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Nesting and over-wintering sites of Aesculapian snake, *Zamenis longissimus*, in an anthropogenic landscape in the northern extreme of its range

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A relict population of the Aesculapian Snake (*Zamenis longissimus*) survives almost 300 km north of a contiguous distribution area in the northwest of the Czech Republic (Edgar and Bird, 2006) (Map reference: 50°19´57.168´´N, 13°2´28.835´´E; 350 - 450 m.a.s.l.). It has been long hemmed in by the presence of humans but has adapted to anthropogenic structures, in particular compost heaps, low stone walls, agricultural buildings, road culverts and the embankments of roads and railways. In the area of study, small villages and farm buildings are situated along a busy asphalt road that is lined by low stone terraces and undercut by culverts. During June 2007 we radio-tracked two adult females and four males *Z. longissimus* to investigate their selection of nesting and over-wintering sites.

It is probable that the primary substrate selected by *Z. longissimus* for oviposition is rotting wood and stumps of old trees, with some sites subject to mass egg-laying and containing up to 130 eggs, but in human altered landscapes alternative ovipostion sites may be selected (Gomille, 2002). The first female we tracked laid her eggs under the middle of the roadway near the culvert passes under it. A second female laid her eggs in a garden compost heap, where several other clutches and old shed skins were also observed. Egg-laying by *Z. longissimus* in garden compost heaps has been recorded previously (Schultz, 1996; Rugiero et al., 2002). Similarly in the case of *Natrix natrix*, in climatically less favourable areas, heat-generating compost or manure heaps may be used as oviposition sites (Madsen, 1984; Zuiderwijk et al., 1993). This confers advantages of greater hatch rates, earlier hatching, and larger hatchlings with enhanced locomotory performance (Löwenborg et al., 2010). The use of road structures for egg laying by snakes is not exceptional (Schlaepfer et al., 2002; Guiller, 2009; Lelievre et al., 2010) and in our study area a communal egg-laying site was observed on the abutment wall of the road (Figs 1 & 2).

Despite the great range of natural and semi-natural habitats in their home ranges all tagged snakes except one over-wintered in man-made structures. One inside a stonewall near a house, a second actually inside a house,

Figure 1. Photograph showing the abutment wall of the road, which is a frequently used egg-laying site. (Photograph, Radovan Vita)

Figure 2. Photograph showing three *Z. longissimus* entering and exiting the egg deposition site shown in Fig 1. A female was observed basking daily between 6 and 30 June at the entrance with egg-laying occurring on 28 June in the same cavity. Basking was occasionally observed alongside two other gravid female *Z. longissimus* and also on several occasions with a female grass snake, *N. natrix*. (Photograph, Karel Janousek)

and three others inside dilapidated stone walls situated in the middle of semi-natural habitats. The female that laid eggs in the compost heap was killed in the autumn by a bird of prey while at the compost heap, consequently her over wintering site was not determined. This note suggests that *Z. longissimus* is able to benefit from human presence, and even from such potentially hostile man-made structures as culverts and abutment walls of roads.

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