

Applied Practice

***Evolution:  
Evidence and Patterns  
STAAR Biology EOC***

**RESOURCE GUIDE**

**Volume 5**

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**STAAR Biology EOC**

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## Glossary of Terms

**Adaptation** – a physiological, behavioral, or anatomical change which improves a population's ability to survive in its environment

**Analogous structure** – anatomical similarities between unrelated species of organisms due to similar selection pressures

**Anatomical** – referring to the anatomy, or physical structure, of an organism

**Ancestral species** – from a previous generation

**Bottleneck effect** – a drastic reduction in the number of individuals within a population that results in genetic drift, where the small surviving population is no longer genetically representative of the original population

**Camouflage** – a physiological adaptation in which an organism's coloration blends in with the elements of their habitat

**Cladistics** – a phylogenetic classification system based on shared derived characteristics and common ancestry used to group taxa

**Cladogram** – a tree-like diagram that shows evolutionary relationships based on shared derived characteristics between groups of organisms

**Common ancestor** – an ancestral species which different descendent species share

**Convergent evolution** – evolution of similar characteristics in unrelated species due to similar selective pressures

**Derived characteristics** – characteristics a group of organisms shares with an immediate common ancestor

**Descendent species** – relatives in subsequent generations

**Divergent evolution** – the accumulation of differences between groups of organisms due to selective pressures as they spread out to different environments

**Embryology** – the study of the stages of embryo development

**Endosymbiotic theory** – an idea initially proposed by Lynn Margulis that suggests mitochondria and chloroplasts in eukaryotic cells originated as endosymbiont bacteria

**Evolution** – changes in allele frequencies in a population of organisms which may result in phenotypic changes from one generation to the next

**Extinction** – a species of organism which has died out completely

**Fossil** – the preserved remains or impression of an organism

**Fossil record** – fossils preserved over the 4.5 billions of years of earth's history that provide a record of evolution



**Choose the best answer to each question.**

**Use the amino acid sequence comparison provided below to answer questions 1-2.**

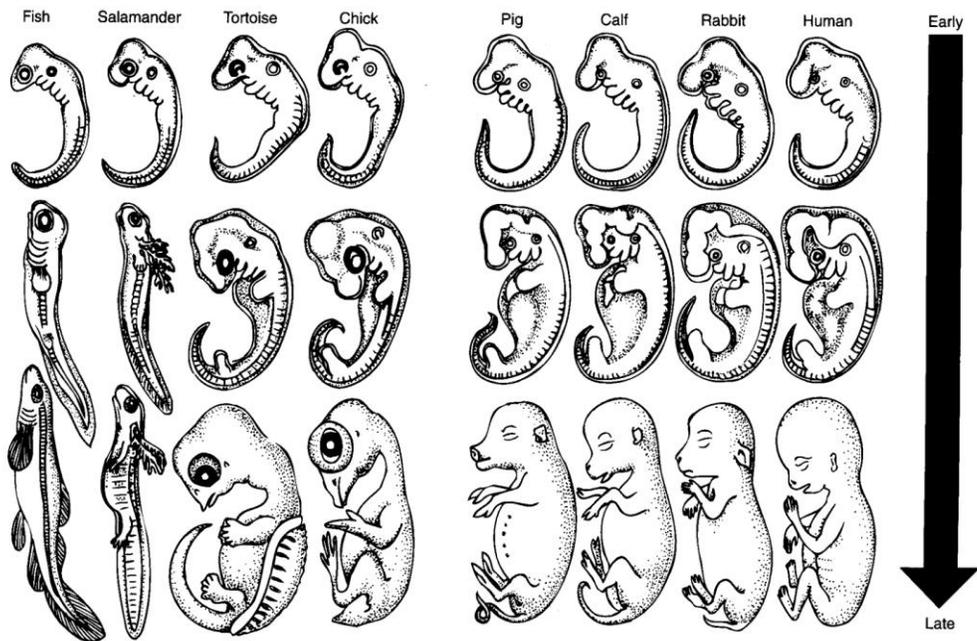
	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101
Human	THR	LEU	SER	GLU	LEU	HIS	CYS	ASP	LYS	LEU	HIS	VAL	ASP	PRO	GLU
Chimpanzee	THR	LEU	SER	GLU	LEU	HIS	CYS	ASP	LYS	LEU	HIS	VAL	ASP	PRO	GLU
Gorilla	THR	LEU	SER	GLU	LEU	HIS	CYS	ASP	LYS	LEU	HIS	VAL	ASP	PRO	GLU
Rhesus monkey	GLN	LEU	SER	GLU	LEU	HIS	CYS	ASP	LYS	LEU	HIS	VAL	ASP	PRO	GLU
Horse	ALA	LEU	SER	GLU	LEU	HIS	CYS	ASP	LYS	LEU	HIS	VAL	ASP	PRO	GLU
Kangaroo	LYS	LEU	SER	GLU	LEU	HIS	CYS	ASP	LYS	LEU	HIS	VAL	ASP	PRO	GLU

	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116
Human	ASN	PHE	ARG	LEU	LEU	GLY	ASN	VAL	LEU	VAL	CYS	VAL	LEU	ALA	HIS
Chimpanzee	ASN	PHE	ARG	LEU	LEU	GLY	ASN	VAL	LEU	VAL	CYS	VAL	LEU	ALA	HIS
Gorilla	ASN	PHE	LYS	LEU	LEU	GLY	ASN	VAL	LEU	VAL	CYS	VAL	LEU	ALA	HIS
Rhesus monkey	ASN	PHE	LYS	LEU	LEU	GLY	ASN	VAL	LEU	VAL	CYS	VAL	LEU	ALA	HIS
Horse	ASN	PHE	ARG	LEU	LEU	GLY	ASN	VAL	LEU	ALA	LEU	VAL	VAL	ALA	ARG
Kangaroo	ASN	PHE	LYS	LEU	LEU	GLY	ASN	ILE	ILE	VAL	ILE	CYS	LEU	ALA	GLU

- 1** This gene is highly conserved among vertebrates as it codes for the critically important hemoglobin protein which serves to deliver oxygen throughout the body. Based on the comparison of amino acid sequences for the organisms listed above, which two organisms share the most recent common ancestor?
- A** Human and Chimpanzee
  - B** Chimpanzee and Gorilla
  - C** Human and Gorilla
  - D** Horse and Kangaroo
- 
- 2** Each of the following could be concluded from this comparison except —
- F** the chimpanzee is more closely related to the human than it is to the gorilla
  - G** the primates share a more recent common ancestor with each other than with the horse or kangaroo
  - H** only the primates share a common ancestor
  - J** all of these organisms share a common ancestor

Use the following chart of vertebrate embryo development to answer questions 3-4.



- 3 Based on the comparison of anatomical structures at different stages of embryo development, it can be inferred that —
- A the pig, calf, rabbit, and human share a more recent common ancestor with each other than with the other organisms represented
  - B the fish and salamander share a more recent common ancestor with each other than with the other organisms represented
  - C each of the organisms represented shares a distant common ancestor with the others
  - D all of these

- 4 Which of the following could further define the evolutionary relationships of the pig, calf, rabbit, and human?
- F DNA sequence comparison of the insulin gene
  - G Comparison of the structure of the skeletal systems
  - H Comparison of the biochemical pathway controlling water balance
  - J All of these
- 

Use the illustration below to answer questions 5-7.



- 5 The greenerpeton is an eel-like tetrapod (4-limbed) best known from West Virginia, where over 50 fossils have been discovered. Scientists propose that greenerpeton most likely "de-evolved" from the first amphibians about 330 million years ago, living its entire life in the water. Which of the following pieces of evidence, if true, would not support this hypothesis?
- A Greenerpeton is genetically more similar to amphibians than to eels.
  - B Greenerpeton looks more like an eel than an amphibian.
  - C Greenerpeton has vestigial limbs.
  - D Greenerpeton first appeared in the fossil record about 330 mya.