Sex I . . . How?

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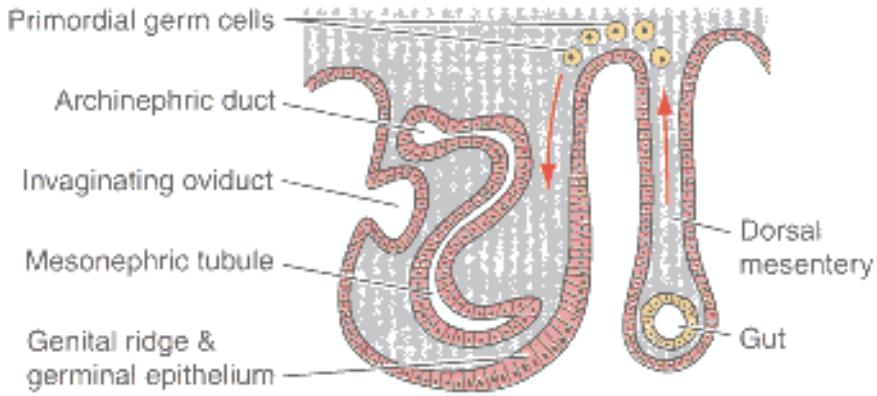
Summary

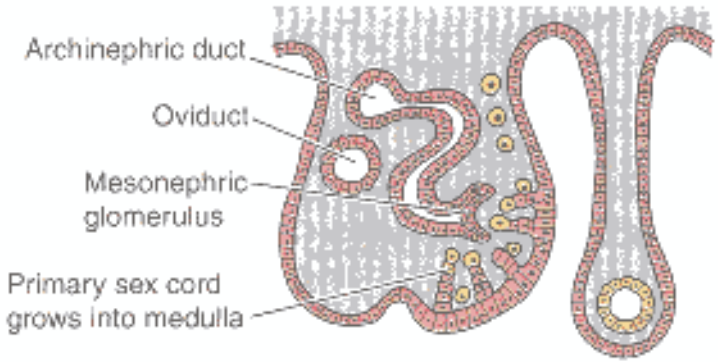
1. Development
2. Mature gonads
3. Reproductive patterns
4. The amniotic “egg”
5. Sex determination

1.- Development-indifferent stage

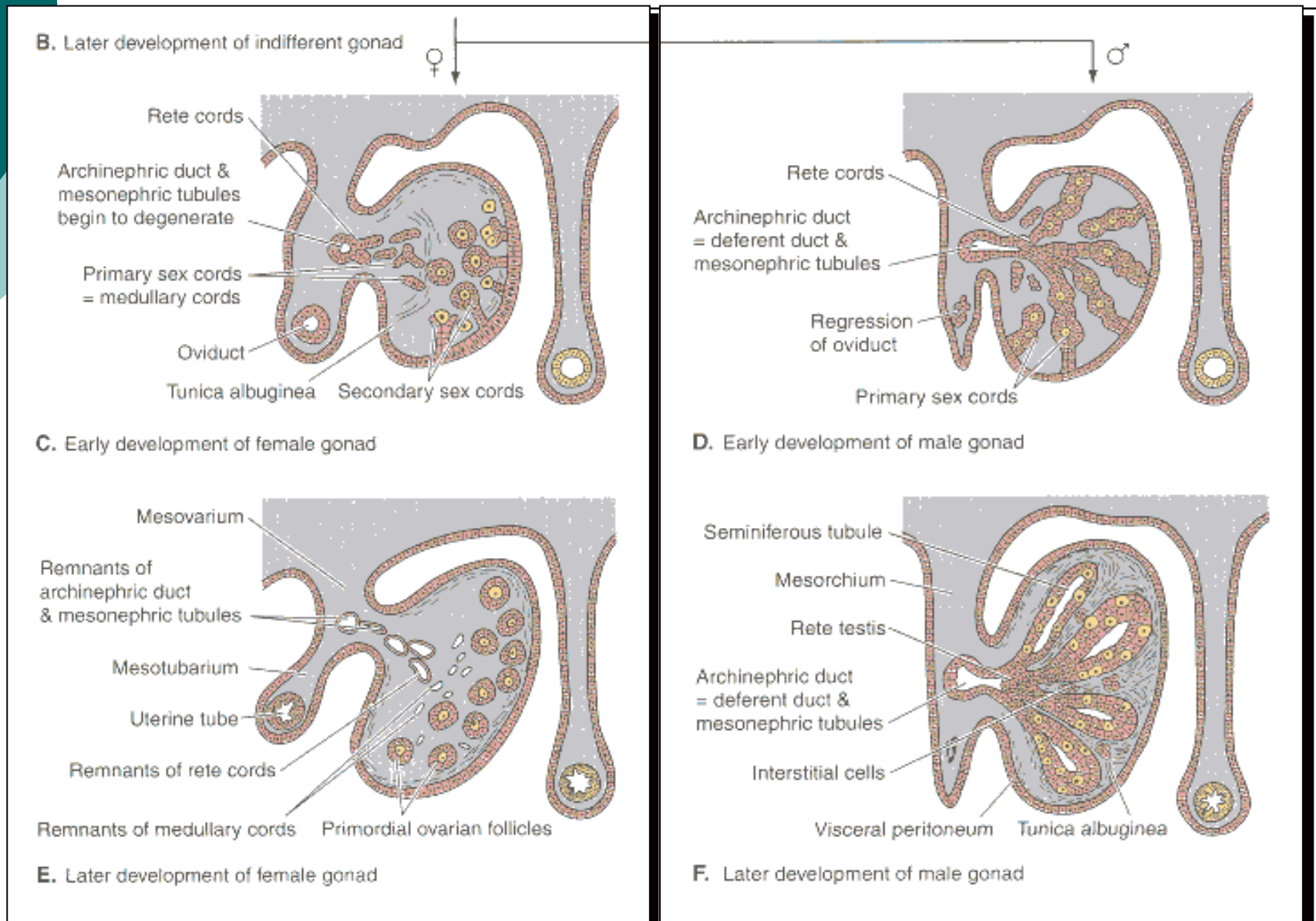
- Coelomic genital ridges → gonads, fat bodies and mesenteries (mesorchia and mesovaria).
- Primordial germs cells migrate from the gut
- Ancestral gonads probably long
- Oviduct present



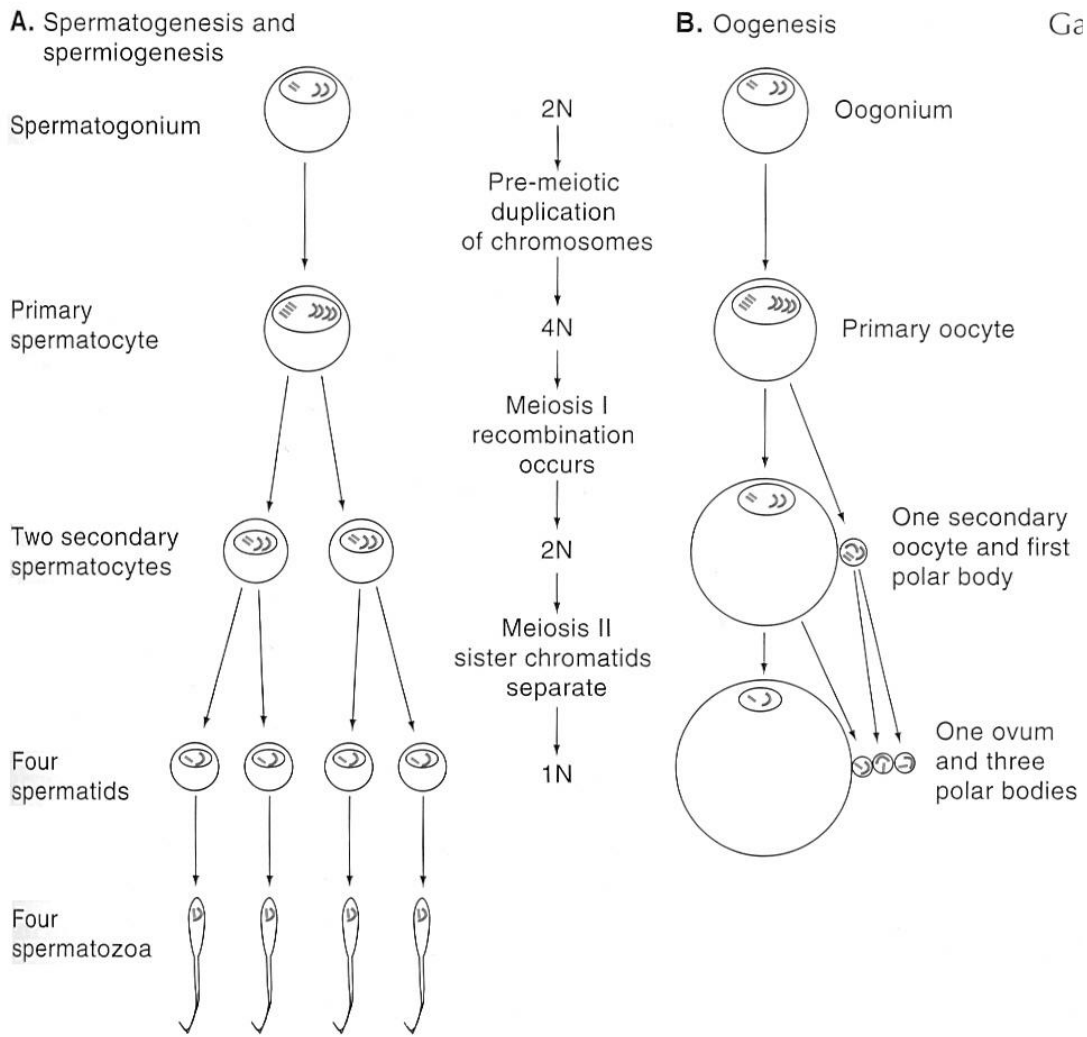
A. Early development of indifferent gonad



1.- Development-male and female



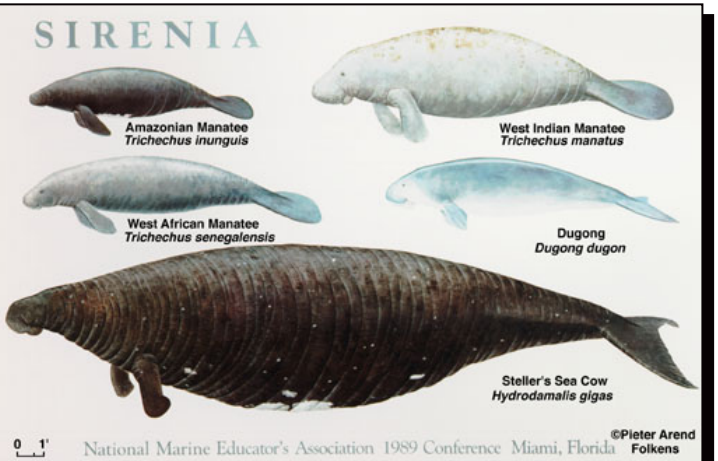
2.- Gametogenesis

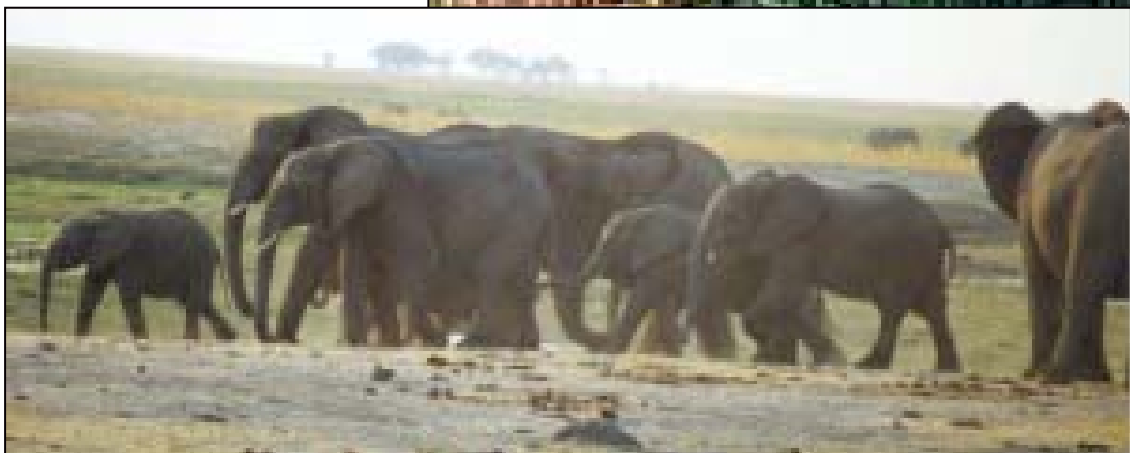


2.- Testes

Anteaters

Sirenia





2.- Testes

Testicles can also descend into the scrotum sometimes only during the reproductive period.

Some carnivores

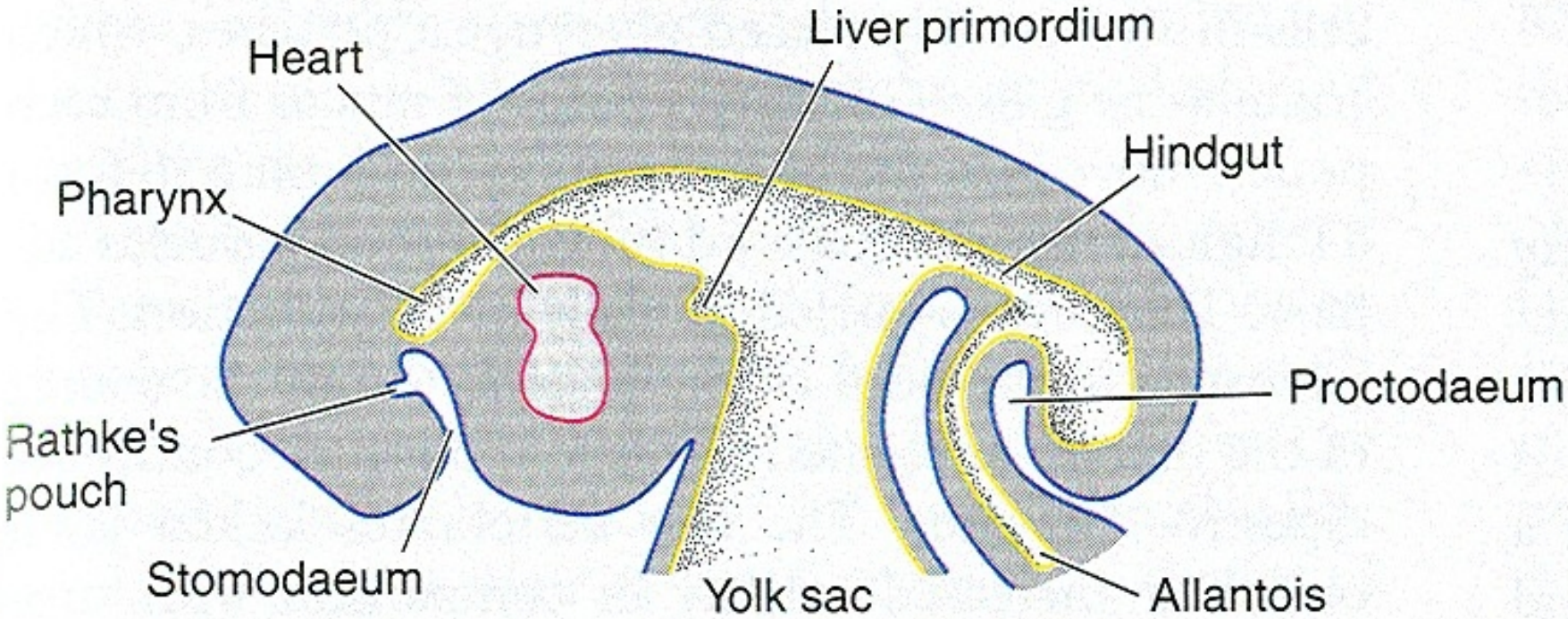
Bats

Many rodents

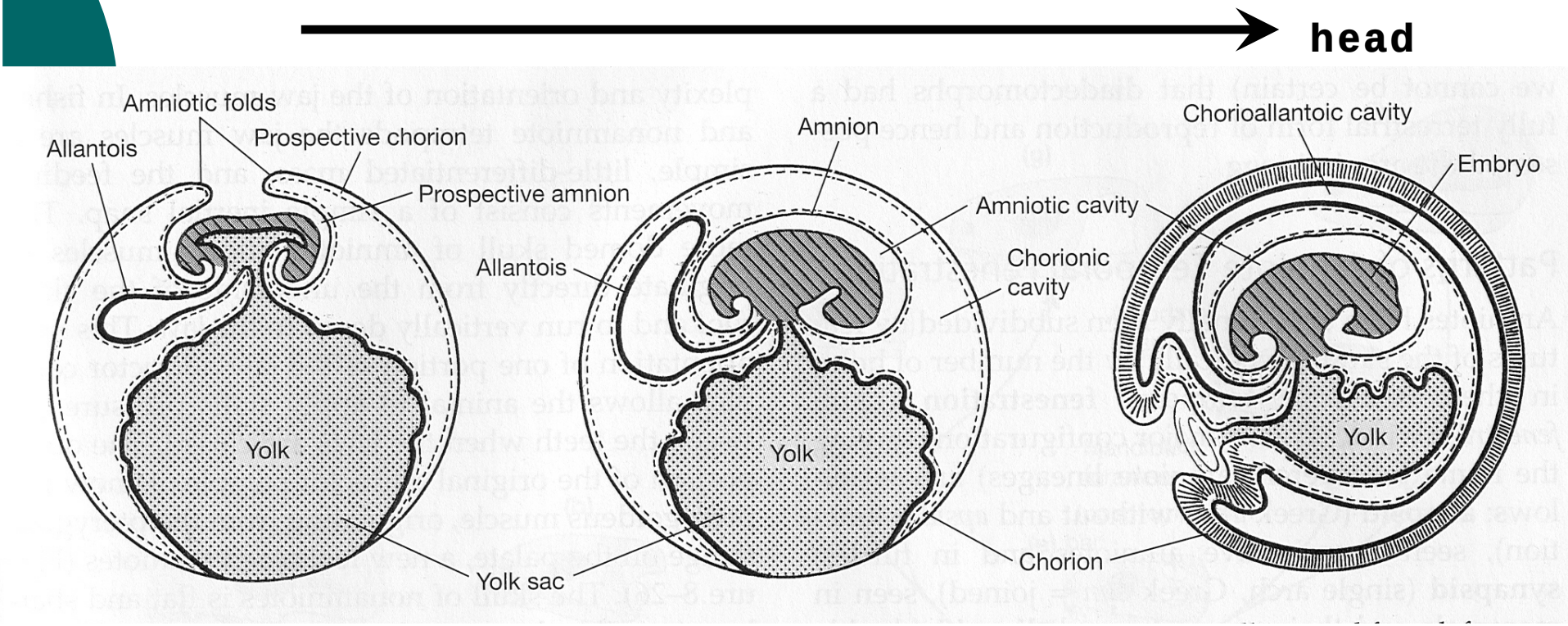
3.- Reproductive patterns

- External or internal fertilization
- Oviparous: egg layers (most fishes, amphibians, reptiles and all birds)
  - macrolecithal and mesolecithal eggs (sufficient yolk for development of embryos)
- Ovoviviparous: internal fertilization, internal development but embryo does not receive resources from the mother (lecithotrophy)
- Viviparous: chodrichthyans, some teleosts, ichthyosaurs, caecilians, some squamates, and mammals (matrotrophy)

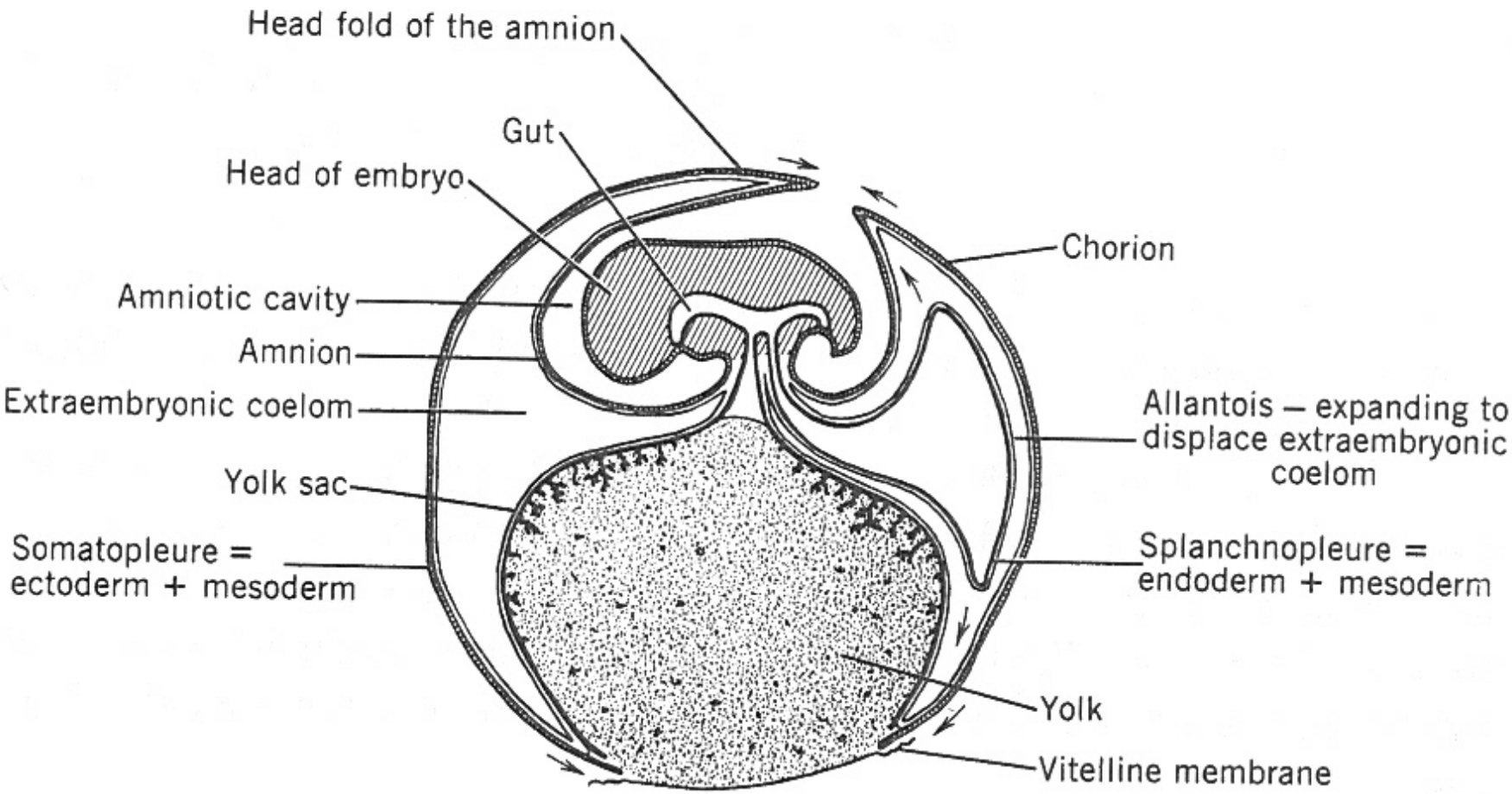
4.- The amniotic (cleidoic) “egg”



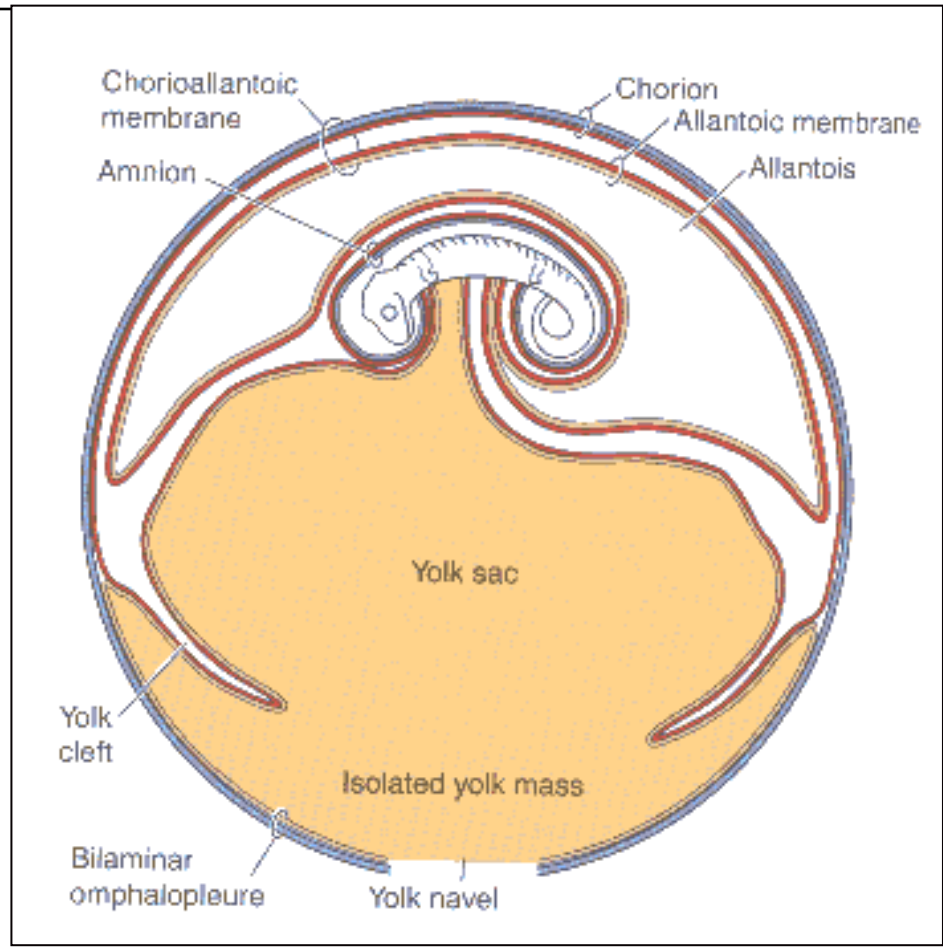
A. Early stage in development of digestive tract

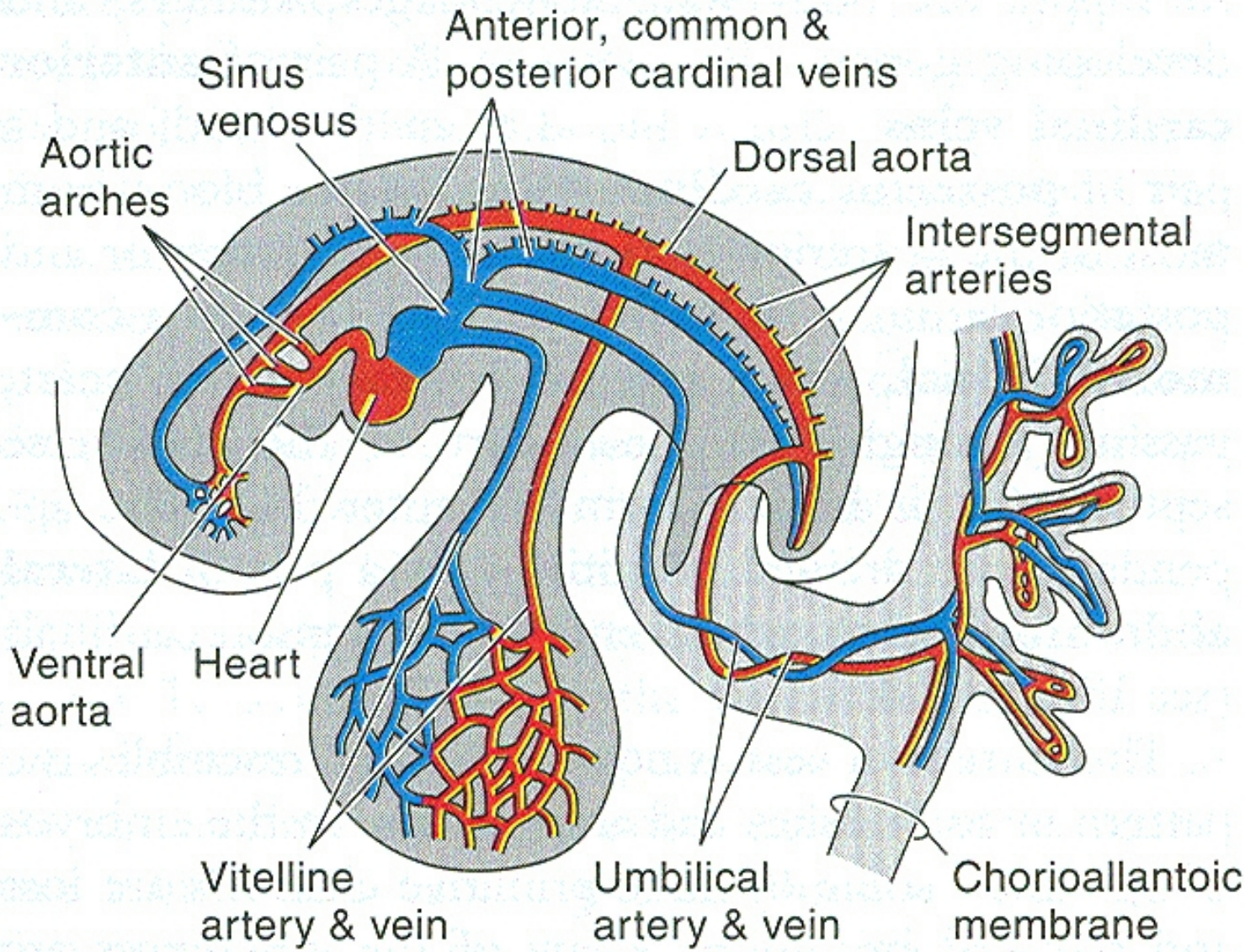

head
Amniotic folds
Allantois
Prospective chorion
Prospective amnion
Yolk
Yolk sac
Amnion
Allantois
Amniotic cavity
Chorionic cavity
Yolk
Chorion
Chorioallantoic cavity
Embryo
Yolk

4.- The amniotic “egg”



- **<u>Yolk sac</u> : endoderm, formed around the yolk mass (telolecithal egg). Aids in the digestion of yolk.**

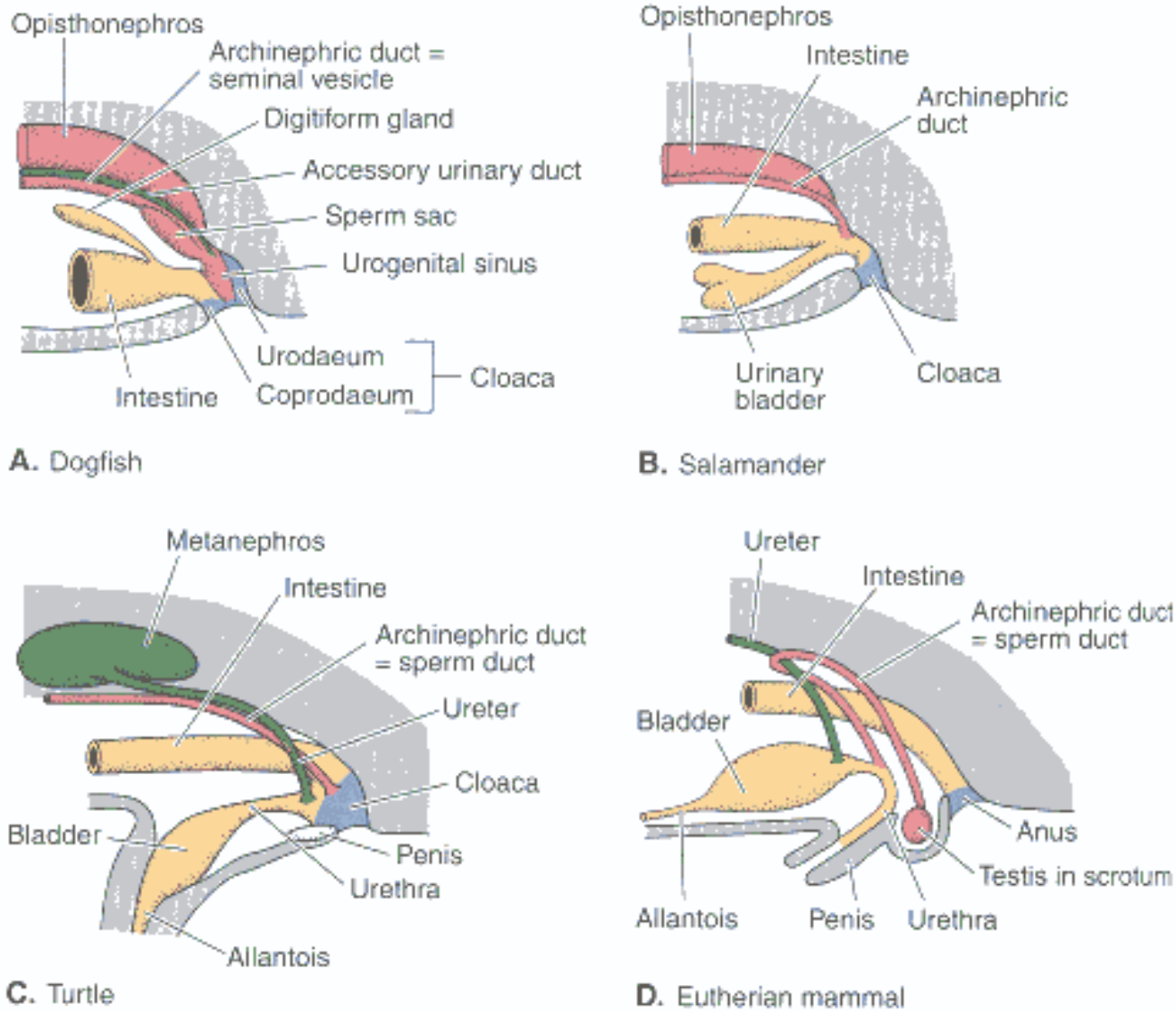


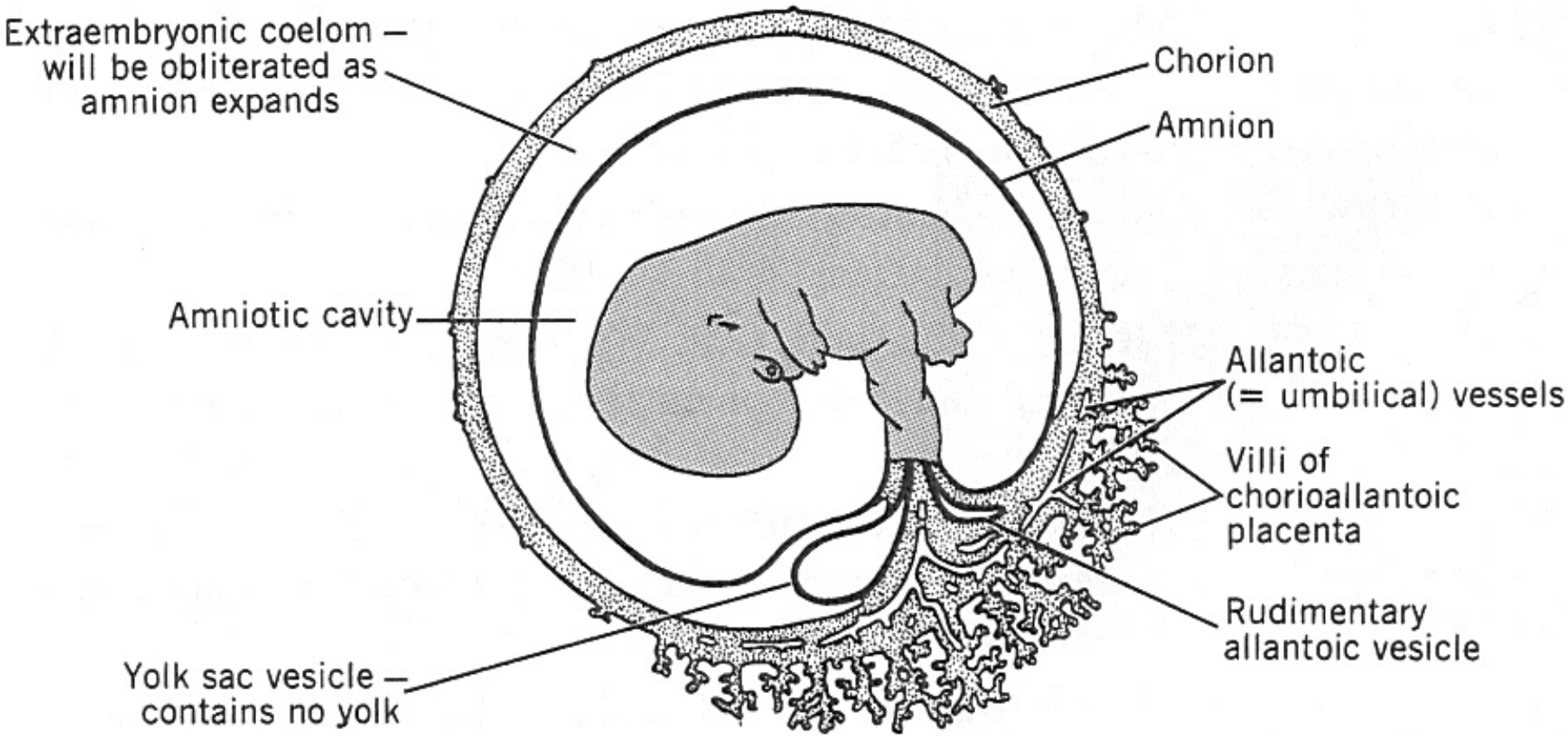


D. Early circulation of a human embryo

Allantois →Bladder

Fig. 20-8




Extraembryonic coelom – will be obliterated as amnion expands
Chorion
Amnion
Amniotic cavity
Allantoic (= umbilical) vessels
Villi of chorioallantoic placenta
Rudimentary allantoic vesicle
Yolk sac vesicle – contains no yolk

5.- Sex determination-parthenogenesis

- Teleost fish (perch, darters*, bass)
- Common in squamate lizards (6 families, including geckos), probably more…
- Many parthenogenic lizards have resulted from hybridization of sexual species
- Species concept?

5.- Sex determination-genotypic

- Genotypic sex determination
  - Mammals:
    - males are heterogametic (XY)
    - females are homogametic (XX)
  - Birds:
    - females are heterogametic (WZ)
    - males are homogametic (ZZ)
  - Reptiles: the heterogametic sex can be either female or male

5.- Sex determination - Temperature

- Some fishes, turtles and some lizards and crocodiles:
  - Sex determination is temperature dependant
    - turtle eggs incubated at 30ºC = females
    - turtle eggs incubated at 20ºC = males
- Different thresholds throughout the range

5.- Sex determination - pH

- Fish: *Pelvicachromis pulcher*
  - pH 5.0: 96% male
  - pH 6.9: 80% female

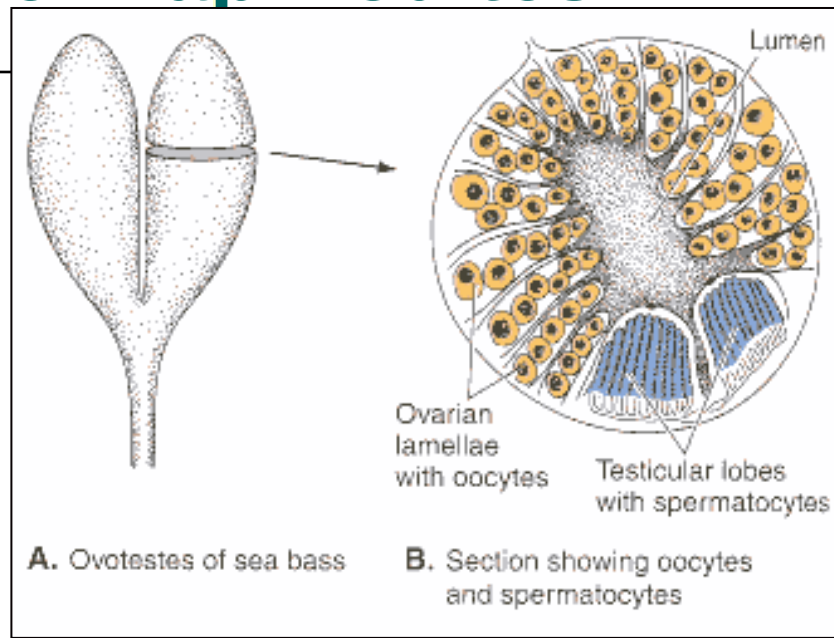
Pelvicachromis pulcher
(kribensis)

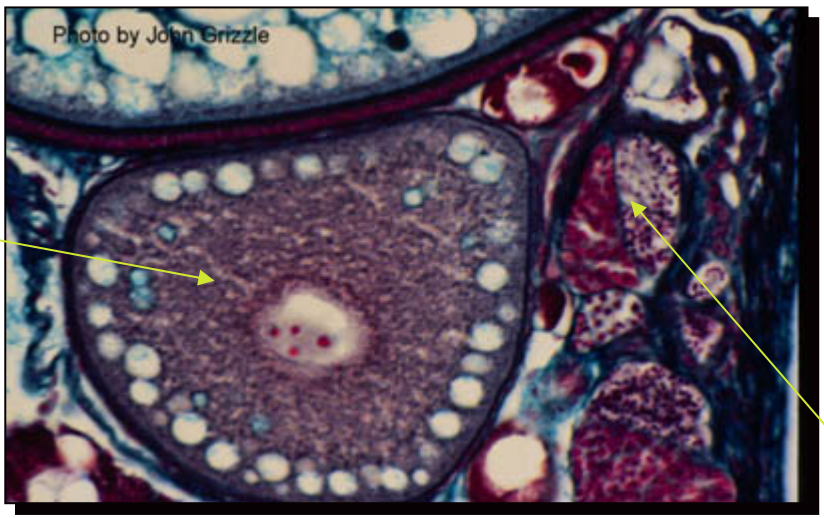
http://www.thekrib.com/

5.- Sex determination-hermaphrodites

Fig 21-1

- Common in non-anmiotes, usually absent in anmiotes.
- Usually sequential, but sometimes synchronous.





Mature ovum

spermatocytes

Rivulus marmoratus

http://www.bsi.vt.edu/rivmar/#figure

5.- Sex determination-hermaphrodites

Clownfish: protandrous

Parrotfish: protogynous