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Short Note

Apparent Inadequacy of Tail-Loss Figures as Estimates of Predation upon Lizards

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Introduction

Most lizards can autotomize the tail when attacked by predators (Etheridge, 1967) and Rand (1954) was among the first to use the frequency of tail loss in a lizard population as an estimate of the level of predation upon lizards (see Pianka, 1967). To date, the only evidence for this assumed relationship is that reported by Pianka (1970) who showed that tail-loss figures were higher in areas where more potential predators were observed. Pianka's assumption was that the occurrence of a greater number of predators results in more lizard/predator encounters. Although not unreasonable, this assumption does require that those areas with more numerous predators actually contain predators that eat lizards. If these predators do not prey upon lizards, or if they prey upon lizards only in negligible amounts, counting potential predators will not adequately estimate predation risk to lizards. A more adequate assessment of the relationship between lizard tail-loss and actual predation is the correspondence between tail-loss figures and the incidence of different lizard species in the diet of sympatric predators. Such data have rarely been gathered (see Jaksić et al., 1982).

Here we compare tail-loss frequencies in lizard species from Cádiz Province, Spain, with the representation of these same species in the diets of predators at the adjacent Marismas del Guadalquivir. The same predator and lizard species occur in each area and we feel that this comparison is reasonable.

Materials and Methods

Vertebrate prey in the diet of falconiforms (*Aquila heliaca, Hieraaetus pennatus, Buteo buteo, Milvus milvus, Milvus migrans, Circaetus gallicus, Falco subbuteo, Falco pere-*

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grinus, and *Falco tinnunculus*), owls (*Tyto alba, Athene noctua*, and *Otus scops*), snakes (*Elaphe scalaris, Coronella girondica, Natrix maura, Malpolon monspessulanus*, and *Vipera latasti*), and carnivores (*Genetta genetta* and *Felis lynx*) resident at Las Marismas del Quadalquivir was examined (see Valverde, 1967; Jaksić et al., 1982). Of 2663 recorded vertebrate prey items, 128 were lizards that could be identified to species. The frequency of occurrence of these lizard species as prey to this predator assemblage was 19.5% *Acanthodactylus erythrurus*, 18.0% *Lacerta lepida*, 20.3% *Podarcis hispanica*, 23.5% *Psammodromus algirus*, and 0.8% *Tarentola mauritanica*.

Specimens representing these lizard species from Cádiz Province, deposited with Carnegie Museum of Natural History (Pittsburgh, Pennsylvania), were examined and the number of regenerated and intact tails was recorded. Of the total number of specimens examined for each species (sample sizes in parentheses), percent tail losses were 27.3% in *A. erythrurus* (447), 24.6% in *L. lepida* (65), 59.3% in *P. hispanica* (81), 32.5% in *P. algirus* (169), and 54.5% in *T. mauritanica* (121). These figures were plotted against the corresponding percent incidence of each species in the diets of those predators listed above (Fig. 1). Correlation between these variables was calculated with Spearman's rank correlation coefficient, the significance of which was assessed with a two-tailed Student's *t*-test (Siegel, 1956).

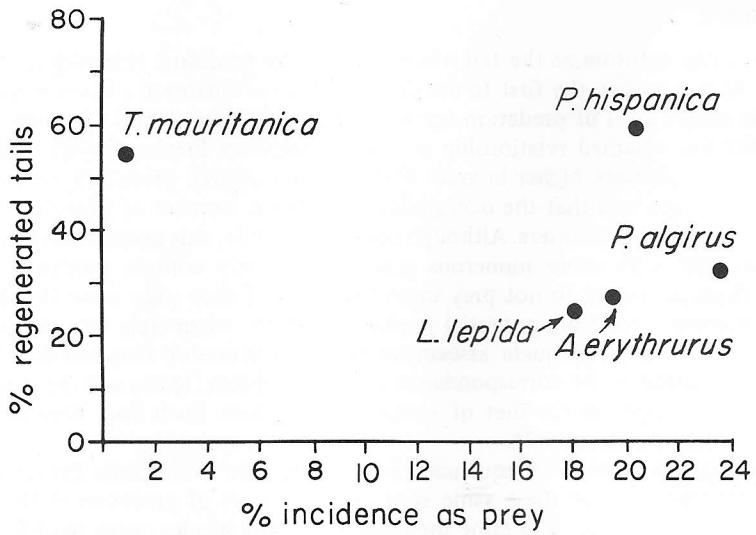

Fig. 1. Percent regenerated tails versus percent incidence as prey for local predators of five lizard species in southern Spain.

Results and Discussion

The expectation that lizard tail-loss should be directly proportional to the actual amount of known predation is not verified (Fig. 1). The correlation coefficient for these data does not differ significantly from zero ($r_S = 0.200$; $p > 0.50$). A lizard population without regenerated tails may be either a population not attacked by predators (or that, when attacked, escapes without autotomizing the tail), or a population totally unsuccessful in escaping predators in which every predation attempt results in the death of a lizard.

A fraction of tail loss within some lizard populations may, however, be the result of intraspecific agonistic encounters rather than the result of predatory encounters. Territorial populations would then, if judged solely on tail-loss figures, be mistakenly considered as subject to high predation. Without detailed empirical data on the lizards in this assemblage, the safest conclusion we can advance is that no relationship exists between a lizard species' frequency of tail-loss and its incidence as prey and we further suggest that frequency of tail-loss not be used as an estimate of predation upon lizards.

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