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

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One of the central aims of ecology is to clarify the reasons for the coexistence of various organisms. Niche theory is a favored 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 Gödöllő, 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 overlap between the foraging
rhythms of the two populations as regards the seasons are 69% and 59.3% respecti-
vely.

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 composi-
tion 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 ex-
cluded 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 sub-
adult 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 ± 7.5 m²
- **L. agilis** 34.9 ± 10.9 m²

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 m²
- **L. agilis** 62.5 m²

Hence the real value is between these limits and this accords with literature /Strij-
bosch 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.
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REFERENCES

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.