

## Review Worksheet Answers: Comparative Anatomy and Geographical Distribution

1: Fill in the table below:  
(17 marks)

| Comparative Anatomy    |   |   |  |
|------------------------|---|---|--|
|                        | Definition  | Evidence it provides for evolution  | Example  |
| Comparative Embryology | <i>The comparison of embryonic development to provide evidence for common ancestry and evolutionary change over time. (1)</i> | <i>1: Embryos are initially very similar between species (0.5) – this indicates a common ancestor (0.5)</i><br><i>2: More closely related species are similar for a longer period (0.5) – indicates different levels of relatedness. (0.5)</i><br><i>3: Features of the early embryo differentiate over time (0.5) – indicates common ancestry then adaptation (0.5).</i> | <i>1: fish, bird and human embryos initially look very similar. (1)</i><br><br><i>2: Closely related pig and human embryos look similar for longer than the more distantly related fish and human embryos. (1)</i><br><br><i>3: Gill slits appear in all early embryos. In human embryos, these develop into Eustachian tubes thyroid and tonsils. (1)</i>                   |
| Homologous Structures  | <i>Structures that are the same across several species but adapted for different functions (1)</i>                            | <i>Same number of bones and joints indicate a common ancestor (1), adaptation of these indicates evolution to suit different environments. (1)</i>  | <i>Vertebrate forelimb has same bones in different species (0.5) eg human, whale and bat (0.5), but bones are adapted in shape and size for different functions (0.5) eg human – reaching and grasping, whale flipper for swimming, bat wing for flying.(0.5)</i>  |
| Vestigial Organs       | <i>Structures that are of little to no use in a modern organism but were of use in an ancestral form. (1)</i>                 | <i>Vestigial organs are often small or almost absent (0.5). They are no longer useful and so have not been selected for (0.5), but indicate that the organism has evolved from a common ancestor (0.5) with a functional version of the organ (0.5).</i>  | <i>Some snakes have tiny vestigial limbs (0.5)</i><br><i>The human appendix is the vestigial remnant of the caecum (0.5), which was useful in a common ancestor that ate a lot of plant matter.(0.5)</i><br><i>The nictitating membrane closes across the eyeball to protect it from damage during fighting in many mammal species but is almost absent in humans. (0.5)</i> |

- 2: Explain how the geographical distribution of Darwin's finches on the Galapagos provides evidence for evolution.  
(4 marks)

*There are many species of finch in the Galapagos which live in close proximity to each other (1), but are adapted for the different food sources on different islands (1). This indicates that they are descended from a common ancestor (1) that came to the Galapagos, and the species then evolved to take advantage of different food sources (1).*

- 3: Scientists, including Charles Darwin, predicted that fossils of human ancestors would be found in Africa. Use your understanding of geographical distribution to explain the reasoning behind this prediction.  
(3 marks)

*Species alive today that appear to be the closest relatives to humans, such as chimpanzees and gorillas, are found in Africa (1). If humans and these apes have a common ancestor, it is likely to have lived somewhere where all three modern species (humans, chimps and gorillas) can be found (1). Africa is the only continent where chimps and gorillas are found in the wild, so it is reasonable to infer that the common ancestor of humans, chimps and gorillas also lived there (1).*

- 4: Describe the steps of inflammation in detail, from the moment of tissue injury until the stage is set for tissue healing.  
(11 marks)

*A: Tissue damage occurs (0.5). Pathogens may or may not be introduced and continue damage (0.5)*

*B: Tissue damage (0.5) causes Mast Cells (0.5) to release Histamine (0.5) and Heparin (0.5)  
Histamine causes local capillaries (0.5) to dilate and become leaky (0.5), to allow leukocytes to enter the area of tissue damage (0.5). This causes redness, heat, swelling and pain. (0.5)*

*Heparin prevents clotting in the immediate area. (0.5)*

*C: Complement proteins (0.5) are activated (0.5) and attract phagocytes (0.5), which are able to enter the tissues due to the leaky, dilated vessels in the area (0.5). The phagocytes engulf and digest dead cells and bacteria. (0.5)*

*D: Once pathogens are cleared (0.5), mast cells and complement (0.5) cease chemical messaging (0.5). Local capillaries return to normal (0.5), phagocytosis stops (0.5) and the stage is set for tissue healing (0.5).*