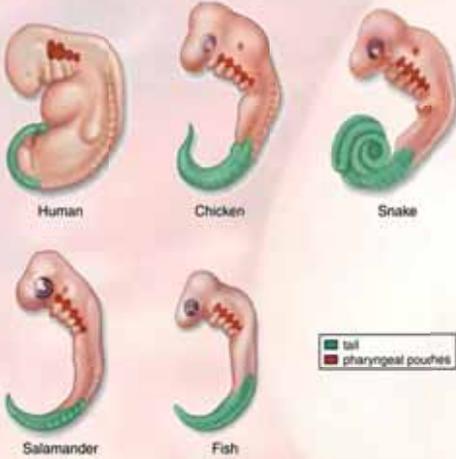


EVO-DEVO: HISTORY REPEATS ITSELF

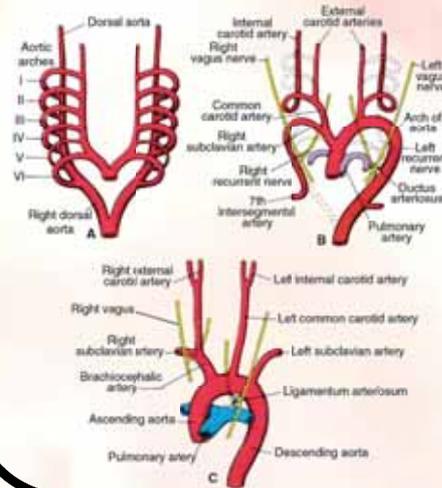
The technological and analytical advances in the field of genomics allow us to explore the genetic framework that underpins the embryological development of life forms. Not surprising, phenotypic resemblance found between different embryos is in agreement with their respective genetic machinery. This leads to the origin of new field of study referred to as **Evo-Devo** or **Evolutionary Developmental Biology**

Embryos Recapitulate Evolution



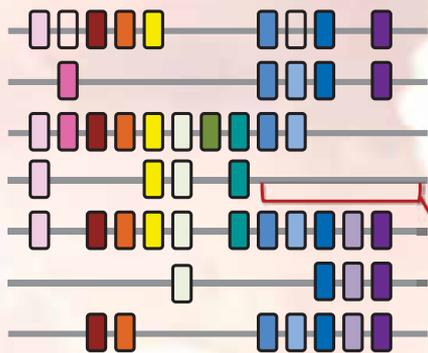
It is difficult to overlook the similarities between the developing embryos of vertebrates. Development of **pharyngeal gills** in land vertebrates and their transformation into other organs, development of **tail** in tail less mammals tells the tale of our evolutionary history

Now You See Me, Now You Don't



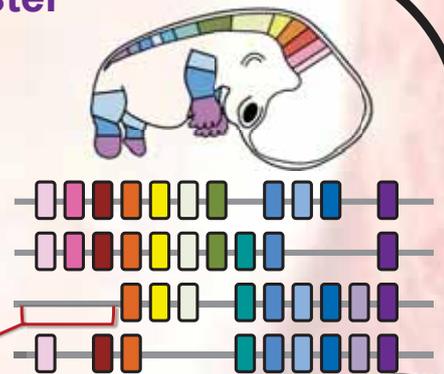
Development of **aortic arches** in the human embryo provides glimpses of our evolutionary past. Before gaining the shape as we see in adult humans, its antecedent embryonic stages are **startlingly similar** with the vascular system found in **fishes, amphibians and reptiles**

Cluster of Tales or Tale of Cluster



Embryological resemblance is not only confined to the morphological and anatomical characteristics. The presence and expansion of **Hox gene cluster** and its relative involvement in the formation of different organs is parallel to the increased anatomical complexity found in vertebrates. This increase is the result of both gene and genome duplications

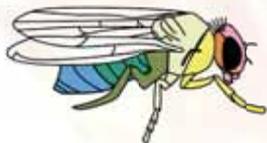
The **absence of corresponding genes** at these and other locations reflects extensive **gene death** in vertebrates



3R

Fish specific genome duplication (3R) further increased the number of **Hox genes** in the specific lineage

In cephalochordates **Hox gene cluster** further expanded to form full prototype of the **Hox gene tool kit**



In protostomes, **Hox gene cluster** expanded, the relative involvement of these genes in the development of corresponding structures is shown

Origin of **Hox gene** is dated back to **protozoans**



2R

1R

Two whole genome duplication events (1R and 2R) between non vertebrate chordates and vertebrates result in the increase (4x) in the numbers of **Hox genes**

Before vertebrates the expansion of the **Hox genes** are mostly driven by **gene duplications**. Shown here are the potential **paralogous relationship** of **Hox genes** expanded by gene duplications



Cnidarians are the first metazoans where **Hox gene** started to transform into a gene cluster

