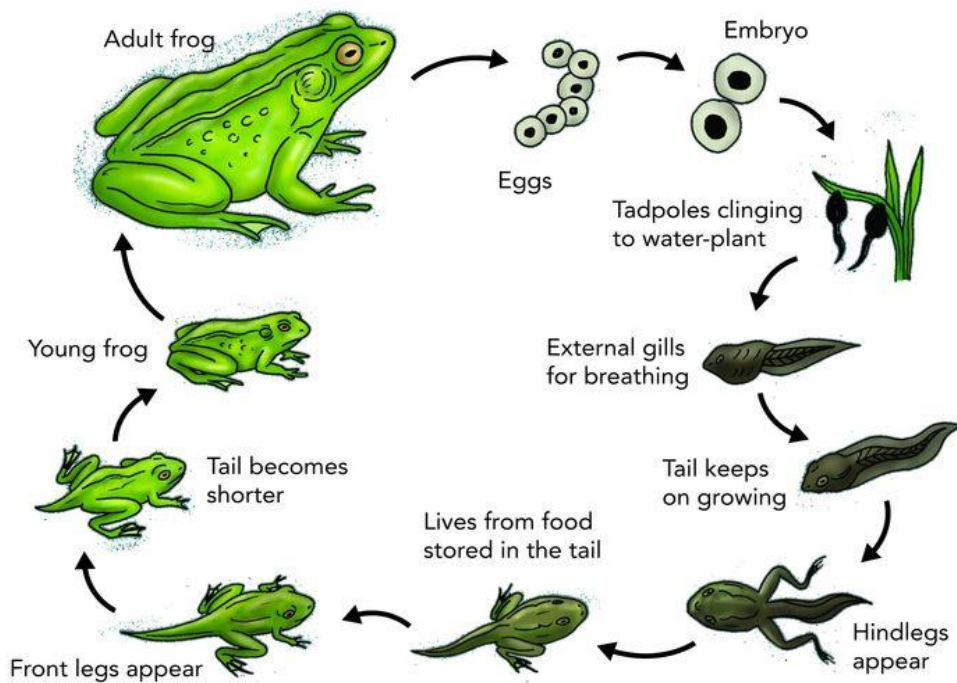
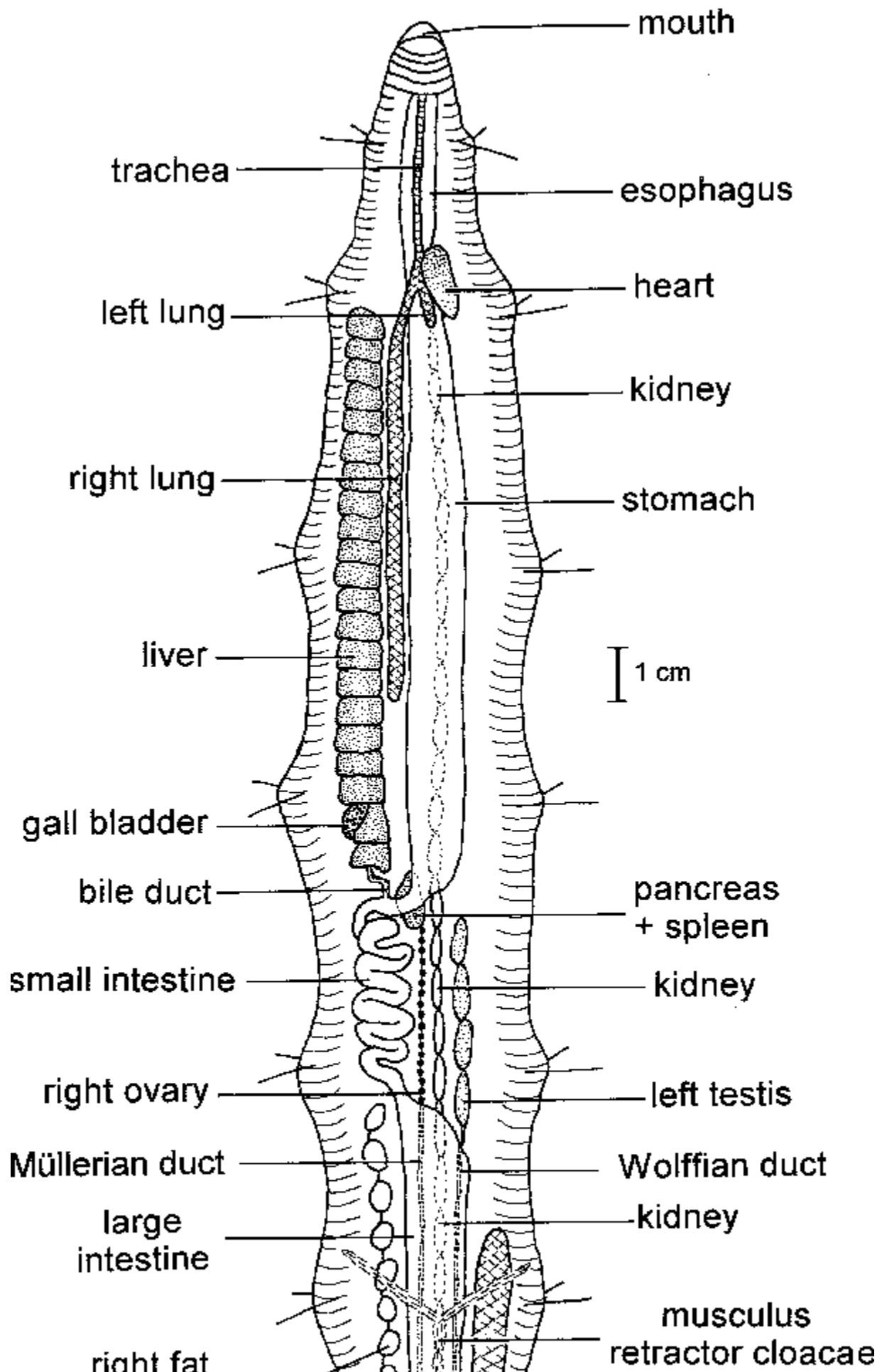


## Class Amphibia

### Amphibia - Origin and Evolution

#### 1. Introduction to Amphibia





**Amphibia** are the first vertebrates that successfully invaded land. They form a connecting link between fishes and reptiles.

### **General Characteristics**

- Cold-blooded (ectothermic) vertebrates
- Skin moist, glandular, without scales
- Respiration by gills (larva), lungs & skin (adult)
- Heart three-chambered (2 auricles, 1 ventricle)
- Eggs laid in water, external fertilization (mostly)
- Development indirect with metamorphosis

## **2. Geological Origin of Amphibians**

### **Period of Origin:**

- **Late Devonian Period** (~370 million years ago)
- Known as the “**Age of Fishes**”

Amphibians evolved from **lobe-finned fishes (Sarcopterygii)**.

## **3. Ancestry of Amphibians**

### **(A) Crossopterygian Fishes (Rhipidistians)**

The most accepted theory states that amphibians evolved from crossopterygian fishes such as:

- **Eusthenopteron**
- **Ichthyostega**

### **Similarities between Crossopterygians and Amphibians:**

- Presence of internal nostrils (choanae)
- Lobe fins with bones similar to tetrapod limbs
- Lungs or lung-like air bladders
- Similar skull and teeth structure

## 4. Transitional Forms

### 1. Ichthyostega

- Fish-like tail with fin rays
- Well-developed limbs
- Both gills and lungs present

### 2. Acanthostega

- Eight digits on limbs
- Mostly aquatic

These fossils show the transition from water to land life.

## 5. Evolutionary Adaptations for Terrestrial Life

Feature	Evolutionary Change
Limbs	Fins modified into pentadactyl limbs
Respiration	Development of lungs
Circulation	Three-chambered heart
Sense organs	Development of eyelids & tympanum
Skin	Moist skin for cutaneous respiration

## 6. Primitive Amphibians (Stegocephalians)

- Large, heavily built skull
- Labyrinthine teeth (complex folded enamel)
- Dominant during Carboniferous period

Example:

- **Eryops**

## 7. Evolutionary Trends in Amphibia

1. Gradual shift from aquatic to semi-terrestrial life
2. Reduction in tail in some groups (frogs)
3. Development of vocal sacs (anurans)
4. Internal fertilization in advanced forms
5. Parental care in some species

## 8. Modern Orders of Amphibia

Order	Example	Characteristics
Anura	Frog	Tail absent in adult
Urodela	Salamander	Tail present
Apoda (Gymnophiona)	Caecilian	Limbless

Examples:

- **Rana tigrina**
- **Salamandra salamandra**
- **Ichthyophis**

## 9. Significance of Amphibians in Evolution

- First vertebrates to colonize land
- Link between fishes and reptiles
- Show double life (aquatic larva, terrestrial adult)
- Important in understanding vertebrate evolution.