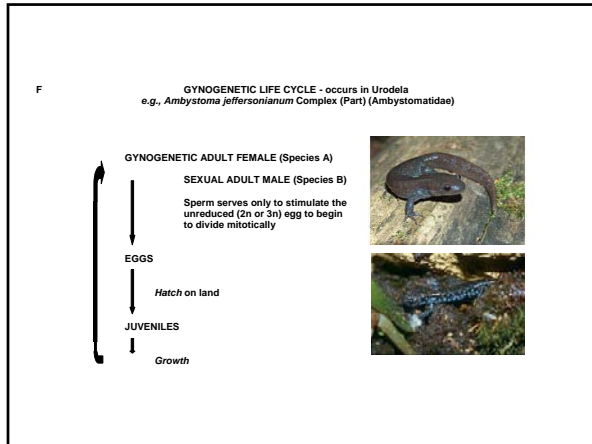
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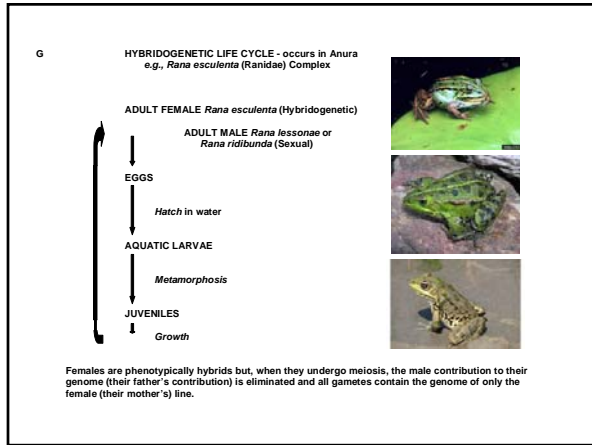
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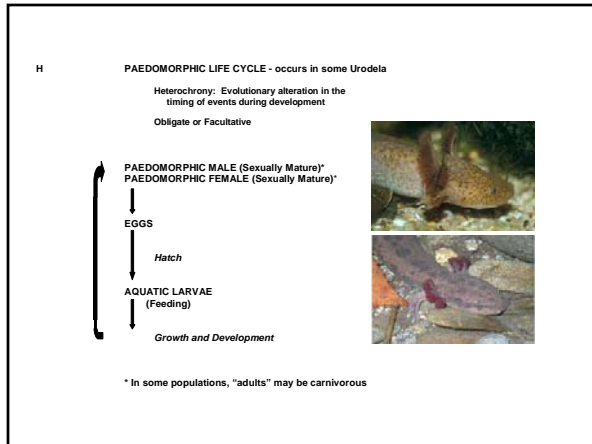
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PARENTAL CARE

Parental care occurs in Anura, Urodela, and Gymnophiona and there are a wide variety of types. Among these are:

- A. Construction of nests (e.g., *Physalemus* ["Leptodactylidae"], *Hyla boans* [Hylidae], many salamanders, some caecilians)
- B. Guarding of eggs, or eggs and larvae, by the male or female parent (e.g., some hylid frogs, *Pyxicephalus adspersa* [Ranidae], many salamanders, some caecilians)
- C. Carrying of the eggs on or in the body of a parent (e.g., *Alytes* [Discoglossidae], *Pipa pipa* [Pipidae], *Gastrotheca* [Hylidae], live-bearing caecilians)
- D. Carrying of the tadpoles on or in the body of a parent (e.g., *Dendrobates* [Dendrobatidae], *Rhinoderma* [Rhinerodermatidae], *Rheobatrachus* [Myobatrachidae])
- E. Carrying of the eggs, tadpoles and, in a few species, newly metamorphosed young on the body of a parent (e.g., *Hemiphractus* [Hylidae])




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