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PRELIMINARY EXAMINATION: PAPER 2

MEMO

SECTION A

QUESTION 1

Refer to pages 1 – 4 of the Source Material Booklet. Use this information as well your own knowledge to answer the questions that follow.

1.1 Define adaptive radiation.

A burst of divergence from a common ancestor/single lineage to form a variety of new species. ✓ (1)

1.2 Source A refers to the 'divergent camouflage of feather lice'. Explain what is meant by 'divergent evolution'.

A process in which species that share a common ancestor ✓ gradually diverge into new forms/ become less similar ✓ as common traits or structures evolve differently due to different environmental pressures. ✓ (3)

1.3 Differentiate between 'microevolution' and 'macroevolution'.

Microevolution: small changes in the genotype ✓ causing variation within a species. ✓ Over time microevolution leads to macroevolution ✓

Macroevolution: significant changes over a long period of time ✓ at the species level. Over time macroevolution results in speciation ✓

MAX 2 MARKS EACH (4)

1.4 Explain briefly how scientists use genes to identify evolutionary relationships between different organisms.

They compare the base sequences in the DNA of different organisms. ✓
The more shared sequences they have in common, ✓ the more closely related they are/
more recently that they shared a common ancestor. ✓ (3)

- 1.5 Source B describes how "the bees moved north, diversifying and spreading in a parallel partnership with angiosperms"

Explain the significance of the joint migration and subsequent co-evolution that occurs in bees and angiosperms.

Honeybees and angiosperms evolved traits that are better suited to one another ✓, resulting in more effective ? more efficient pollination ✓ ultimately enhancing the chances of survival for both species in new/changing environments ✓ (3)

- 1.6 Explain why the study of bee evolution is ecologically important.

It helps scientists/conservationists understand how bees adapt to changing environments/ climate change ✓ this helps them to predict certain outcomes ✓ /prevent the loss of the species ✓ . It allows for better understanding of how to protect current bee populations from current threats like climate change/pesticides etc ✓

ANY WELL-EXPLAINED ANSWER – IT MUST BE LINKED TO UNDERSTANDING OF CHANGES IN THE PAST RESULTS IN BETTER UNDERSTANDING OF CHANGES IN THE PRESENT/FUTURE SOMEHOW, (2)

- 1.7 Refer to Source C to answer the questions that follow.

- a) How long did the Cretaceous era last, according to the diagram?

145,5 mya to 65,6 mya ✓ (79,9 million years) (1)

- b) How long ago did hunting wasps and bees last share a common ancestor?

130,0 mys ✓ (1)

- c) Refer to the Family Colletidae to identify which sub-family is most closely related to *Xeromelissinae*.

Hylaeinae ✓ (1)

- d) Which family shared a common ancestor most recently with the family Apidae?

Megachilidae ✓ (1)

- 1.8 Explain how mosquito populations developed insecticide resistance over time.

Natural variation in mosquito populations. ✓

Some survived pesticides, while others didn't ✓

Surviving mosquitoes reproduced with one another ✓ the pesticide resistant gene was passed on to the offspring ✓

Over time resistant populations formed. ✓

MAX 4 POINTS. MUST include inheritance of the resistant gene. (4)

- 1.9 Refer to the graph shown in Source E to answer the questions that follow.
- a) Identify the dependent variable in the investigation.
(percentage) Mortality of mosquitoes ✓ ✓ (2)
- b) What percentage of resistant mosquitoes survived the 2-hour investigation?
+/- 75% ✓ (1)
- 1.10 Explain the effect of increased resistance in mosquito populations on the economy.
It will have a negative effect on the economy. ✓ as more money will be needed for public health care/medication/awareness and education campaigns etc. ✓ as well as a decreased work force due to illness and/or death ✓ (3)

[30]

QUESTION 2

Refer to pages 5 – 7 of the Source Material Booklet. Use this information as well your own knowledge to answer the questions that follow.

- 2.1 Source A states that 'jaw-size is driven more by usage than genetics.' Identify the correct term for a non-inherited trait that develops as a result of its repeated use.
Acquired trait ✓ (1)
- 2.2 The text mentions how wisdom teeth no longer serve a purpose in modern humans. What is the correct term for a structure which no longer has a function or serves its original purpose?
Vestigial organ/structure ✓ (1)
- 2.3 Identify ONE additional example of the structure identified above in modern humans.
Appendix/tail/wisdom teeth/goosebumps etc. ANY ONE ✓ (1)
- 2.4 Briefly explain how 'diverging diets' resulted in geographical differences in the structure of hominin jaws.
Different availability of different food types in various geographical areas ✓ required different types of teeth and/or extent and amount of chewing. ✓
Organisms adapted to the specific diets available in their environment, ✓ developing different traits as a result over time. (3)
- 2.5 Source A states that; 'the size and shape of the jaw is not only controlled by genes, but also strongly affected by the environment, such as how much it has to chew.'
Which famous scientist focussed in an organism's response to their environment as opposed to their inherited traits?
La Marck ✓ (1)

- 2.6 Explain why early hunter-gatherers required larger and stronger jaws compared to recent hominin species.

Early hominins ate more raw foods, ✓ which required more chewing. This in turn required larger muscles and areas of muscle attachment. ✓ over time the process of cooking made food softer requiring less chewing ✓, / tools enabled food to be cut into bite size pieces. ✓ These changes enables hominins to survive with smaller muscles and areas of muscle attachment as a result. ✓ MAX 3 (3)

- 2.7 Describe an additional change that occurred in the structure of early hominins; excluding their jaws, teeth or skulls, which occurred as a result of agriculture.

Less dense bones ✓ (1)

- 2.8 Explain a possible reason for the change identified in Question 2.7.

Agriculture allowed for a less active lifestyle ✓ due to less hunting and not having to travel long distances to find food. Over time this resulted in their bones becoming less dense. ✓(2)

- 2.9 Which hominin species was the first to show evidence of tool use?

H. habilis ✓ (1)

- 2.10 Which hominin species was the first to manipulate fire or cook their food?

H. erectus ✓ (1)

- 2.11 Refer to Source C to answer the questions that follow.

- a) Describe the trend observed in the hominin dentition shown in the diagrams provided in Source D.

different teeth became more similar in size over time ✓ canines and molars became smaller/less sharp over time ✓ the diastema disappeared as hominins evolved/over time ✓ (2)

- b) Describe the trend observed in the hominin palate shown in the diagrams provided in Source C.

The palate became less rectangular/more curved/parabolic ✓ over time. ✓ (2)

- c) Explain why the change in hominins diet resulted in the changed observed in the hominin palate.

Large jaws/canines/molars were no longer necessary due to softer food/tool use ✓ decrease in the size of canines resulted in the loss of the diastema over time, ✓ smaller jaws and clower teeth lead to a more curved palate. ✓. (3)

- 2.12 Identify TWO additional examples of changes that occurred in the hominin skull as a result of their change in diet, (excluding palate shape or dentition) AND give a reason why each of these changes was necessary.

Smaller jaws/less prognathism/formation of a chin ANY TWO ✓

-Due to less need for strong muscles for chewing, and therefore smaller areas of muscle attachment.

Increased cranium ✓

Due to the change in diet, leading to more protein, healthier diets and therefore an increase in cranial capacity. ✓ (4)

2.13 Explain any TWO advantages that agriculture provided for early hominins.

- Less dependent on climate/seasons for supply of food. ✓
- Availability of food year-round ✓
- no need to travel as much as before – saving time and energy/providing safety and security ✓
- Less competition with other species for food etc ✓

• ANY TWO ACCEPTABLE ANSWERS. (2)

2 14 Describe the social impact of agriculture on hominin evolution.

- Allowed hominins to remain in one place – creating the opportunity to build towns/villages. ✓
- Developed a community as hominin settled together and shared responsibilities in tending to the crops ✓
- Created relationships due to sharing of food preparation and sharing the available food with one another. ✓ Creating trust and appreciation between one another. ✓
- Lead to development of communication to pass on knowledge regarding the necessary skills and knowledge relating to agriculture etc. ✓

ANY WELL EXPLAINED AND JUSTIFIABLE EXAMPLE (2)

[30]

SECTION B

QUESTION 3

New evidence on human evolution has some scientists questioning the Out-of-Africa Hypothesis in favour of the alternative, multi-regional hypothesis, while other scientists believe that this new information does not provide sufficient evidence to disprove the Out-of-Africa Hypothesis as a whole, despite poking holes in some of the finer details surrounding it.

New evidence from recent discoveries on human origins has not discredited nor contradicted the Out-of-Africa Hypothesis, however it has revealed the need to re-examine certain details.

Using the source material provided as well as your own knowledge, discuss your opinion on the above statement in the form of a 2½ – 3 page essay.

[40]

GRAND TOTAL = 100