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Life Science Prelims Paper 11 2023 Memo

Total: 100

Question 1

- 1.1.1 B ✓
- 1.1.2 A
- 1.1.3 Neither
- 1.1.4 A
- 1.1.5 Both (5)
- 1.2 Flow diagram with words and arrows ✓
- Correct sequence of info ✓✓✓
- Heading ✓ (5)
- Tuskless elephant result from a gene mutation
- In a herd there are tusked and tuskless elephants
- Poachers target elephants with tusks only
- Tuskless elephants survive and pass on mutation to offspring
- Next generation have more tuskless elephants
- New species of tuskless elephants arises over time
- 1.3 With small populations ✓ the selective force could be due to a bottle neck event like poaching ✓ or by genetic drift when many get killed randomly and few survive ✓ instead of natural selection which only selects for those best suited for survival. (3)
- 1.4 $2542 \times 18.5 / 100 = 470.27$ ✓ elephants (3)
- 1.5.1 divergent ✓
- 1.5.2 23mya-5.3mya
- 1.5.3 extant
- 1.5.4 more (4)
- 1.6.1 DNA evidence ✓ comparing the DNA differences with living and extinct species that Africa has 2 species of elephants, not one. ✓ (2)
- 1.6.2 Sympatric speciation ✓ as the both the savanna and forest elephants evolved within Africa/same geographic area/continent ✓ and no geographical barriers separated them ✓ (3)

- 1.7 Male elephants enter Musth when they are ready to mate which attracts females ✓ OR
Females approach musth bulls and/or exhibit an estrous walk or vocalize at this time OR
Males wrestle and compete for females with the weaker bulls retreating OR
Successful mating occurs briefly and males usually stay with the females to prevent her mating with other males any 2 strategies (2)
- 1.8.1 Disadv recessive genetic diseases/disorders become evident ✓
Offspring susceptible to disease-low resistance- loss of vigour
Gene pool is weakened any one (1)
- 1.8.2 Adv heterozygous traits ensure weak genes suppressed ✓-increase vigour
Genetic diversity increased ✓
Gene pool strengthened any two (2)

QUESTION 2 MEMO

- 2.1 Genetic evidence/biochemistry ✓ (1)
- 2.2 grasping of objects is much more accurate. ✓
allows for better manipulation of these object and the use of tools ✓ (2)
- 2.3 Pan (chimpanzees) ✓ (1)
- 2.4 B
High forehead ✓ (and lack of a brow ridge) to accommodate larger frontal lobe ✓
Large bulbous cranium ✓ to house larger brain ✓
Short jaw ✓ (and flatter face) as larger teeth and heavier jaw are not required to chew softer / cooked food ✓ (4)
- 2.5 Foramen magnum is situated towards the middle of the base of the skull (where the atlas / (cervical) vertebrae are directly beneath the skull) ✓. (1)
- 2.6 Any new evidence that is found ✓ means that the lineage will be reviewed and if necessary, revised. ✓ (2)
- 2.7.1 *Homo naledi* ✓ (1)
- 2.7.2 Between *A. garhi* ✓ and *Homo habilis*. ✓ (2)

2.8.1 Handy man✓

2.8.2 the first *Homo* species to use tools✓

This made gathering food more efficient and survival more likely✓ (2)

2.9 Bipedalism allows for the free use of the hands ✓ for things other than walking or climbing so carrying young is easier ✓.

Making and using tools becomes more possible ✓ as hands are more specialised (opposable thumbs).✓

having a striding gait ✓ It improves our long-distance locomotion ✓, making it easier to traverse much longer distances, especially over rough terrain.

it is easier to cool the body as less surface area is exposed to direct sunlight ✓ so efficient locomotion is still possible in the heat of the day ✓ (ANY 2 + reasons) (4)

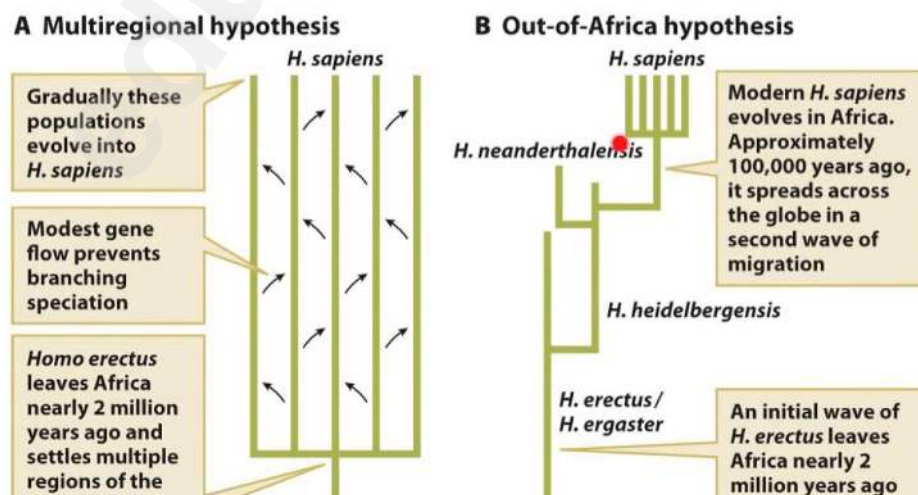
2.10.1 B ✓ (1)

2.10.2 The toe at the front of the foot/ convergent big toe/ big toe not opposable✓ provides a mechanism to push off from the ground. This is a far more energy efficient way to move.✓ (2)

2.11 if the pelvis is narrow the birth canal is narrower ✓ this adds to risk in childbirth as the offspring may become lodged in the pelvis ✓ (2)

2.12 **Out of Africa hypothesis** ✓ wave of *Homo erectus* ✓ that led to dead end in *Homo neanderthalensis* followed by 2nd (possibly more) waves of *Homo sapiens* from Africa ✓

Multiregional model ✓ - *Homo erectus* developed into *Homo sapiens* in various locations✓ (5)



ESSAY- MARKING GUIDELINES

SOURCE	NOT WORTH THE EFFORT	IS WORTH THE EFFORT
A Infographics explaining the process Reliability – just explains so no bias toward it	- won't be a proper woolly mammoth but a hybrid - rather focus on saving the endangered Indian elephant - Process is complicated and have yet to develop artificial womb and needs skilled people - rather focus on saving animals that are practically extinct (northern white rhino)	- process mimics cloning and have the expertise and technology - all trials will help improve the process and technology - bring back extinct species genome to increase diversity In rhino gene pool
B Colossal has scientists who will carry out the process – understand all the pros and cons but believe its worth it. Could be bias because scientists work for company Recent article	- cruel experiment - hybrid animals could suffer from many health problems - animals "recreated" will be subject to life in labs and continuous testing - animal might not survive and efforts will have been wasted	- company believes it will be a conservation victory - mammoths a keystone species in arctic environment - reintroduction could boost biodiversity - mitigate effects of global warming by removing blankets of snow - melting permafrost releases greenhouse gases which is reduced by mammoth - process could help save endangered species by using the technology to make species stronger
C Facts about animal extinctions Valid- professional researcher/ specialist	- golden toad extinction was not necessarily a result of humans so its true natural selection - governmental campaign to save a species didn't work so why will the process of de-extinction	- extinction as a result of human activities so could do something to bring them back, could try and reverse the damage done - moral obligation to protect and care for the environment
D Anecdotal and bias- bring awareness to current plight of species on the earth	- some species have existed since dinosaurs so it's a case of the strongest survive - no point in bringing back species because of the damage currently being done to the planet - humans are aware of their impact and very little has changed to try and preserve species	- value in bringing back extinct animals especially if it was caused by humans (rep S C)
E IUCN international organisation stats updated regularly	- 28% of all species threatened with extinction which is a more pressing issue	

F From a scientific magazine, scientists involved, read by scientists	- process of de-extinction is incredibly costly - can't clone birds because cannot access an unfertilised egg similar to a mammal - unsure how dodo proxy will respond to current environment - unknown effect on existing species with similar ecological niches - Scientist says it is not a solution to the extinction crisis> so why do it - dodo reproduced slowly so possibly just die out again unless major intervention	- extracted the dodo dna and reconstructed entire genome - know the closest living relative so it is possible to create a dodo hybrid - looking at using avian PGC so there is hope - recreating environment for dodo could have knock-on benefits for other endemic plants - reintroduced dodo could restore the ecosystem much like the reintroduced Giant tortoises - By pursuing de-extinction, colossal develops critically needed tools for avian genomics including genetic rescue such as editing genetic diversity in threatened populations - assist with all avian conservation
G Stanford researchers give insight into pros and cons	- bringing back species for human endeavours rather than for the species itself - species could carry pathogens if brought back to life - health issues in reintroduced species - species will lack many characteristics for it to be properly classified as the extinct species - exploit species which goes against animal welfare - Legalities involved and Patent laws	- revive ecosystems (rep) - breakthrough in field of genetic engineering - understand genetics behind species extinction - eradicate diseases caused by specific genes - offers insight into evolutionary theories/process - redemption from harm caused (rep) -see rather than hear about these species
H Valid- evol geneticist from University of Copenhagen Devel biologist from Melbourne Uni Stanford and Shantou Uni	- as much as 5% of genome still missing - highlights difficulties involved even a seemingly small amount of missing DNA has - Scientist himself says its not to recreate extinct species but rather a hybrid -resources taken from conservation of endangered animals - costly	- Christmas island rat has closest living relative identified - majority of genome has been sequenced - According to biologist, 5% could be repeat regions that won't affect how animal looks or behaves - proxies created- hybrids similar to extinct species

OWN	- hybrid may not adapt to the environment - would need to bring back many to repopulate a species - money could be better spent on reversing climate change and saving endangered species - unknown effects on extant species - people will hunt the recreated species as they did before esp for food in an evergrowing population - follows a similar pattern to cloning and there are many issues with cloned animals- still the exception rather than the norm - playing God - companies will monopolise copyright - who decides which animal to bring back?	- hybrid has a mix of traits superior to parents and could be stronger - can increase biodiversity - more species so could protect humanity an provide more food - expense might make people more weary of their impact on the environment in order to protect these renewed species - many endangered species so technology could be applied to save extant species - ethics involved in bringing back species
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Facts to support: $1 - 3 = 1 \times 2 = 2$

$$4 - 6 = 2 \times 2 = 4$$

$$7 - 9 = 3 \times 2 = 6$$

$$10 + = 4 \times 2 = 8$$

Own 1 to 2 = 1 or 3

Own 3 + = 2 or 4