Parapatry of two lizard species (Podarcis muralis, Lacerta bonnali) at Circo de Piedrafita (Alto Aragón, Pyrenees, Spain)

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Parapatrische Verbreitung von zwei Eidechsenarten (Podarcis muralis, Lacerta bonnali) im Bereich des Circo de Piedrafita (Alto Aragón, Spanische Pyrenäen)


At medium altitudes (above 1,100 m a.s.l.), the predominant lizard species in the Pyrenean mountain range is Podarcis muralis (Martínez-Rica 1979). Its highest enclaves, according to this author, is «Lac de Port Bleu» at 2,280 m (probably an incorrect spelling, corresponding to a lake at 2,280–2,300 m altitude on the Spanish map near Port Vell, W of Andorra, near the Spanish/French/Andorran border). At high altitudes, P. muralis is replaced by largely isolated populations of three alltopatic and closely related lizard species, Lacerta bonnali, L. arnicas and L. aureliai (Arribas 1995a, 1995b, 1994c). In the Monte Perdido massif, L. bonnali occurs between 2,280–2,400 m altitude (Martínez-Rica 1979). It is known to occur up to 2,750 m (Arribas 1994d) or 2,900 m (Martínez-Rica 1979).


Circo de Piedrafita is a plateau between 2,120 m (dam of Respomuso) and ca. 2,500 m altitude, inclosed by higher mountains reaching 3,151 m altitude (Balaítoos peak), in the alpine domain and in the limits of the subalpine domain of the Aragonese Pyrenees in Huesca province, Spain. Geologically, soils are mainly granitic. We carried out field observations during four visits to the area, in June 1995 (MV), July/August 1996 and 1997 (AP, JR, AR) and August 1997 (AP, MV). The most intensive samplings were carried out from 15. July to 10. August 1996. Total person-hours spent in intensive lizard searching are 75, referring to a total of about 80 lizard sightings. Lizards were recorded exclusively on rocky (granitic) sites on S- and SW-exposed slopes and plains, as schematically shown in fig. 1. No lizards at all were recorded on the largely shaded slopes (E-, NE-, No-, and NW-exposure) opposed to those figured. P.
Muralis was recorded at two separate sites (here called PM1 and FM2). PM1: Slopes above the Aguas Limpias brook, up to an altitude of 1,940 m on the S-exposed slope. FM2: 100 m section of the path from the dam to the Respomuso refuge, at an altitude of 2,160–2,200 m. UTM grid 30YN2144. L. bohni was recorded at three separated sites (LB1–3). LB1: Path between de Arriel to Respomuso, 2,140–2,280 m altitude. UTM grids 30YN1944 and 30YN2044. LB2: Pico del Cristal slopes, between the cliff of Respomuso and Ibón de Ranas, 2,140–2,260 m altitude. UTM grids 30YN2144 and 30YN2244. LB3: Pico del Cristal slopes from Ibón de Ranas to Campodolano, 2,260–2,280 m altitude. UTM grid 30YN2244. A larger transect section (about 200 m) not populated by lizards was interpolated between PM1 and LB1, whereas FM2 bordered sharply to LB2 and LB3, with a nearest distance between specimens of both taxa of ca. 30 m. No area of sympatric occurrence of both species, and no inter specie behavioral interactions were observed.

Fig. 1: Profil des Circo de Peñamita, from the Ibón de Raza to the Aguas Limpias brook. Distribution of Lacerta bohni (L) and Podarcis muralis (P) is schematically plotted on the sun-exposed slopes of the figured peaks. Plotted areas correspond to those described in the text (PM1–3 and LB1–3). Approximate altitudes and distances are expressed in meters. For exact altitudes and UTM grids see text. No lizards were recorded on the slopes opposite to those shown (E-, NE-, N-, and NW-exposed). Approximate direction and incidence of valley and Riba winds is shown by white arrows.

The overall distribution of lizards in the study area is clearly explained by temperature, caused by daily amount of solar radiation (only S- or SW-exposed slopes populated). No definite explanation for the parapatric distribution of both taxa is known.
Evidence may be found in the future by detailed analysis of microclimatic conditions caused by different winds shown in fig. 1. (1) Valley wind daily rises from the Aguas Limpias valley to the slopes of the Baloñais as indicated by direct observations and records of the Responmoso meteorological station during four years (at average, only two to four days per month winds of contrary direction are recorded; A. Martí, pers. comm.). Site PM1 is largely influenced by this wind. At higher altitude, it continuously loses strength. Passing the Responmoso reservoir it is probably charged with additional humidity which affects site PM2 as indicated by the occurrence of single deciduous trees otherwise absent from Circo de Piedrafita. (2) Fohn winds commonly descend along parts of the S-exposed slopes as indicated by direct observations and typical banya-shape of trees (Pinus uncinata), where present. Occurrence of Festuca grasses in the areas of major incidence (corresponding to LBI) shows that these winds are hot and dry as typical for Fohn.

The temperature and humidity effects caused by Fohn and valley winds may be decisive direct factors for lizard survivability, or they may indirectly influence food availability and density as well as habitat structure. If a direct influence should exist, then P. murielli seems to be better adapted to humid plots, whereas L. bonalli prefers drier zones.

References


