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ECOLOGICAL NICHE SEGREGATION OF SEVEN SYMPATRIC LACERTID LIZARDS IN THE PELOPONNESE HIGHLANDS

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Mayer, W. & Beyerlein, P.: Ecological niche segregation of seven sympatric lacertid lizards in the Peloponnese highlands. Nat. Croat., Vol. 8, No. 3., 339–344, Zagreb, 1999.

All seven lacertid species recorded in the Peloponnese can be found in a very small area in the Arcadian highlands on the Peloponnese peninsula. Only one example of such unique diversity in such a small area has been described in the Mediterranean region before.

This density requires the occupation of different restricted ecological and ethological niches by all seven species and therefore the habitats have to be diverse. Niche segregation, ecological demands and the ethological differences between the species are discussed in relation to this habitat diversity.

Keywords: Lacertidae, *Lacerta, Podarcis, Algyroides,* Greece, ecology, ethology, niche segregation

Mayer, W. & Beyerlein, P.: Raspodjela ekoloških niša između sedam simpatričkih lacertidnih gušterica u Peloponeškom gorju. Nat. Croat., Vol. 8, No. 3., 339–344, Zagreb, 1999.

Svih sedam lacertidnih vrsta zabilježenih za Peloponez mogu se naći na vrlo malom području u Arkadijskom gorju na poluotoku Peloponezu. Dosad je na području Sredozemlja poznat samo jedan primjer takve jedinstvene raznolikosti na tako malom prostoru.

Takva gustoća zahtijeva zauzeće različitih ograničenih ekoloških i etoloških niša sa strane svih sedam vrsta i zbog toga staništa moraju biti raznolika. U radu se raspravlja o toj podijeljenosti niša, kao i o ekološkim zahtjevima i etološkim razlikama među vrstama, u odnosu na raznolikost staništa.

Keywords: Lacertidae, *Lacerta, Podarcis, Algyroides,* Grčka, ekologija, etologija, raspodjela niša

INTRODUCTION

Today, about 45 lacertid species live in the part of Europe west of the border of the former Soviet Union. The highest numbers of species can be found on the Iberian peninsula (about 17 species) and on the Balkan peninsula (about 19 species),

while on the south and central Italian mainland only three species can be found altogether. In spite of the dominating role of Lacertidae in Mediterranean herpetosocieties a sympatric occurrence of more than five species is very rare. ARNOLD (1987) describes sympatry of seven species near Gacko in Bosnia-Herzegovina.

Usually, the foraging strategies of lizards are classified into the »sit and wait« or »widely foraging« types (PIANKA, 1966). These two forms enable the coexistence of two species with the same activity period and similar prey in the same area and thus may cause an increasing species diversity in this area.

While the Feneos basin was being mapped, seven lacertid lizard species were recorded within an area of less than 100 km² five different species being registered in areas of less than five hectares (MAYER *et al.*, 1990).

This area can be found on the Greek Peloponnese peninsula in the Corinth prefecture near the borders with Arcadia and Achaia. The basin shows no drainage above ground. It is drained by the Olvios River, which flows southwards, and which fed a lake in the southern part of the basin until 1890 or later (PHILIPPSON, 1891) – today it runs out through a karst hole at a height of about 700 m above sea level.

The Olvios River has only one important tributary, which rises in the Mt Durduvana region and flows into the Olvios south of Feneos village. Since no name was established for it, in the sequel it will be referred to as the Durduvana brook (see Fig. 1).

The valley bottom (700 – 900 above sea level) is used as pasture and farmland; only along the brooks and in a small area south of Feneos do small forest relicts exist, consisting mainly of planes (*Platanus orientalis*), oaks (*Quercus fraineto*, *Q. pubescens*), poplars (*Populus* spec.), and black pines (*Pinus nigra*).

MATERIALS AND METHODS

We investigated the area during seven different visits in the months of May, June and July, between 1988 and 1995. Habitat preferences as well as hunting strategies were ascertained. *Podarcis erhardii* only lives in a very small range within the area. Though this species occurs together with four other lacertids at several places in this area we have only incomplete data concerning it and therefore have restricted our report to the other six species in two small investigation sites less than five hectares in area each:

1. Durduvana valley south of Feneos: sparse riverine forest with adjoining temporary water meadow, road embankment and edge of the forest on the adjoining slope.

2. Olvios drain north of Mati: steep limestone rocks and meadow on the ancient lake ground.

Since we do not agree with BÖHME's argumentation concerning *Podarcis'* male gender (1997), we list these species with their female names as usual up to now (see MAYER, 1998).

RESULTS

Five different species could be recorded from each of the two observation sites. In the Durduvana valley we found *Lacerta trilineata*, *Podarcis peloponnesiaca*, *P. taurica*, *P. muralis*, and *Algyroides moreoticus* and north of Mati we found *L. trilineata*, *L. graeca*, *P. peloponnesiaca*, *P. taurica*, and *Algyroides moreoticus.* Habitat needs and foraging strategies are characterized as follows:

L. trilineata: inhabitant of open grassy or stony habitats with bushes. No specialized foraging behaviour.

L. graeca: rock climbing lizard. No specialized foraging strategy.

P. peloponnesiaca: inhabitant of mainly stony, often sloping habitats. Usually »sit and wait« hunter.

P. taurica: typical meadow inhabitant. »Widely foraging hunter«.

P. muralis: In valley sites, an inhabitant of humid-cool habitats, in riverine woods in the trees, on humid slopes, ground-dwelling. Foraging mode variable.

Algyroides moreoticus: inhabitant of bushy areas. Typical »widely foraging hunter« in deep leaf litter.

Near the Olvios drain *L. graeca* inhabits the steep limestone rocks; juveniles are also found on the rocky ground on larger stones. *P. taurica* lives on the adjoining flat meadows. In the border zone of these two main habitat types, between fallen rocks and stones and small bushes (especially *Phlomis* spec. and *Rubus* spec.) these species come into contact with each other, and also with *P. peloponnesiaca*, *L. trilineata* and occasionally *A. moreoticus*.

At the Durduvana valley investigation site *L. trilineata* and *A. moreoticus* live on the sparse riverine forest ground, *P. muralis* is a tree-dweller, and *P. taurica* is a ground-dweller in the meadows. Although the sparsely vegetated road embankment is dominated by *P. peloponnesiaca*, its humid herbaceous zones are inhabited by *P. muralis*; *P. taurica* can be found directly on the roadside only. On a small slightly sloped wood-lined meadow, pine trunks have been piled for several years. Here, *P. peloponnesiaca* mainly can be found on the trunks and *P. taurica* on the meadow, while *L. trilineata* and *A. moreoticus* inhabit the forest edge. While *L. trilineata* uses the whole meadow as food territory, *A. moreoticus* only hunts in the leaf litter.

A scheme of the microhabitat distribution of the six species is shown in Fig. 2.

DISCUSSION

Though all Mediterranean lacertids are described as »widely foraging« hunters (ARNOLD, 1987) and though ARNOLD highlights *Podarcis peloponnesiaca* as one of them in the neighbouring Stymphalic basin, this species shows itself to be a typical »sit and wait« strategist everywhere in the investigation area. Two species (*P. taurica* and *A. moreoticus*) in fact are »widely foraging« hunters, the other ones (most likely *P. erhardii*, too) showing no particular specialization. In this respect *P. muralis* is ex-

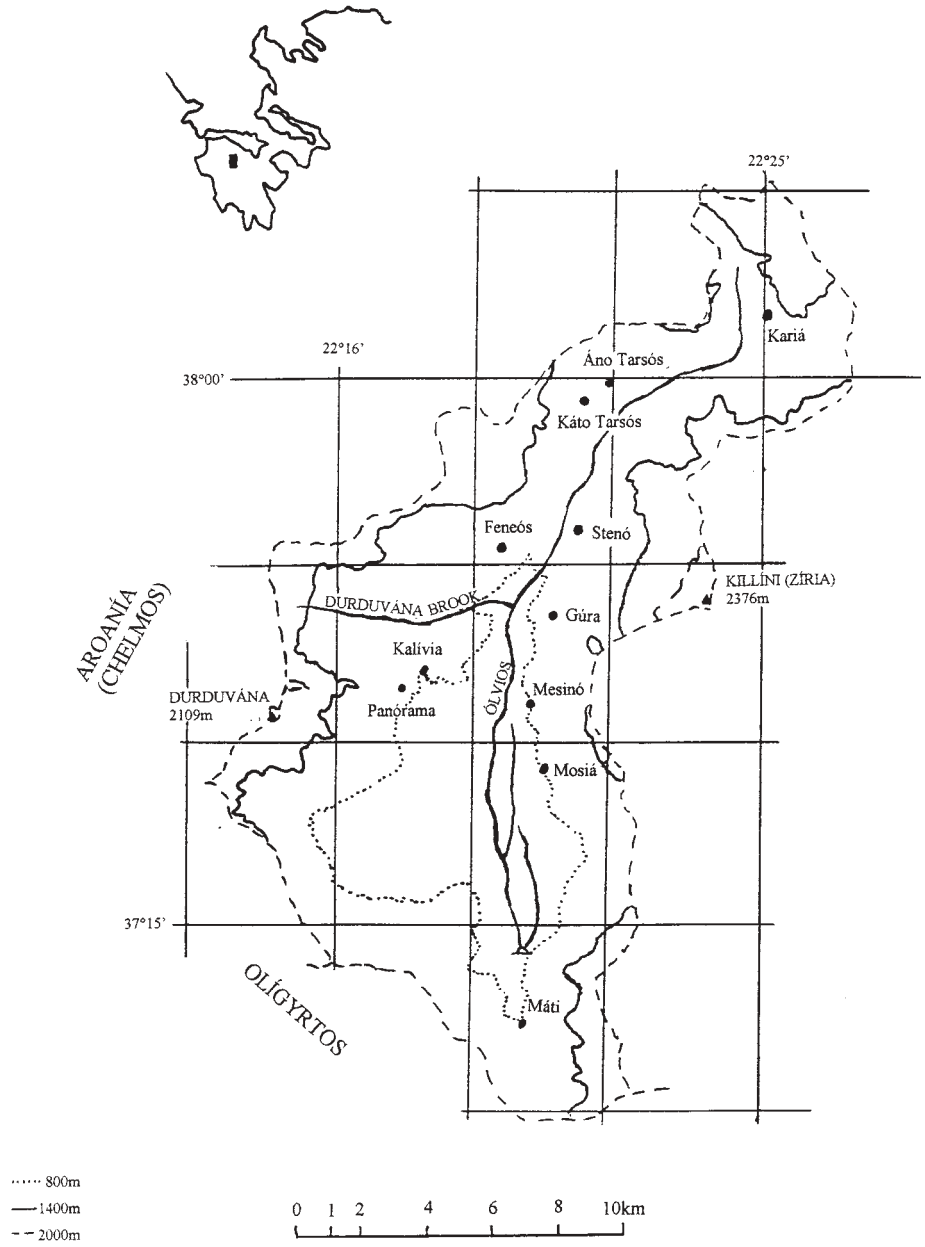

Fig. 1. Map of the Feneos basin

tremely adaptable. Thus, it turns out to be »widely foraging« when found syntopically with the »sit and wait« hunter *P. peloponnesiaca*, and to be a »sit and wait«

strategist when in competition with *P. taurica*. These observations could also be supported by analyses of stomach contents (RICHTER & MAYER in prep.): *P. peloponnesiaca*, living on the road embankment, and *P. muralis*, from the riverine forest, being revealed to feed on very similar prey.

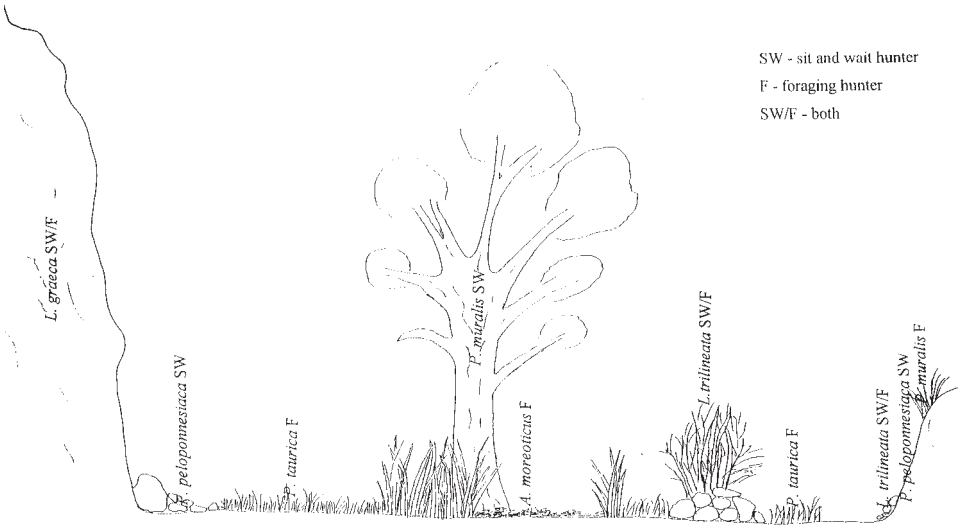

Fig. 2. Habitat use and niche segregation of different lizard species

Considering the species' differences in size and therefore assigning particular niches to the very large *L. trilineata* and to the very small *A. moreoticus*, at least four (or five, including *P. erhardii*) different lacertid species of one size class live together in possible competition in the Feneos basin. This competition is avoided partly by different habitat preferences, partly by different foraging strategies. Caused by the high diversity and the high competition pressure within this region the different species' ecological niches seem to be much closer than in other regions, which could be an interpretation of the differences found between ARNOLD's (1987) and our results.

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APPENDIX

An EU-financed construction of a storage-lake in the Durduvana valley investigation site caused its total devastation in 1995.