

Size-dependent tortoise predation by baboons at De Hoop Nature Reserve, South Africa

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This paper provides the first account of chacma baboons (*Papio cynocephalus ursinus*) feeding on the angulate tortoise (*Chersina angulata*) at De Hoop Nature Reserve, Western Cape Province, South Africa. Six cases of actual predation and 10 cases of attempted predation were observed during the 13-month study. Predated tortoises were smaller than those subjected to attempted predation, with both of these groups being smaller than the population mean. Predation by baboons may be an important factor limiting tortoise population sizes at De Hoop Nature Reserve.

Amongst primates, terrestrial species are frequently cited as having the most diverse diets,¹⁻³ and this dietic diversity has been attributed to a lack of gut specializations for fermenting leaves.⁴ For *Papio* baboons, the highly diverse nature of their diet is reflected in their usual categorization as generalist omnivores,⁵⁻⁹ although this description has tended to obscure the fact that they are also highly selective feeders.⁷⁻⁹ At Mikumi, Tanzania, baboons have been recorded to take 185 species,⁸ while at Amboseli, Kenya, yearling baboons were found to eat 277 different foods.¹⁰ More typically 50 to 100 food species are recorded for individual populations,¹¹⁻¹⁴ with seeds, flowers, leaves, fruits, gums and underground roots and tubers all being consumed. Despite wide variation between sites, however, baboon diets converge in terms of nutrient composition.¹⁵

Although less widely documented, baboon diets also contain a wide variety of animal matter. Primarily, observations relate to consumption of insects and other invertebrates,⁴ although baboons are also reported to eat animal material ranging from lizards and bird eggs to small antelope (refs 13,14; Hill unpublished observations). This article describes the first known observations of chacma baboons (*Papio cynocephalus ursinus*) feeding upon the angulate tortoise (*Chersina angulata*).

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Study site and methods

The data presented are from a 13-month field study (December 1996 to December 1997) of chacma baboons at De Hoop Nature Reserve, South Africa (20°24'E, 34°27'S). De Hoop is a coastal reserve with a Mediterranean climate: mean annual temperature is 16.9 °C with an average rainfall of 428 mm per year. The vegetation is classified as coastal fynbos, and is characterized by Proteaceae, Ericaceae and Restionaceae species.

Two troops of baboons were studied intensively, with all adults individually recognized and habituated to observer presence. The data presented here are from the larger of these troops (VT), which ranged in size from 40 to 44 individuals during the study. Details of actual or attempted predation by baboons on tortoises were collected ad lib. during full-day follows. Where possible, all tortoises subject to actual or attempted predation were measured for length and width. Where only part of the carapace was recovered following actual predation, as many measurements as possible were taken. Furthermore, whenever tortoises in the general population were encountered, these were also measured. In addition to length and width, the carapace segments that were recovered from the tortoises predated were measured for the general population, so that regression

equations could be derived to generate the predicted length and width of predated individuals.

Results and discussion

Six cases of actual predation on angulate tortoises were observed during the study, all by adult baboons (3 males, 3 females). Of these it was only possible to recover three of the carapaces, and in one of these instances it was necessary to estimate the length and width of the shell through regression equations relating to the size of the recovered carapace fragment (fragment vs length: $r^2 = 0.293$, $F_{(1,29)} = 10.35$, $P < 0.005$; fragment vs width: $r^2 = 0.287$, $F_{(1,29)} = 10.06$, $P < 0.04$). A further 10 cases of attempted predation involving both adults and juveniles were observed where the baboons were unable to break open the carapace, and seven were recovered and measured. Finally, the carapace length and width of 23 tortoises from the general population were recorded.

The mean lengths and widths of the tortoises in the three categories are given in Fig. 1. No distinction was made between individuals on the basis of sex, although sexual dimorphism in body size has been reported for the angulate tortoise.¹⁶ However, since it was not possible to sex the predated tortoises, only general means are considered here. The mean carapace length for the general population was 17.81 cm, with a mean width of 10.54 cm. These values conform closely to those of other sites.^{16,17}

There were significant differences in length and width among the three categories for both carapace length and width (ANOVA; length: $F_{(2,33)} = 4.86$, $P = 0.015$; width: $F_{(2,33)} = 4.41$, $P = 0.021$) and *post hoc* comparisons revealed that in both

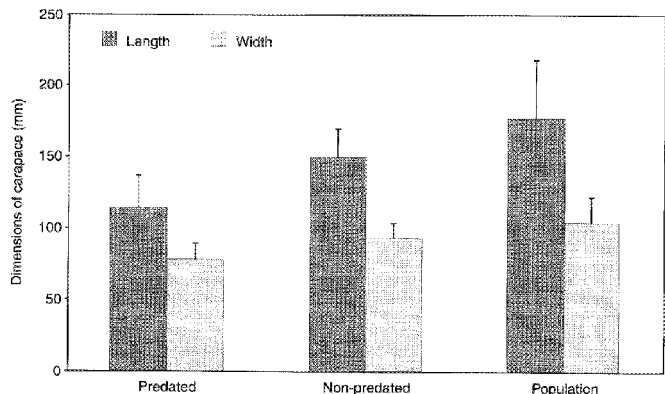


Fig. 1. Mean length and width of predated and non-predated angulate tortoises compared with a representative sample of tortoises from the total population.

cases these differences lay between the predated and general population categories (Tukey-HSD, $P < 0.03$ in both cases). Predated individuals were the smallest within a population. Moreover those individuals subject to attempted predation appeared to be smaller than the average-sized member of the population, although this difference was not significant. The probable explanation for this is that carapace thickness is likely to increase with size. When attempting to eat a tortoise, a baboon would insert its lower canines into the head opening of the carapace with the underside facing towards it. The baboon would then attempt to break open the underside of the carapace by pulling the tortoise away with its hands. Carapace thickness will obviously affect its ability to break the shell. As a consequence, baboons are only able to break open the carapaces of the smaller individuals. While baboon body size, and thus the relative strength of males and females, are likely to play a role in determining the range of tortoise sizes an individual is able to feed on, sample sizes were insufficient to examine this further.

Predation on angulate tortoises by kelp gulls (*Larus dominicanus*) on Dassen Island, South Africa, was also biased towards young tortoises.¹⁸ However, the

greater body size and strength of baboons is likely to increase greatly the size of tortoises accessible to them. As a consequence, predation by baboons may be a factor limiting population sizes of angulate tortoise at De Hoop Nature Reserve.

I thank Cape Nature Conservation, S.P. Henzi and L. Barrett for permission to work at De Hoop, and R.I.M. Dunbar, J.E. Lycett and an anonymous referee for comments on an earlier draft of the manuscript. This study was funded by a University of Liverpool studentship.

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NRF board announced

The minister of arts, culture, science and technology, Ben Ngunane, has announced the initial composition of the board of the National Research Foundation, the agency funding body formed to replace the Foundation for Research Development and the Centre for Science Development of the Human Sciences Research Council on 1 April (see Lickindorf E. 'The NRF: what's in store for researchers?' *S. Afr. J. Sci.* 94, 514-517; 1998).

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