
Vulnerability of small mammals to vertebrate predators in the Ecological Station of Itirapina, SP

Adriana de Arruda Bueno

Abstract

Prey selection studies may result in different conclusions depending on the analysed forager. Predators with different foraging modes, such as raptors and carnivorous mammals, may select different prey types. Certain prey morphological and behavioural patterns could explain selection. Predation would be favouring morphological/functional adaptations, such as inflated auditory bullae, saltatorial locomotion, use of habitat with shelters and higher activity levels during moonless nights. This kind of study is still scarce in Brazil. So, the goal of this research was the analysis of small mammal selection in the diet of three predators at Itirapina Ecological Station, SP, as well as to verify the vulnerability of small mammals in relation to hearing, locomotion, use and activity in different physiognomies during nights with varying lunar illumination.

Analysis of prey selection by the Barn Owl (*Tyto alba*) was conducted in relation to species, size, age and sex. The Burrowing Owl (*Athene cunicularia*) was studied in relation to the consumption of small mammal species, size and age. The Maned Wolf (*Chrysocyon brachyurus*) was only evaluated concerning prey species selection. Remains of bones (mandibles and pelvic girdles) found in pellets and faeces of predators were utilized to identify prey species, sex and to quantify number of consumed individuals. Analysis of prey species selection was conducted by comparisons between proportion of prey found in the diet and in environment, applying G test and Bonferroni confidence intervals. Differential sex consumption was evaluated by G test and Fisher exact test. Mann-Whitney test was employed to compare prey size in the diet and in the environment. Rodent ages found in pellets/ faeces and in the field were compared by G test. The volumes of auditory bullae were obtained by injection of water in these structures using micro-syringe. Bipedalism index (ratio between fore and hind limb lengths) was calculated to find the best potential escape response among the studied rodents. Small mammal abundance/activity in three different physiognomies was assessed by pitfall traps during full or no moon nights.

The Barn Owl was more selective than the Burrowing Owl in relation to prey species consumption, though both of them include the same small mammal species in their diets. *Calomys tener* and *Oligoryzomys nigripes* were the most preyed on rodents by the two owls. Small-sized and juvenile

individuals of *C. tener* were more consumed by the Barn Owl, whereas sub-adults were more preyed on by the Burrowing Owl. Differences may be due to foraging mode of each owl and biological characteristics of prey. Selection of smaller individuals within species may suggest predation of more vulnerable prey. So small-sized rodent selection may not result from active predation by the owls, but from higher vulnerability of these prey.

Oligoryzomys nigripes was never selected positively by any of the three predators and the Barn Owl consumed mainly juveniles in the dry season. These set of information may suggest that *O. nigripes* is a less vulnerable prey to the owls and to the maned wolf in comparison to the other rodents. Its saltatorial locomotion may explain these results. The poor hearing ability and lack of response to varying lunar illumination levels suggest a later escape response opposed to detection of predator in advance. *Calomys tener* seems to be a high vulnerable prey in Itirapina. Although it decreases activity/abundance level during full moon nights, it is the most consumed rodent by the two owls. Both hearing and locomotion are poor in relation to the other rodents. The three predators positively selected *Bolomys lasiurus*. However, its abundance was very low in the Ecological Station and further investigation on its abundance should be assessed before conclusions.

The consumption of larger prey, such as *Clyomys bishopi*, by the larger predator, the Maned Wolf, was expected. Data revealed that *Clyomys bishopi* owns the best hearing capability, but the worst escape response, according to the bipedalism index. Although it has large auditory bullae, which could be related to communication among co specific, it is the most consumed prey by the maned wolf. The low consumption of this Echymidae by the Barn and Burrowing owls may be related to its great body mass and consequently difficulties in prey handling.

Based on this study, depending on locality and differences in prey composition/abundance, predators may adopt different strategies. In the same area, resource was utilized in different manner by these predators, at least, in terms of prey proportion in the diet, size and age. Further studies using the same methodology, involving all components of trophic guilds, besides environmental variables, may better illustrate the role of each species in community. The so-called efficient escape strategies were the ones found among rodents in deserts. It may be the case in

that these morphological and behavioural characteristics may not confer less vulnerability in savannah-like environments. Besides, the lack of information about predator and prey sensory capabilities makes it difficult to interpret and test hypotheses. All these questions should be taken into account in further studies about prey selection and vulnerability.

Key-words: small mammals; predation; vulnerability; savannah

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Bueno, Adriana de Arruda

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