

# EVOLUTION



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# EMBRYOLOGICAL EVIDENCE FOR EVOLUTION

# INTRODUCTION

The study of the developmental stages of an organism is called embryology

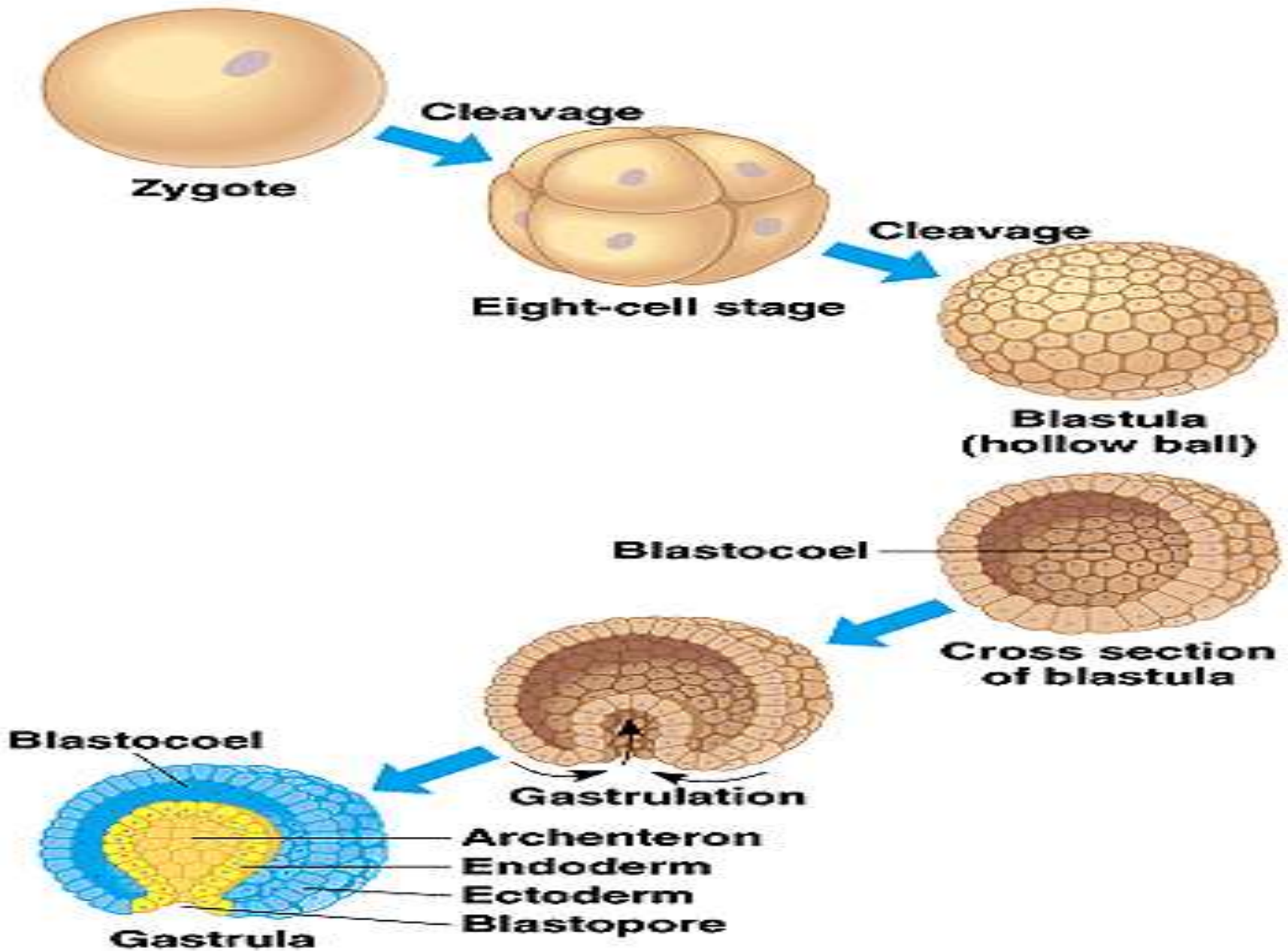
If we observe the embryos of different animals, there is a similarity.

This similarity tells us that there is a relationship between the animals.

The embryological evidences show support to organic evolution

# SEQUENCE OF DEVELOPMENTAL STAGES

- ❖ ALL MULTICELLULAR ORGANISMS BEGIN THEIR LIFE AS A SINGLE CELLED STAGE, NAMELY ZYGOTE.
- ❖ ZYGOTE-----MORULA-----BLASTULA-----GASTRULA-----ADULT
- ❖ THE SEQUENCE OF EMBRYOS SHOWS THAT EVERY MULTI CELLULAR ORGANISM PASSES THROUGH THE ABOVE STAGES REPRESENTING THEIR ANCESTORS



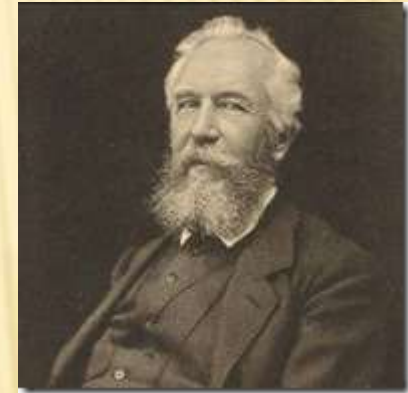
# EMBRYOLOGICAL PRINCIPLES



VON BAER PROPOSED THESE PRINCIPLES BY STUDYING THE EMBRYOLOGY OF FISH, FROG, TORTOISE, PIGEON, CHIMPANZEE AND MAN

1. GENERAL CHARACTERS APPEAR IN THE EARLY EMBRYOS
2. THE SPECIAL CHARACTER APPEAR IN THE LAST EMBRYOS
3. THE EMBRYOS OF CLOSELY RELATED INDIVIDUALS ARE ALMOST SIMILAR UP TO THE END WITH SMALL DIFFERENCES
4. THE EMBRYOS OF ONE ORGANISM RESEMBLES TO THE EMBRYOS OF ITS ANCESTORS BUT NOT WITH ADULTS

# BIOGENETIC LAW



- IT WAS PROPOSED BY EARNEST HAECKEL
- LAW STATES THAT ONTOGENY OF AN INDIVIDUAL REPEATS ITS PHYLOGENY (THE STUDY OF THE SEQUENCE OF EMBRYOS OF AN ORGANISM IS CALLED ONTOGENY. THE EVOLUTIONARY HISTORY OF AN INDIVIDUAL IS CALLED PHYLOGENY).

Fish

Salamander

Tortoise

Chick

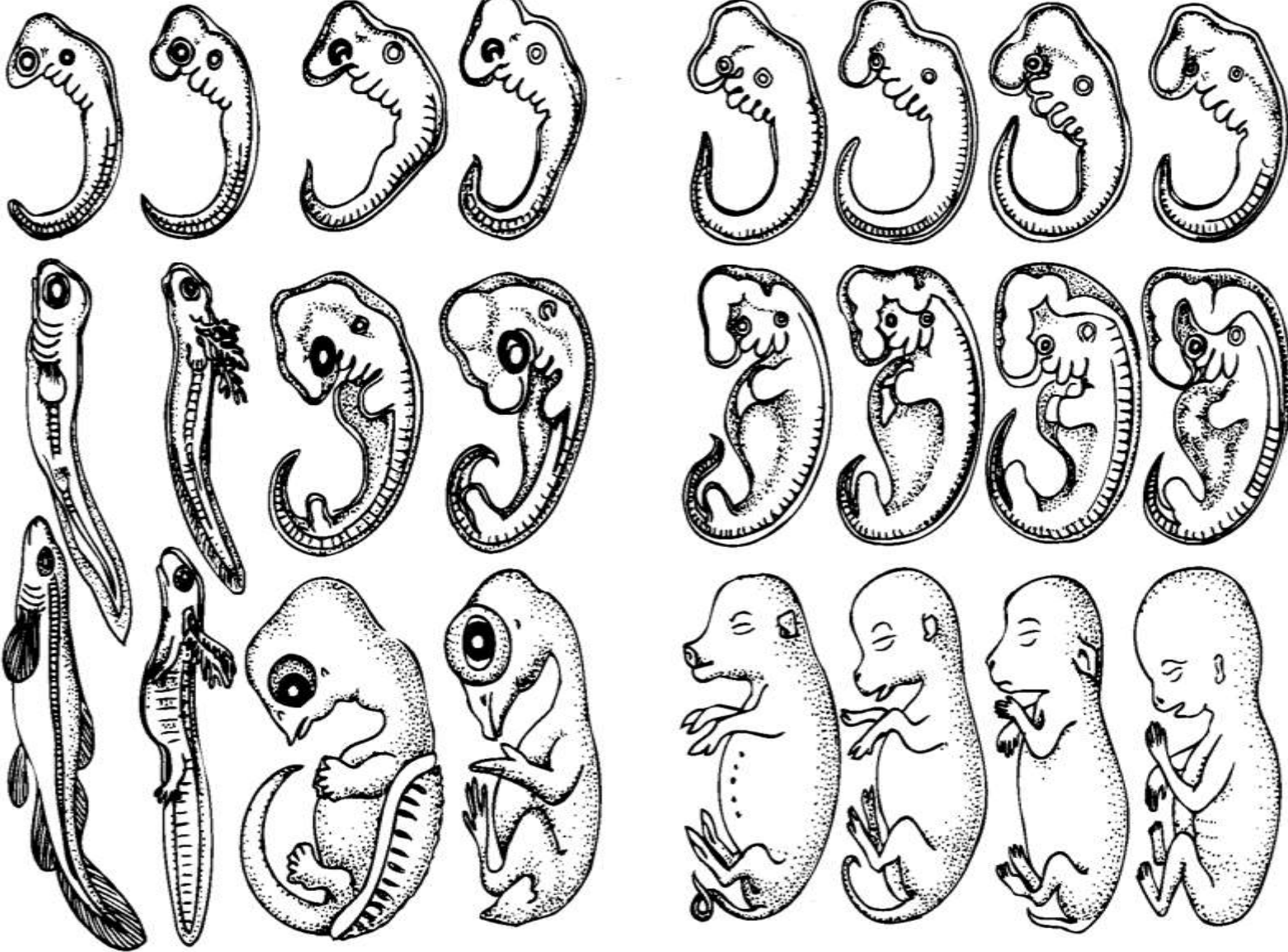
Pig

Calf

Rabbit

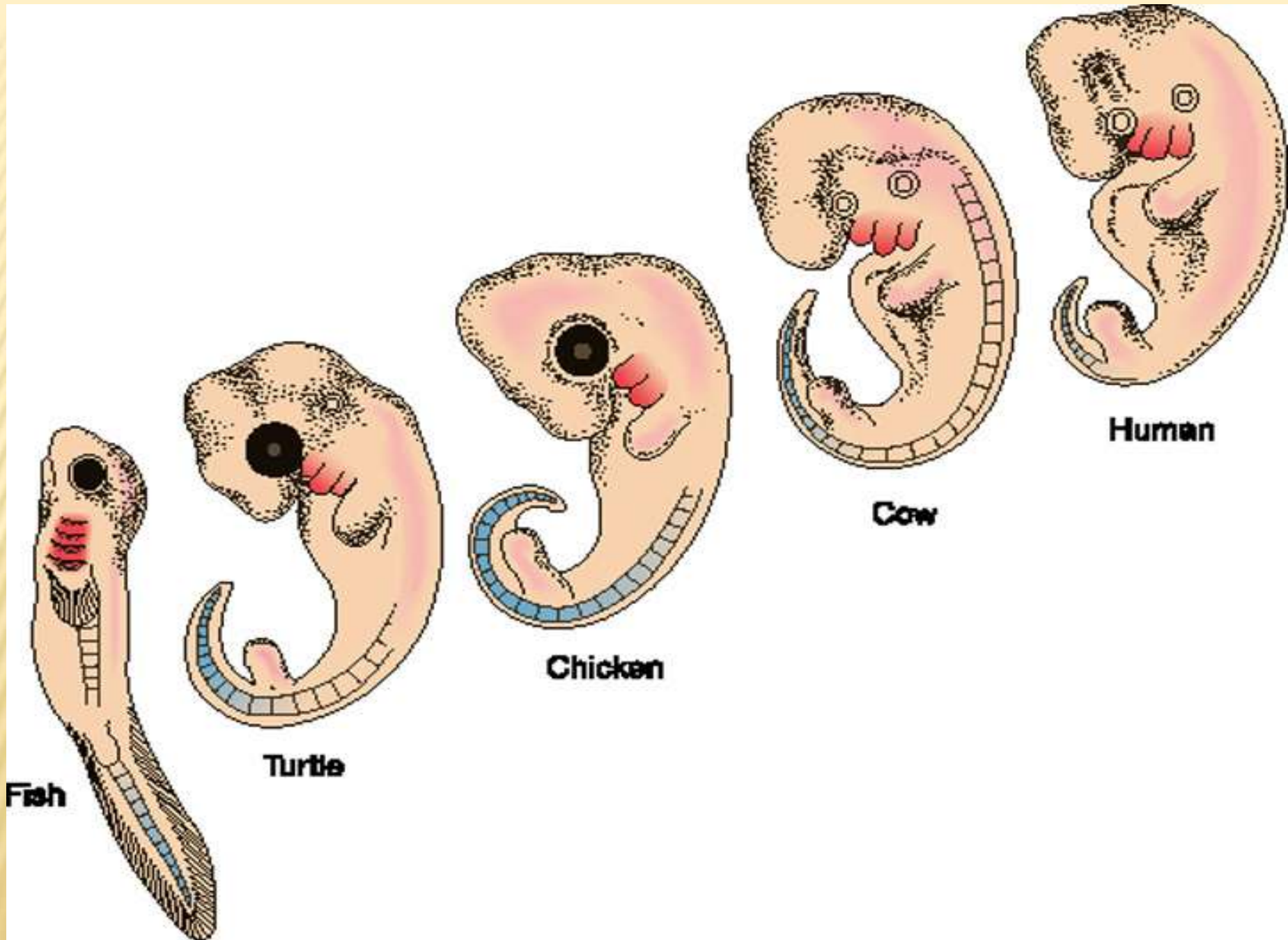
Human

Early



Late





**Fish**

**Turtle**

**Chicken**

**Cow**

**Human**

# **BOIGENETIC LAW- EXAMPLES**

- ❖ **TAD POLE LARVA OF FROG**
- ❖ **CATER PILLAR LARVA OF BUTTER FLY**
- ❖ **DEVELOPMENT OF '4' CHAMBERED HEART IN THE EMBRYOS  
OF BIRDS AND MAMMALS**
- ❖ **TEMPORARY EMBRYONIC NONFUNCTIONAL ORGANS.**

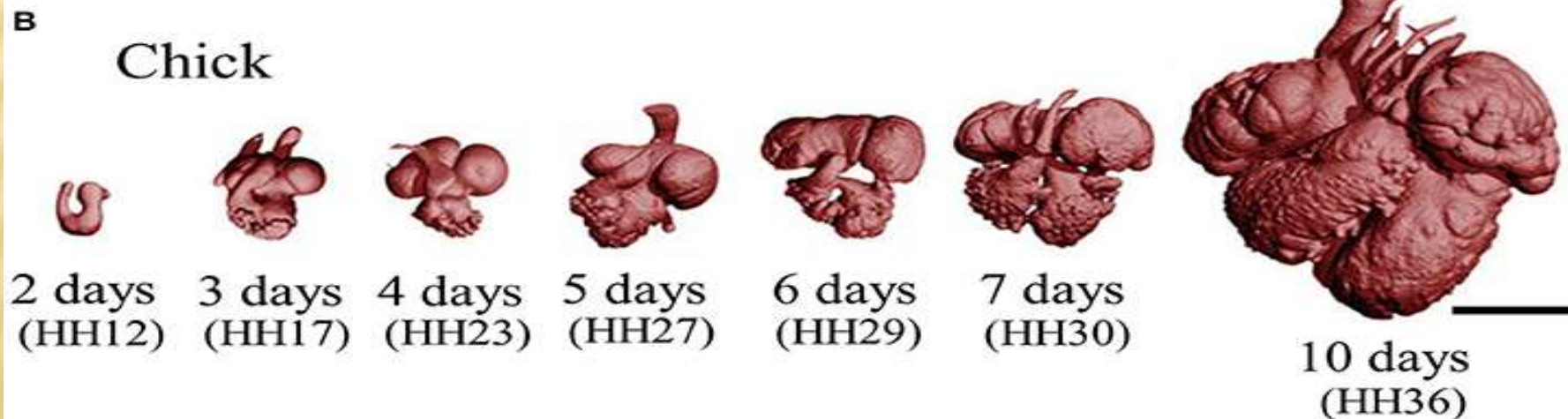
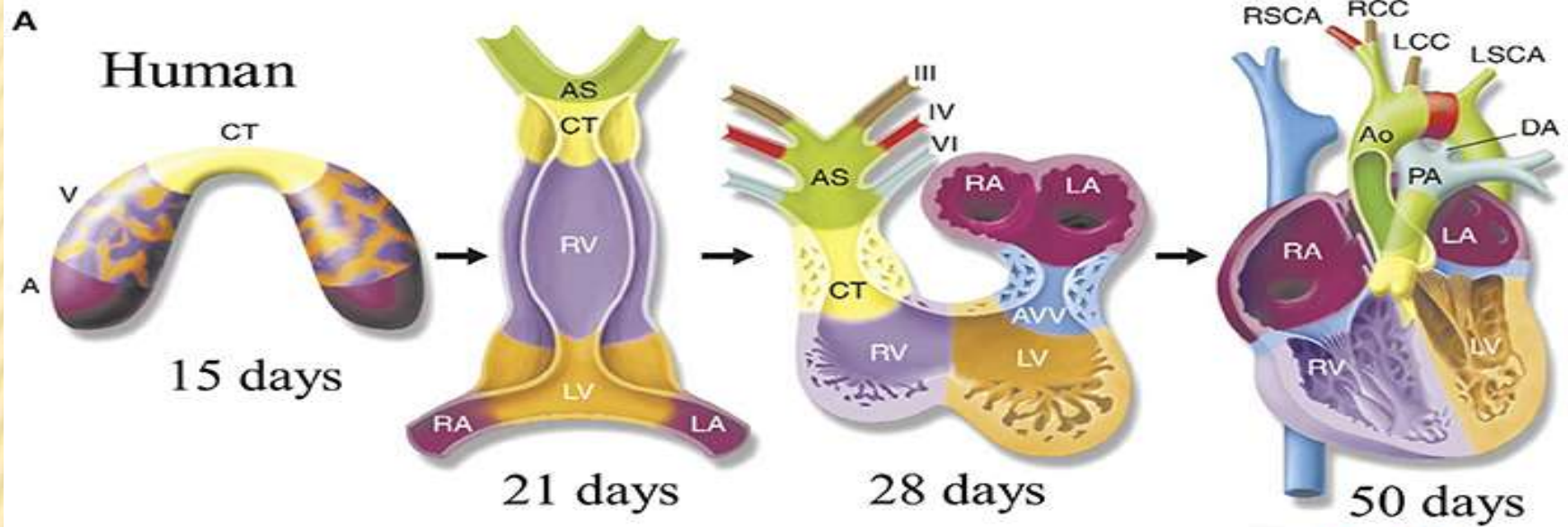
# TADPOLE LARVA OF FROG



# CATER PILLAR LARVA OF BUTTER FLY



# DEVELOPMENT OF '4' CHAMBERED HEART



# TEMPORARY EMBRYONIC NONFUNCTIONAL ORGANS

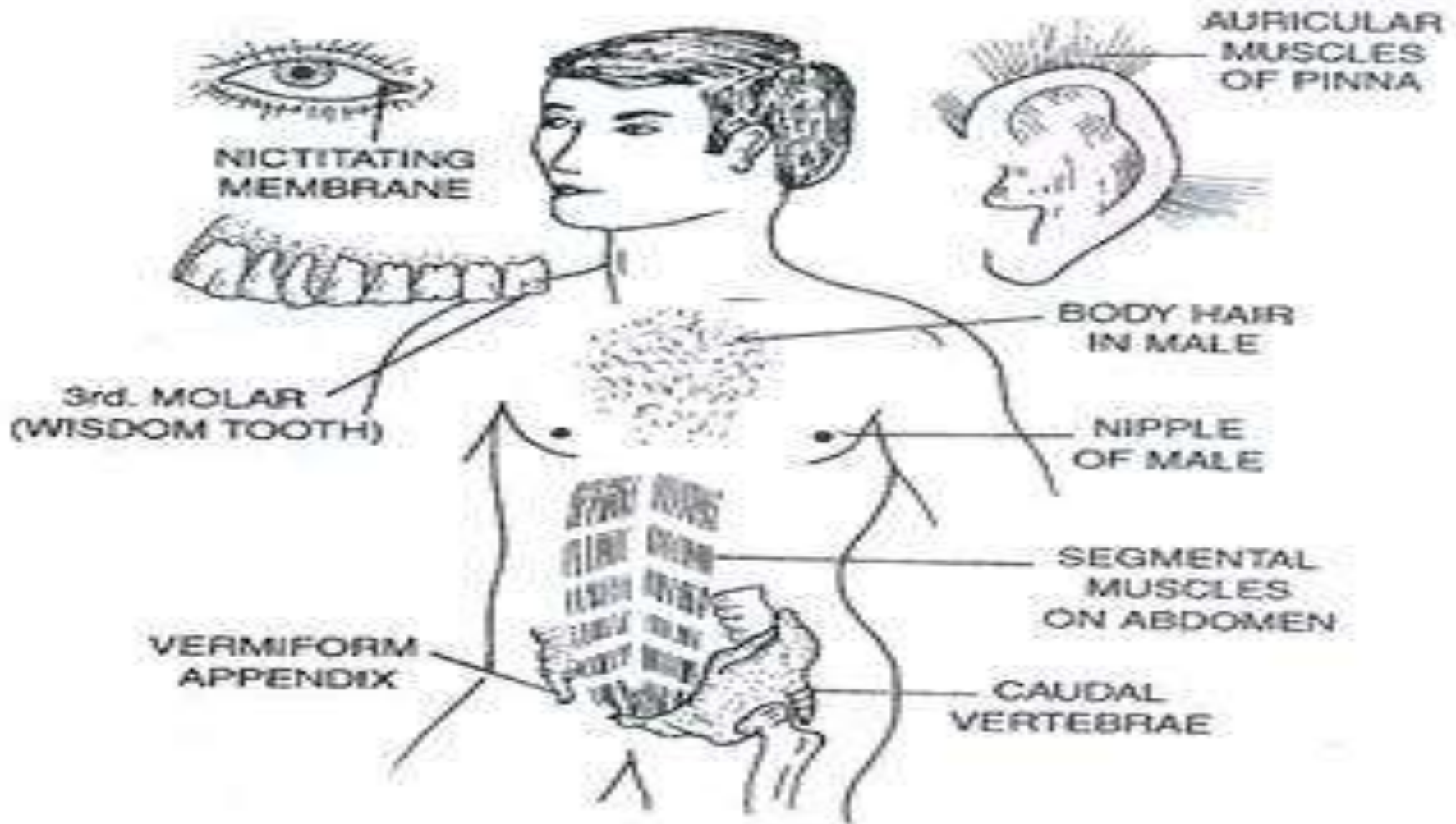
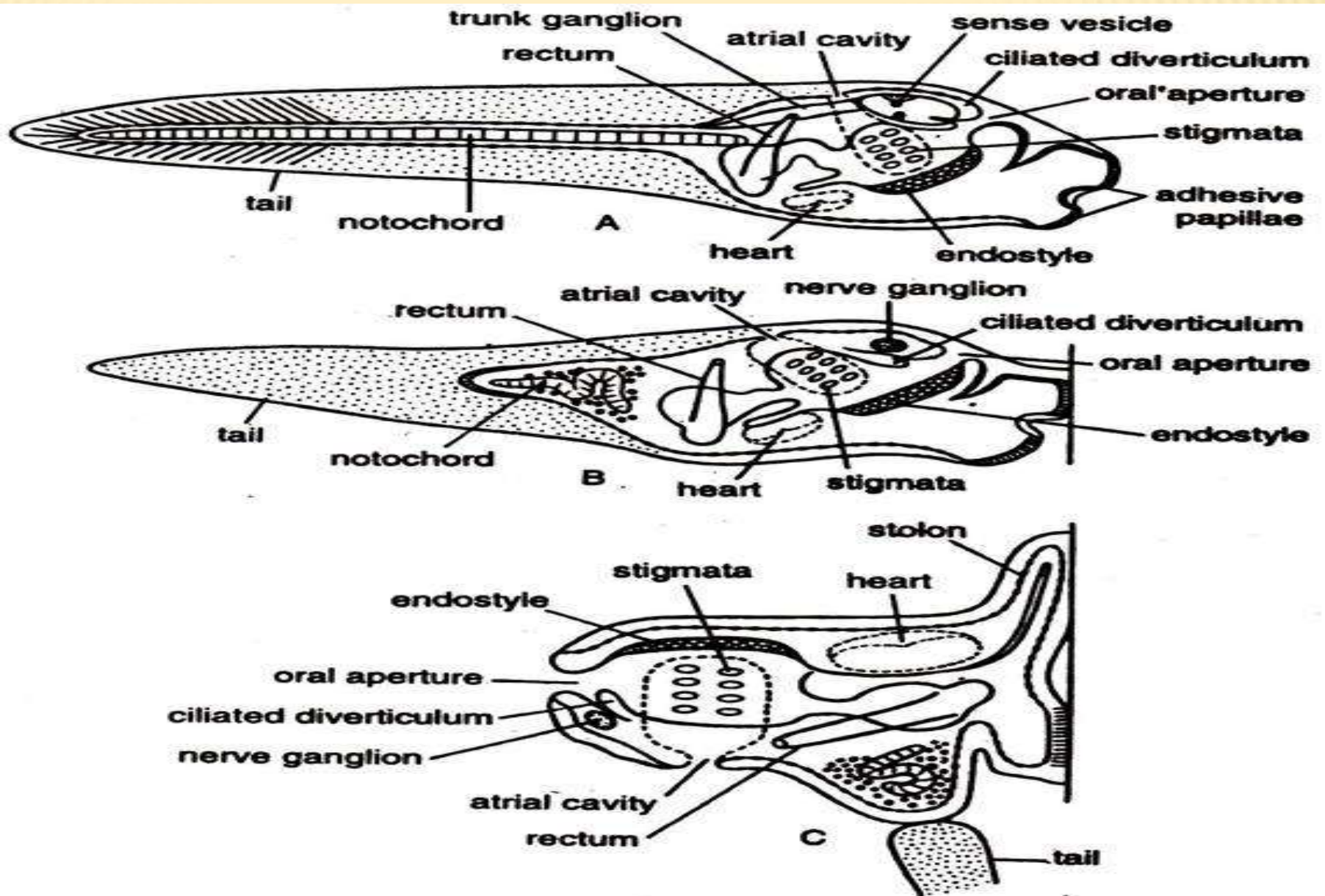


Fig. 7.26. Some vestigial organs in human body.

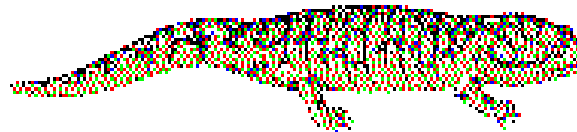


**Fig. 30.6. *Ascidia* sp. Metamorphosis — free tailed larva into a fixed ascidian**

metamorphosis

**Neoteny:**  
reduction of the  
allometric coefficient

**B**



metamorphosed  
salamander

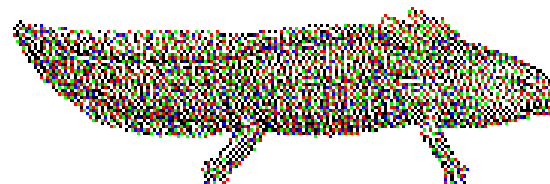
Sexual maturity is reached  
as some definite age.  
If approach to metamorphosis  
is decelerated ( $a' < a$ ),  
larval forms (Axolotls)  
achieve sexual maturity.

$a$

$a'$

**B'**

sexually-mature  
Axolotl



growth period

age of sexual maturity