



FACULTY OF SCIENCE

DEPARTMENT OF ZOOLOGY

MODULE	ZOO0099
CAMPUS	APK
EXAM	SUPPLEMENTARY EXAM 2016

DATE: TBA
ASSESSOR(S)
INTERNAL MODERATOR
EXTERNAL MODERATOR
DURATION: 2 HOURS

SESSION: TBA
PROF P R TESKE
PROF BJ VAN VUUREN
PROF P KING
MARKS: 50

NUMBER OF PAGES: 3

INSTRUCTIONS: Answer all questions and write legibly

QUESTION 1

Provide brief definitions of the following terms (1-2 sentences each):

- 1.1 Disruptive selection [2]
- 1.2 Founder effect speciation [2]
- 1.3 Eastern Pacific barrier [2]
- 1.4 Homoploid hybrids [2]
- 1.5 Vicariance [2]
- 1.6 Khoekhoe (or Khoi-Khoi) [2]
- 1.7 Parapatric speciation [2]

QUESTION 2

[9]

A rocky shore crab invades a new habitat in which it feeds exclusively on a snail species with long, thin shells that the crab can easily crush with its chelae (claws). The snail species also has a rare shell morph (short and thick) whose shells the crab struggles to break. Describe the morphological changes in both the snail and crab populations over time, and motivate what type of natural selection will take place in each species.

QUESTION 3

DNA barcoding has resulted in the unprecedented discovery of previously overlooked species. [6]
In animals, this approach requires the sequencing of a portion of a single mitochondrial gene, COI, a marker that evolves at a rate of about 1-10% per million years (depending on the taxonomic group). However, in some study systems, DNA barcoding has failed almost completely to confirm the species status of animals for which there is strong independent evidence, e.g. in the form of morphological and behavioural data. Discuss one such study system where DNA barcoding failed, and focus specifically on the reasons why it fails in this particular case.

QUESTION 4

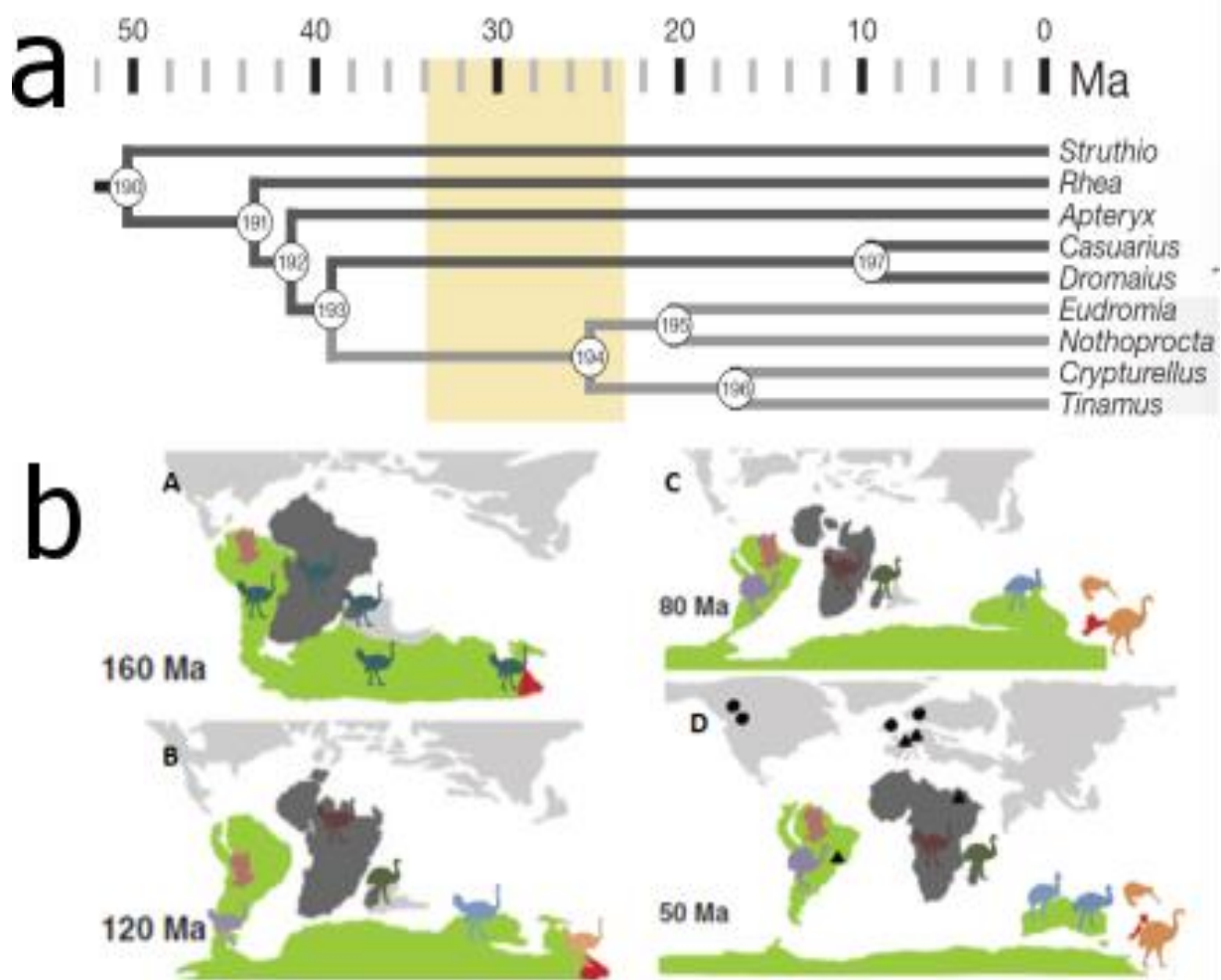
[9]

The Indo-Australian archipelago (also known as the Coral triangle, or the Indo-West Pacific) is one of the world's tropical marine biodiversity hotspots. Describe three explanations for the region's very high species richness.

QUESTION 5

[12]

The two figures below depict reconstructions of the evolution of the ratites; a) dated phylogeny reconstructed using next-generation sequencing data (Prum et al. 2015); b) hypothesized evolution of ratites resulting from Gondwanan breakup. The phylogeny in a) partly supports the Gondwanan breakup hypothesis, but there are also discrepancies between these. Discuss both support and rejection of the hypothesis in the light of the phylogenetic evidence. [Ma: Million years ago; *Struthio*: Ostrich (Africa); *Rhea* (South America); *Apteryx*: Kiwi (New Zealand); *Casuarus*: Cassowary (Australia/Papua New Guinea); *Dromaius*: Emu (Australia); *Eudromia*, *Nothoprocta*, *Crypturellus*, *Tinamus*: four genera of flying Tinamous (South America)].



Total marks [50]