

UNIVERSITY OF FORT HARE
DEPARTMENT OF ZOOLOGY AND ENTOMOLOGY
SUPPLEMENTARY EXAMINATIONS: JANUARY 2019

ZOOLOGY 324

ZOO 324

TIME: 2 HOURS

100 MARKS

Internal Examiner

Prof. E. Do Linh San

External Examiner

Dr T. McIntyre (UKZN)

Instructions to Candidates

Answer ALL questions.

Number your answers correctly using the same numbers as on the question paper.

Number of pages: 4 including cover

SECTION A (50 marks)

1. Study the graph below (and read the caption).

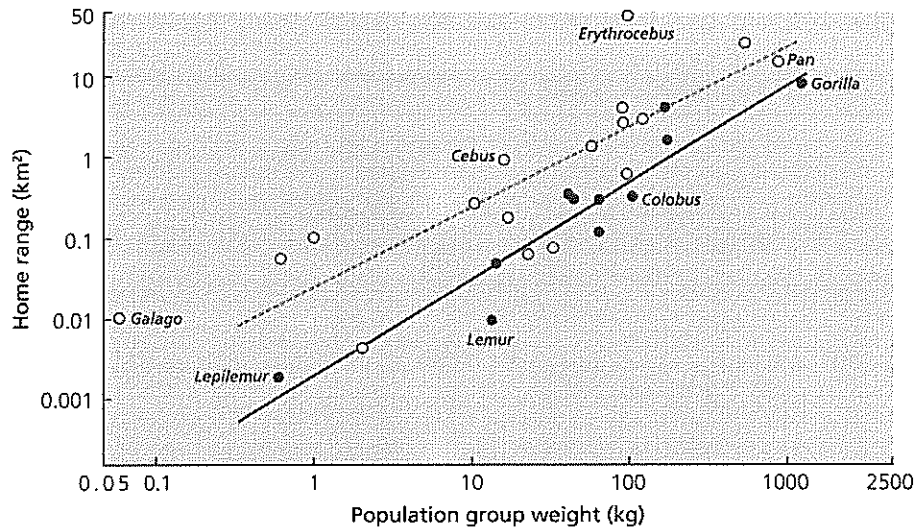
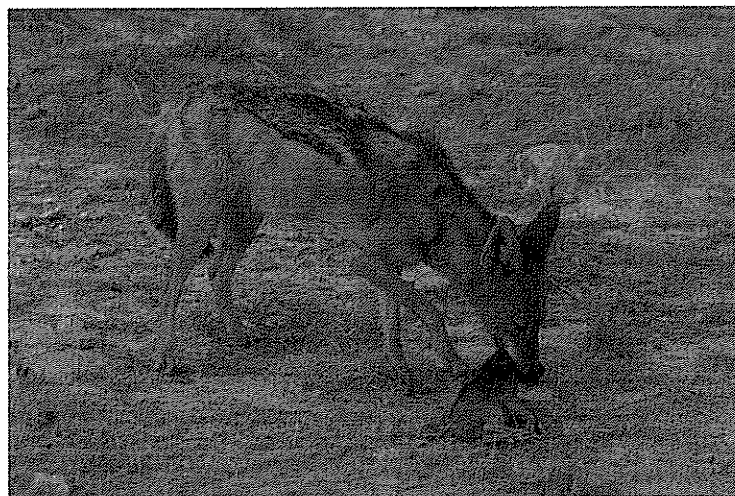


Fig. 2.5 Home range size plotted against the weight of the group that inhabits the home range for different genera of primates. The solid circles are folivores, through which there is a solid regression line. The open circles are specialist feeders (insectivores or frugivores) and the regression line through these points is dashed. Some of the genera are indicated by name. From Clutton-Brock and Harvey (1977).

- a) What are the two main scientific conclusions that can be drawn from these results? (3)
- b) What ecological factor(s) could explain the observed difference between folivores and specialist feeders. (2)

2. The picture below shows a pregnant female black-backed jackal (*Canis mesomelas*) eating a young warthog (*Phacocoerus africanus*) that was hidden by its mother in a burrow. List five possible questions linked to this behaviour and briefly mention (1–2 lines) whether, and why, each of these questions is related to a proximate or ultimate cause (or both) of this behaviour. (10)



3. Using the example of diet and social organization in African ungulates, explain how the comparative approach can be used to suggest the adaptive significance of similar or contrasting behaviours exhibited by related species. (10)
4. Why do some animals live in groups? Write an essay on the benefits of group living. You should mention and discuss in detail five different types of benefits, each time providing only one detailed example of an animal species that has clearly been shown to gain such advantages. (25)

SECTION B (50 marks)

5. A biologist, Mr Mbulelo Xalu, uses PVC traps to assess the population size of bush rats (*Otomys unisulcatus*) at his study site. This continuously breeding population contains 105 individuals in November 2018. After how many months will it have 245 rats if the intrinsic rate of increase (r) is 0.013 individuals/(individual * month)? (4)
6. As predicted by the species-area formula, a 60-km² swamp characterised by $k = 7.26$ and $z = 0.222$, is inhabited by 18 dragonfly species. Suppose that 8 dragonfly species went extinct following a drought. What is the size of the area that was lost during the drought? (5)
7. Suppose that an endangered grasshopper species survives in only eight isolated grassland patches. What is the probability for this species to persist at a regional scale over the coming year, given that the yearly probability of local extinction p_e (i.e. in one grassland patch) is 0.77? (4)
8. Imagine that a yellow mongoose (*Cynictis penicillata*) population living in a protected area is growing according to the logistic equation. If the carrying capacity of the reserve is 240 mongooses and $r = 0.26$ individuals/(individual * year), what is the maximal possible growth rate (individuals/month) for the population? (4)
9. Dr Urs Breitenmoser studied the predation of European lynxes (*Lynx lynx*) on European hares (*Lepus europaeus*) in a specific area of Switzerland. He used Lotka-Volterra equations to model the population dynamics of both species. His long-term demographic data indicated that $r = 0.18$, $q = 0.2$, $\alpha = 0.003$ and $\beta = 0.001$. During the 2017 camera-trapping census, he recorded 40 lynxes and 190 hares in his study area.

