**Studies in Herpetology, Roček Z. (ed.)** | **pp.** 455 - 458 | **Prague 1986**

# Ecological Comparison of *Lacerta viridis* and *L. agilis*

Zoltán KORSÓS

Zoological Department, Hungarian Natural History Museum,
Baross u. 13., H-1088 Budapest, Hungary

One of the central aims of ecology is to clarify the reasons for the coexistence of various organisms. Niche theory is a favorized framework for such investigations /Vandermeer, 1972/, because of its operative usefulness for studying the relationship between the tolerance of the populations and their complementary environment. However, there are several other ecological phenomena which may play important roles in the sympatry of the species. In the following, a short survey of the niche relationships of two populations of Lacerta viridis and L. agilis is given, with results on their growth, age structure and home range.

## MATERIALS AND METHODS

The study area, selected for the two years' investigations, is situated near Gödöllö, Hungary, in a hillside Scotch pine plantation. The lizards were marked by toe-clipping, then measured, and at each capture site the measurements of environmental variables were recorded. Stomach contents have also been studied for estimating the food of the lizards. Niche overlap values of each resource set were calculated by means of Schoener's measurement /Schoener, 1968/. Home range sizes were estimated by the convex polygon method /Rose, 1982/.

## NICHE SEGREGATION

A discriminant analysis was performed on the microclimatic variables including the soil and air temperature and measurement of light exposure /Fig. 1/. Regarding the relative frequency distributions of discriminant scores of these environmental variables, the value of Schoener's overlap between the populations of Lacerta viridis and L. agilis has been found as 63.5 %. Although it was presumed that the microdistribution of the lizards on the study area might be affected by the different vegetational densities, it has been shown that the relative frequency distributions of the two species do not differ significantly /overlap value 74.1 %/.

Much more remarkable is the divergence of the daily activity rhythms of the two populations /Fig. 2/. The activity diagrams compiled separately for the spring and the summer periods show almost the same situation: L. agilis has a unimodal activity, and appears earlier in the morning, while L. viridis has two foraging peaks before and after the maximum of the other species. However, L. viridis extends his activity further into the late afternoon, especially during the summer. The overlaps between the foraging rhythms of the two populations as regards the seasons are 69 % and 59.3 % respectively.

Despite other works /e.g. Rose, 1976/ segregation of food seems, in our case, the most important distinctive factor. On the basis of stomach content analysis the overlap between the prey size categories appeared as 35.2 %. Considering the food composition by prey taxa the overlap between the two species is even lower: 18.5 %. Further details have been published elsewhere /Korsós, 1984/.

## GROWTH, AGE STRUCTURE AND HOME RANGE

The change of tail length/snout-vent length ratio during the ontogeny of the two lizard species is represented in Fig. 3. In the case of L. viridis there is a logistic curve with equation $y = 0.6 \log x + 0.8$. The growth of L. agilis has a negative parabolic shape. It has a maximum in the subadult age group, and then declines to the same value as that in the hatchlings. It is usually accepted that the relative length of a lizard's tail might have an important role in its locomotion /Vitt, 1983/. In respect of the different life histories of L. viridis and L. agilis, the greater ability of adult green lizards for moving quickly on twigs as well as on the soil surface seems supported by their higher value for the quotient of tail length to snout-vent length.

The age structure of the two lizard populations has been compiled on the basis of the snout-vent length /SVL/ measurements. Three age groups could be recognized /Fig. 4 /: the subadults with 30-50 mm SVL, the adults with SVL over 70 mm and the hatchlings. The lizards of this latter group, having been born in August and September, were excluded from Fig. 4. The measurements of the specimens belonging in the two age groups are displaced in the summer toward the greater length values. The members of the subadult group have hibernated only in their first winter, compared with the adult twice or more times. The two lizard populations have the same age structure, except that in L. agilis the length measurements are somewhat shorter than in the other species.

Home range sizes of the two species has been calculated as follows:

L. viridis $61.6 \pm 7.5$ $m^2$
L. agilis $34.9 \pm 10.9$ $m^2$

Unfortunately, the number of sightings were very low /3-4/, so the real home range sizes presumably exceed the estimated values /Rose, 1982/. This is supported by the comparison with the reciprocal densities of the lizards in the study area /Korsós, 1984/:

L. viridis 125 $m^2$
L. agilis 62.5 $m^2$

Hence the real value is between these limits and this accords with literature /Strijbosch et al., 1983; Peters, 1970/. However, in further studies it is necessary to take into consideration the social behaviour of these lizards which might have a significant influence on the home range sizes. On the other hand, it would be very interesting to compare these sympatric populations with the ecological peculiarities of other allopatric lizard populations. The study of character displacement may contribute to the clarifying of the real values of the various factors decreasing competition.

## ACKNOWLEDGEMENTS

I would like to thank Dr. O. Gy. Dely for introducing me to herpetology. I am much indebted to Dr. A. Demeter for his continuing helpful advice during the whole study.

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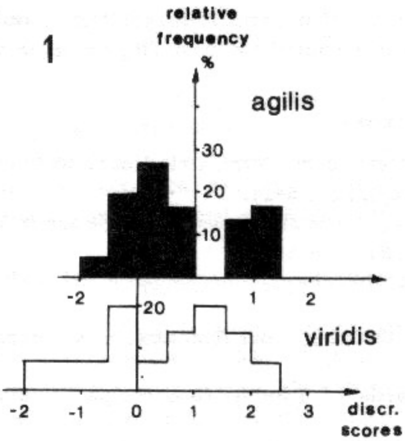

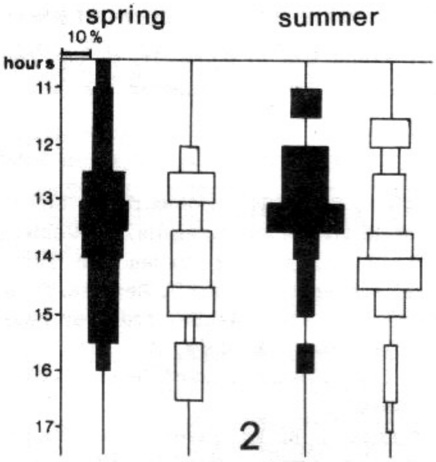

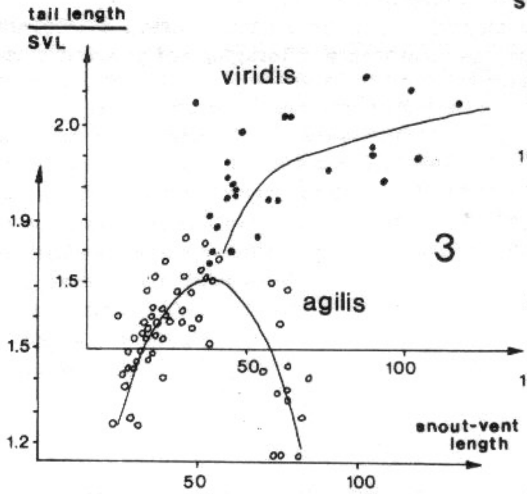

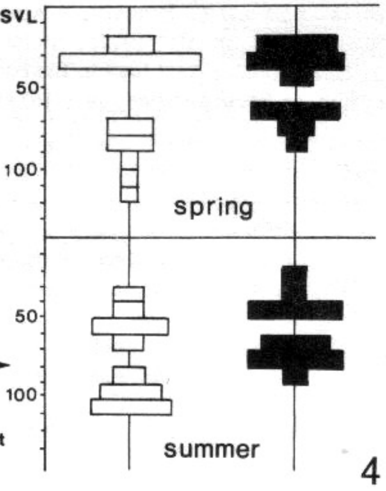

Fig. 1: Frequency distribution of discriminant scores of the microclimatic variables. Fig. 2: Daily activity rhythms of the two species. Fig. 3: Quotient of tail length to snout-vent length plotted against snout-vent length in a linear co-ordinate system. Fig. 4: Age structure based on snout-vent length /mm/, compiled for two periods of the year. ■ Lacerta agilis, ☐ L. viridis.