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# ST DOMINIC'S SCHOOL FOR GIRLS

## GRADE 12 LIFE SCIENCES

### PRELIMINARY EXAMINATION PAPER 2

2023

|                     |           |               |                   |
|---------------------|-----------|---------------|-------------------|
| <b>Examiner:</b>    | M Smith   | <b>Date:</b>  | 13 September 2023 |
| <b>Moderator/s:</b> | E Kennedy | <b>Time:</b>  | 2 Hours           |
|                     |           | <b>Marks:</b> | 100               |

#### MEMORANDUM

#### QUESTION 1

- 1.1 B✓✓
- 1.2 NATURAL SELECTION✓✓
- 1.3 1- GREENISH WARBLERS PRODUCED MORE OFFSPRING THAN ARE REQUIRED FOR POPULATION GROWTH✓✓  
 2 – WITHIN THE POPULATION THERE WERE BIRDS WITH LONG HOOKED BEAKS AND BIRDS WITH SHORT STOUT BEAKS✓✓  
 3 – THE BIRDS WITH LONG HOOKED BEAKS PRODUCED MORE OFFSPRING IN FORESTS WHERE THERE WERE MORE FLYING INSECTS. ✓ BIRDS WITH SHORT STOUT BEAKS PRODUCED MORE OFFSPRING IN FORESTS WITH GROUND INSECTS. ✓  
 4 – IN EACH HABITAT THAT TRAIT OF DIFFERENT SHAPE BEAKS WAS INHERITED BY THE OFFSPRING AND A CHANGE IN THE PHENOTYPE WAS OBSERVED FOR EACH POPULATION. ✓✓
- 1.4 CLADOGRAM✓ / PHYLOGENETIC TREE
- 1.5 FOSSILS✓; EMBRYOLOGY✓; BIOGEOGRAPHY✓; ANATOMY ( ANY 3 EVIDENCE FOR EVOLUTION)
- 1.6 B✓
- 1.7.1 GENE FLOW REFERS TO BREEDING BETWEEN DIFFERENT POPULATIONS OF GREENISH WARBLER✓✓
- 1.7.2 THE DIFFERENCE IN SONG✓ PREVENTS MATE RECOGNITION ✓ BETWEEN THE WARBLER POPULATIONS
- 1.8 MICRO-EVOLUTION✓✓
- 1.9 SYMPATRIC SPECIATION✓ AS THERE IS NO GEOGRAPHIC BARRIER ✓ TO SEPARATE THE POPULATIONS OF WARBLER
- 1.10 YES✓, A SPECIES IS DEFINED BY ITS INABILITY TO INTERBREED ✓ AND PRODUCE VIABLE OFFSPRING WITH ANOTHER CLOSELY RELATED SPECIES. ✓ IN SIBERIA THE TWO POPULATIONS OF GREENISH WARBLER CANNOT INTERBREED WITH EACH OTHER✓ REPRODUCTIVE ISOLATION PREVENTS THEM FROM MATING✓  
 (THEY LOOK DIFFERENT SO THEY MUST BE DIFFERENT✓) ONLY WORTH 1 MARK.

## QUESTION 2

2.1.1 TRUE✓

2.1.2 FALSE✓

2.1.3 TRUE✓

2.1.4 TRUE✓

2.1.5 FALSE✓

2.2 HOMO NALEDI BRAIN CASE IS 560 CM<sup>3</sup>✓. HOMO SAPIENS IS 1350 CM<sup>3</sup>✓. THIS IMPLIES THAT BRAIN SIZE HAS INCREASED✓ FROM 300 000 YA TO PRESENT

2.3 *primitive above, modern below* = mixture of more advanced Homo features and more primitive Australopithecine features

**Primitive above:** *H. naledi's* hand displays curved fingers, a clue that the species had retained an ability to climb in trees and on rocks; the shoulders were apish too; the widely flaring blades of the pelvis were as primitive as Lucy's; proportionately long arms; small braincase.

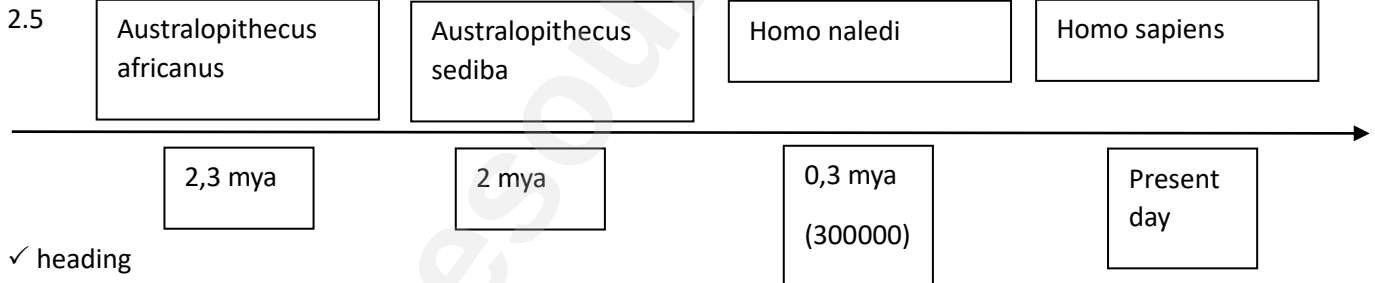
**Modern below:** the bottom of the pelvis looked like a modern human's; The feet are virtually indistinguishable from modern humans longer legs; ridges for strong muscle attachment.

(Accept other relevant structural differences (1 = explanation + 2 = primitive above + 2 = modern below))

2.4.1 C – A – B

2.4.2 ALL TOES ARE IN LINE WITH H NALEDI AND H SAPIENS FEET✓ IN MORE PRIMITIVE AUSTRALOPITHECINE HAS A DIVERGENT LARGE TOE WHICH SHOWS A DECREASED ABILITY TO WALK UPRIGHT✓

2.4.3 UPRIGHT POSTURE – FREED HANDS ✓, SPECIES COULD MANIPULATE OBJECTS/TOOLS✓, CARRY FOOD BACK TO TRIBE✓, ALLOWED WALKING OVER LONG DISTANCES✓



✓ heading

✓✓✓✓ correct order of species

✓ time line correct from 3 mya to present time when each species lived

2.6 YES – RECENT FOSSIL (300000 ya)

- SKULL HAS LARGER FRONTAL BONE

- CULTURE FROM ENGRAVINGS IS EVIDENT

- BURIAL OF THEIR DEAD WHICH IS NOT FOUN IN ANY OTHER ORGANISM

NO - BRAIN IS STILL MUCH SMALLER

- UPPER BODY IS STILL ADAPTED FOR CLIMBING IN TREES

- IT IS NOT YET POSITIVE THAT CAVE MARKINGS ARE THEIRS.

- NOT YET CLEAR IF THEY BURIED THEIR DEAD.

**FACTS FROM SOURCES SUPPORTING DEVOLUTION**

- DEVOLUTION IS THE NOTION THAT SPECIES CAN REVERT TO SUPPOSEDLY MORE PRIMITIVE FORMS (A)
- THE IDEA OF PROGRESS IN EVOLUTION PERMITS THE OPPOSITE IDEA OF DEVOLUTION (B)
- THERE IS A GREATER COMPLEXITY AS GROUPS OF ORGANISMS EVOLVE (B)
- GROUP OF STICK INSECTS EVOLVED FROM ANCESTORS THAT HAD WINGS, STICK INSECTS THEN LOST WINGS AND AGAIN EVOLVED WINGS MORE RECENTLY (C)
- DEVOLUTION MIGHT BE POSSIBLE IF THE TRAIT IS SIMPLE, WITH A SINGLE MUTATION INVOLVED (C)
- IF IT IS ADVANTAGEOUS TO LOSE AN APPENDAGE IN A SEVERELY CHANGED ENVIRONMENT THEN MOVING BACKWARDS MAY BE THE WISE THING TO DO (D)
- HAGFISH IS A SPECIES THAT IS COMPLETELY BLIND AND IS EVOLVING SIGHT AGAIN (D)
- NOT SURE WHY PENGUINS EVOLVED AWAY FROM HAVING FLIGHT (D)
- DOMESTICATED MIRROR CARP REVERT BACK HAVING MANY SCALES WHEN RELEASED INTO THE WILD (D)
- SCIENTISTS ARE ABLE TO REVERT A CHICKEN INTO HAVING A SNOUT LIKE A DINOSAUR SHOWING THAT DINOSAUR GENES ARE STILL PRESENT IN BIRDS (F)
- THIS SHOWS THAT DEVOLUTION IS POSSIBLE IF ONLY IN THE LAB (F)
- WHEN LAND MAMMALS ADAPT TO LIVING IN WATER THEY LOSE LIMBS (G)
- MODERN HUMANS HAVE STARTED LOSING WISDOM TEETH, ALREADY LOST THEIR TAIL, APPENDIX IS DISAPPEARING. (H)
- IN BIRDS THERE IS THE RE-EMERGENCE OF A BONE FOUND IN FOUR LEGGED ANCESTORS OF DINOSAURS (I)

**FACTS FROM SOURCES NOT SUPPORTING DEVOLUTION**

- EVOLUTION IS THE CHANGE IN THE CHARACTERISTICS OF A SPECIES OVER SEVERAL GENERATIONS (A)
- EVOLUTION ACCORDING TO DARWIN IS BASED ON NATURAL SELECTION (A)
- THE IDEA EVOLUTION HAS A PURPOSE IS LAMARCKIAN EVOLUTION THIS IS PROVEN INCORRECT (B)(E)
- DOLLO'S LAW STATES THAT AN ORGANISM NEVER RETURNS TO ITS FORMER STATE (C)
- WING EVOLUTION IN STICK INSECTS DID NOT NECESSARILY REVERT BACK TO THE SAME BIOCHEMISTRY SO IT DOES NOT PROVE DEVOLUTION (C)
- REVERTING THE GLUCOCORTICOID RECEPTOR TO ITS ANCESTRAL FORM FAILED, THE NUMBER OF MUTATIONS WERE TOO GREAT TO REVERSE (C)
- NO DEVOLUTION AS ALL CHANGES IN GENE FREQUENCIES ARE A FORM OF EVOLUTION (E)
- NO HIERARCHY OF TRAITS (E)
- IF SPECIES CANNOT EVOLVE TO CHANGING ENVIRONMENTS THEN THEY BECOME EXTINCT THEY DO NOT DEVOLVE (E)
- WHEN SPECIES EVOLVE IT IS NOT A REACTION TO NECESSITY (H)(B)
- EVOLUTION DOES NOT MEAN THERE IS PROGRESS TO MORE ADVANCED ORGANISMS (H)(B)
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