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Resúmenes de Tesis

Title: Structure and function of epigeic animal communities with emphasis in the lizard *Podarcis milensis* (Sauria: Lacertidae), in insular ecosystems of the Aegean.
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During this study the structure, some basic functions and certain ecological aspects of the main components of animal soil communities were studied in two typical ecosystems of the Aegean islands, in Milos: 1/ in a back-dune system (Achivadolimni) and 2/ in a Mediterranean type ecosystem (Vounalia). These communities include vertebrates, with the lacertid lizard *Podarcis milensis* being the most abundant representative, as well as invertebrates, mostly arthropoda.

In both study plots, the lizard *P. milensis* plays the most important part in the soil habitats. It is the most important predator for the arthropod fauna and together, the most abundant prey for a considerable number of higher vertebrates including the Milos viper (*Macrovipera schweizeri*).

P. milensis specimens used in this study were either collected directly from the field or provided by the Herpetological collections of the Alexander Koenig Museum und Forschungsinstitut (Bonn) and Naturhistorisches Museum of Wien. Whenever needed field specimens and preserved animals were grouped together for further analysis after being checked for differences using the appropriate statistical methods.

The study of the invertebrate fauna was carried out with the use of pitfall traps. Among the soil invertebrates, Coleoptera is the most abundant group during almost all seasons in both study sites. Especially in Achivadolimni they even reach 90% of the total invertebrate population at spring time. The dominant family is *Tenebrionidae*. From the rest of the invertebrate groups the most abundant are ants, Opiliones and Araneae. The diversity of invertebrates in the area of Achivadolimni shows strong fluctuations due to the harsh climatic conditions that prevail during the hot period of the year. The same picture holds for the evenness of the distribution of the groups. In the other area, Vounalia, the plant cover is much more extensive and the climatic conditions milder. Clustering the results to months has showed that in the back dune two seasons exist, one wet and cold and one dry and hot. At the Mediterranean-type site two additional transitional seasons are apparent. The comparison of the dominant soil fauna in the two plots revealed a clear separation only during the wet and cold season (fall/ winter). The structure of the invertebrate community in Achivadolimni is simpler and more heterogeneous than that of Vounalia. The factors responsible for this picture are the nature of the substrate and the extent of the plant cover. At the sandy substrate of Achivadolimni invertebrates have to cope with quite unsuitable conditions. On the other hand, in Vounalia the Mediterranean-type site shows less extreme conditions and more refuges.

The arthropod community is being exploited utmost by the lacertid lizard *P. milensis*, which reaches in the area of Achivadolimni the density of about 500 ind/ha, the highest that has ever been calculated for a lizard in Greece. The estimation was made using the capture-recapture method. The absence of intraspecific competition (only one other lacertid is present in the island -the much larger *Lacerta trilineata hansschweizeri*) and the trophic strategy that the species has adopted (myrmecophagy and consumption of arthropods that show aggregated distribution) seem to «allow» the species to attain such a density, although the predation pressure for the adults is quite high in that area.

P. milensis is an active forager strolling for its food. It feeds on invertebrates, mostly arthropods. The species has adopted a trophic strategy that simulates that of other insular populations of the genus *Podarcis*. It consumes ants, Hemiptera and Coleoptera (mainly of the family *Curculionidae*), meaning groups that show an aggregated distribution and are locally quite abundant, solving out in that way the problem of the poor trophic availability. Moreover its diet consists of constant proportions of plant matter (seeds), insect larvae, while cannibalism has also been detected. The trophic niche breadth for the population of Achivadolimni is 0.7 and for the population of Vounalia 0.69. The taxonomic composition differs according to sex and seasons. The greatest niche overlap between the sexes is observed during summer. Males show a general tendency to consume bigger prey items than females. However, in practice, both sexes usually consume prey items smaller than 3mm. There is a positive electivity for all prey groups mentioned except Coleoptera of the family *Tenebrionidae* which are not preferred by the lizards due to their strongly chitinized exoskeleton. Moreover all prey groups except the ants are consumed independently of their abundance in the field, a fact implying that the lizard shows a stable trophic attitude. By comparing the diet of different populations of *P. milensis* we reach the same result, meaning the dominance of ants, Hemiptera and Coleoptera (mainly other than *Tenebrionidae*). To conclude, the animals seem to select their prey according to a balanced diet as imposed by the minimum nutritional demands, including occasionally more or less different prey groups in response to the seasonal fluctuation of the trophic availability.

P. milensis remains active all year by regulating its daily activity according to the season in one (winter/ spring: unimodal pattern) or two (summer/ fall: bimodal pattern) distinct periods. The daily activity pattern differs according to sex and age. Subadults seem to be more active in general than adults. The mean annual body temperature was found to be 31 ºC. The species shows eurythermy and low activity temperatures. The mean monthly temperatures are grouped into seasons with the greatest observed during the summer period and the lowest at winter time. The efficiency of thermoregulation during summer was calculated with the application of hollow copper models and was found to be very high (E=0.94). *P. milensis* is an occasional thermoregulator presenting a flexible behavior. By carefully selecting the appropriate microhabitat and the time of activity it manages to take a great advantage of the thermic mosaic of the sandy back-dune.

The reproductive strategy of *P. milensis* exhibits some peculiarities regarding that of the other species of the genus. The species presents a clear sexual dimorphism which is expressed both on the body size and the coloration. Males attain sexual maturity when they reach the body size (SVL) of 47 mm (mean adult SVL=56.11 mm), while females attain sexual maturity at the body size of 42 mm (mean adult SVL= 49.78 mm). Both sexes achieve this body size in 13-15 months after their birth. In comparison with other species of the genus *Podarcis*, *P. milensis* has a very small clutch size (mean clutch size=1.73 eggs, range=1-3 eggs) which is accompanied by the capability to produce many clutches in a year. The lizard belongs to the small bodied species that mature early, have many clutches of relatively large offspring (SVL of newborns = 24-31mm), copulate more than two times a year and have a small life expectancy (4 years). The most important feature of its strategy is its prolonged reproductive period. Females start to copulate from January and end at the end of August according to their age and physiological state. The prevailing climatic conditions favor this extension. Females show no relation between their body size (SVL) and the clutch size or the mean egg volume, a fact implying that the species has optimized the quantity of the reproductive output. Considering its ability to reproduce more than two times a season, it appears that the most plausible mechanism for producing more offspring

is to increase the frequency of clutch production. It seems that *P. milensis* invests energy not in the number or size of the eggs but in the frequency, which depends on the length of the available reproductive season. It is believed that the lizard has adopted this quite small and invariable clutch size in order to be able to «improve» the quality of the offspring, meaning their size.

The predation pressure that the adult population of Achivadolimni suffers is very high approximating this of continental species (45.94 %). The estimation was made using the percentage of regenerated or broken tails. Tail autotomy does not differ among sex or seasons. In contrast a statistically significant difference was discovered among animals of different age (subadults present a much lower percentage of tail autotomy: 28.47 %).

Finally, a food web was constructed for the Achivadolimni back-dune. *P. milensis* plays the most important role in this ecosystem due to its high density which is followed by its great efficiency in converting energy in body mass and consequently at the secondary production. Lizards and arthropods share a common trait: they are both ectotherms. In the extreme sandy environments the greatest risk they face is overheating. Both groups avoid this by using the only available refuges in the area (rocks are absent), the bushes. We propose that the role of vegetation for the conservation of the arthropod and lizard populations of the area is vital.